Online Journal of Public Health Informatics

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Roles of Health Literacy in Relation to Social Determinants of Health and Recommendations for Informatics-Based Interventions: Systematic Review

Abstract

Colleagues, I am delighted to present to you the summary abstracts and presentations from the 2019 International Society of Disease Surveillance (ISDS) Conference which was held San Diego, CA from January 30th – February 2nd, 2019. Over the past several years, the concept of investing in data science and data scientists has been touted as a transformational endeavor for governmental organizations, non-profits, as well as private sector and commercial markets. How "true" data science is harnessed to influence and improve public health surveillance and population health remains to be seen. Data science has great potential to provide a new lens to inform and improve public health surveillance and population health. However, this lens needs to focus upon more than just "Big Data" analytics and information technology. It must also focus on fostering organizational environments and multi-agency collaborations that invigorate curiosity and experimentation and development of cross-disciplinarian partnerships to address multifactorial and multidimensional health and disparity challenges. It also must hone in on producing evidence-based analytic results to improve measurable health outcomes. Analysis and summary results are not the end products for surveillance. The concept of data science needs to be leveraged across public health to better communicate the findings of disease surveillance through the "storytelling of illness and disease" to influence public health policy, and ultimately improve population health. This year, with these ideas in mind, and with the support of a dynamic, engaged, and multi-disciplinary Scientific Planning Committee (SPC) - ISDS has expanded its conference scope beyond traditional tracks which historically focused on surveillance, informatics, and analysis, to include tracks related to: One HealthNon – Human Health SurveillanceEcologyCommunications, Medical Rhetoric, Visualization, and ReportingChronic Disease / Mental HealthSubstance AbuseData QualityInjury SurveillanceSubstance Abuse – Opioid SurveillanceRecognizing that Public Health is a collaborative and multi-disciplinary team sport, we have expanded our outreach efforts to include new partners across academia, the private sector, state, local, and tribal partners, as well as federal agencies. During the 2019 ISDS Conference, we had a significant increase in overall attendance (~375) and abstracts submissions compared to prior years; with 29 countries represented and 130 oral presentations and 95 poster presentations provided over the three-day conference. We held a number of sessions on Opioid Use and Prescribing Surveillance as well as Medical Rhetoric, Communications, and Visualization that were standing-room only and beyond. Our keynote speakers on the intersection of Data Science and Public Health included: William J. Kassler, MD, MPH, IBM Watson Health – Deputy Chief Health Officer Wilma J. Wooten, MD, MPH, Public Health Officer for the County of San Diego Michael Hogarth, MD, FACP, FACMI, Chief Clinical Research Information Officer for University of California San Diego Health Some of the key take-aways from the presentations at the 2019 ISDS Conference were that data science and the act of data collections and analysis are NOT the end goals of public health surveillance; they are just the beginning. Data do NOT speak for themselves; they require context, curation, interpretation, and ultimately need to effectively communicating findings through the story telling of illness and disease to officials, policy makers, and the public with the objective to inform and influence public health policy, motivate health behavior change, drive public health action, and ultimately improve population health. I encourage you to review the abstracts submitted here in the Online Journal of Public Health Informatics which were presented at the 2019 International Society for Disease Surveillance 2019 Conference and to engage multi-dimensional and multi-disciplinary conversations (reach out directly to authors and presenters) around these important topics, expand your networks and opportunities in the public health community. Regards, Peter Hicks, MA, MPH Scientific Program Chair International Society for Disease Surveillance (ISDS) 2019 Centers for Disease Control and Prevention* *Information included in this statement are those of the author and do not represent the official position of the Centers for Disease Control and Prevention (CDC)

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Roles of Health Literacy in Relation to Social Determinants of Health and Recommendations for Informatics-Based Interventions: Systematic Review

Abstract

Objective Emergency department (ED) visits related to mental health (MH) disorders have increased since 2006 (1), indicating a potential burden on the healthcare delivery system. Surveillance systems has been developed to identify and understand these changing trends in how EDs are used and to characterize populations seeking care. Many state and local health departments are using syndromic surveillance to monitor MH-related ED visits in near real-time. This presentation describes how queries can be created and customized to identify select MH sub-indicators (for adults) by using chief complaint text terms and diagnoses codes. The MH sub-indicators examined are mood and depressive disorders, schizophrenic disorders, and anxiety disorders. Wider adoption of syndromic surveillance for characterizing MH disorders can support long-term planning for healthcare resources and service delivery. Introduction Syndromic surveillance systems, although initially developed in response to bioterrorist threats, are increasingly being used at the local, state, and national level to support early identification of infectious disease and other emerging threats to public health. To facilitate detection, one of the goals of CDC's National Syndromic Surveillance Program (NSSP) is to develop and share new sets of syndrome codes with the syndromic surveillance Community of Practice. Before analysts, epidemiologists, and other practitioners begin customizing queries to meet local needs, especially monitoring ED visits in near-real time during public health emergencies, they need to understand how syndromes are developed. More than 4,000 hospital routinely send data to NSSP's BioSense Platform, representing about 55 percent of ED visits in the United States (2). The platform's surveillance component, ESSENCE,* is a web-based application for analyzing and visualizing prediagnostic hospital ED data. ESSENCE's Chief Complaint Query Validation (CCQV) data source, which is a national-level data source with access to chief complaint (CC) and discharge diagnoses (DD) from reporting sites, was designed for testing new queries. Methods We used ESSENCE CCQV to query weekly data for the nine week period from the first quarter of 2018 and looked at three common MH sub-indicators: mood and depressive disorders, schizophrenic disorders, and anxiety disorders. We developed four query types for each MH sub-indicator. Query-1 focused on DD codes; query-2 focused on CC text terms; query-3 focused on a combination of CC, DD, and no exclusion for mental health co-morbidity; and query-4 focused on a combination of CC and DD and excluded mental health co-morbidity. We also examined the summary distribution of CC texts to identify keywords related to MH sub-indicators. For mood and depressive disorders, we queried ICD-9 codes 296, 311; ICD-10 codes F30–F39; CC text terms for words "depressive disorder," bipolar disorder," "mood disorder," "depression," "manic episodes," and "psychotic." For schizophrenic disorders, we queried ICD-9 codes 295; ICD-10 codes F20–F29; CC text terms for words "psychosis," "psychotic," "schizo," "delusional," "paranoid," "auditory," "hallucinations," and "hearing voices." For anxiety disorders, we queried ICD-9 codes 300, 306, 307, 308, 309; ICD-10 codes F40–F48; CC text terms for words "anxiety," "anexiy," "aniety," "aniexty," "ansiety," "anxety," "anxity," "anxiety," "phobia," and "panic attack." Results We identified 2.3 million average weekly ED visits for the 9-week period queried. Table 1 shows average weekly ED visits of select MH sub-indicators from the four query types. Because query 4 focused on specific MH outcomes and excluded MH co-morbidities, the average weekly ED visit for all three sub-indicators was almost half that of query 3, which focused on broader concepts by including MH co-morbidities. Among mood and depressive disorders, query 4 identified on average 23,352 ED visits per week versus 45,504 visits per week for query 3. Similarly, for schizophrenic disorders and anxiety disorders, query 4 identified on average 4,988 and 32,790 visits per week compared with 9,816 and 53,868 visits, respectively, for query 3. Further, more MH-related visits were identified using the DD-coded query (query 1) than CC-based text terms (query 2). Conclusions Analysts can benefit from having queries on select sub-indicators readily available and can use these to facilitate routine MH-related monitoring of ED visits, or customize the queries by including local text terms. Consistent with our previous work (3), this analysis demonstrated that MH-related ED visits are more likely to be found in DD codes than in CC alone. * Electronic Surveillance for the Early Notification of Community-based Epidemics References [1] Weiss AJ, Barrett ML, Heslin KC , Stocks C. Trends in Emergency Department Visits Involving Mental and Substance Use Disorders, 2006–2013. HCUP Statistical Brief #216 [Internet]. Rockville (MD): Agency for Healthcare Research and Quality; 2016 Dec [cited 2018 Aug 14]. Available from: http://www.hcup-us.ahrq.gov/reports/statbriefs/sb216-Mental-Substance-Use-Disorder-ED-Visit-Trends.pdf. [2] Gould DW, Walker D, Yoon PW. The Evolution of BioSense: Lessons Learned and Future Directions. Public Health Reports. 2017 Jul/Aug;132(Suppl 1):S7–S11. [3] Dey AN, Gould D, Adekoya N, Hicks P, Ejigu GS, English R, Couse J, Zhou H. Use of Diagnosis Code in Mental Health Syndrome Definition. 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Roles of Health Literacy in Relation to Social Determinants of Health and Recommendations for Informatics-Based Interventions: Systematic Review

Abstract

Objective In this session, we will explore the results of a descriptive analysis of all drug overdose mortality data collected by the Harris County Medical Examiner"s Office and how that data can be used to inform public health action. Introduction Drug overdose mortality is a growing problem in the United States. In 2017 alone over 72,000 deaths were attributed to drug overdose, most of which were caused by fentanyl and fentanyl analogs (synthetic opioids)1. While nearly every community has seen an increase in drug overdose, there is considerable variation in the degree of increase in specific communities. The Harris County community, which includes the City of Houston, has not seen the massive spikes observed in some communities, such as West Virginia, Kentucky, and Ohio. However, the situation in Harris County is complicated in mortality and drug use. From 2010 - 2016 Harris County has seen a fairly stable overdose-related mortality count, ranging from 450 - 618 deaths per year. Of concern, the last two years, 2015-2016, suggest a sharp increase has occurred. Another complexity is that Harris County drug related deaths seem to be largely from polysubstance abuse. Deaths attributed to cocaine, methamphetamine, and benzodiazipine all have risen in the past few years. Deaths associated with methamphetamine have risen from approximately 20 per year in 2010 - 2012 to 119 in 2016. This 6-fold increase is alarming and suggests a large-scale public health response is needed. Methods Data were collected by the Harris County Institute of Forensic Sciences (IFS), which is part of the Harris County Medical Examiner"s Office. IFS is the agency responsible for collecting and analyzing human tissue of the deceased for toxicological information about the manner and cause of death. IFS is able to test for the presence of multiple substances, including opioids, benzodiazepines, methamphetamines, cocaine, ethanol, and many others. These data were cleaned and labeled for the presence of opioids, cocaine, benzodiazepine, Z-drug (novel drug), amphetamines, ethanol, and carisoprodol. Explorative descriptive analyses were then completed in R (version 3.4) to identify trends. An RShiny app was created to further explore the data by allowing for rapid filtering and/or subsetting based on various demographic characteristics (e.g., age, sex, race). Results We found that Harris County is experiencing a modest upward trend of drug related overdoses, with 529 observed in 2010 and 618 in 2016. We also found that the increase was not uniform across all classified drugs: amphetamines, cocaine, and ethanol all saw increases. Deaths involving amphetamine increased substantially from 21 in 2010 to 119 in 2016 (Figure 1). Deaths involving cocaine saw the next sharpest increase with 144 in 2010 and 237 in 2016. Deaths associated with opioids remained fairly constant, with 291 deaths in 2010 and 271 deaths in 2016. Differences in mortality across race and sex groups were also observed. The proportion of amphetamine deaths among whites jumped sharply, while the proportion of opioid and benzodiazepine deaths among whites decreased in recent years. The proportion of amphetamine and cocaine deaths among men rose more sharply than with women in the past three years, whereas for opioids, the proportion of women dying has dropped. Conclusions It is undeniable that the opioid epidemic is a true public health emergency for the nation. New surveillance tools are needed to better understand the impact and nature of this threat. Additionally, as we have found in Harris County, the threat may be polysubstance in nature. Our report offers two important insights: 1) that mortality data is a useful and actionable surveillance resource in understanding the problem of substance abuse; and 2) public health needs to look at substance abuse from a holistic and comprehensive perspective. Keeping the purview limited to opioids alone may create significant blind spots to the public health threat facing us. References 1. National Institute of Health. (2018) Overdose Death Rates. Retrieved from https://www.drugabuse.gov/related-topics/trends-statistics/overdose-death-rates

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Abstract

Objective We estimated the rate of hepatitis C testing between 2011 and 2017 among persons with commercial health insurance coverage and compared rates by birth cohort. Introduction Hepatitis C virus (HCV) infection is the most common blood-borne infection in the US, and a leading cause of liver-related morbidity and mortality. Approximately 3.5 million individuals in the US were estimated to have been living with hepatitis C in 2010, and approximately half of them were unaware that they were infected. Among HCV infected individuals, those born between 1945 and 1965 (usually referred to as the baby boomer cohort) represent approximately 75% of current cases. Because of the substantial burden of disease among this age group, CDC expanded its existing hepatitis C risk-based testing recommendations to include a one-time HCV antibody test for all persons born between 1945 and 1965. The United States Preventive Services Task Force (USPSTF) subsequently made the same recommendation in June 2013. Description We obtained data from the 2011–2017 IBM MarketScan® Commercial Claims and Encounters and Medicare Supplemental and Coordination of Benefits databases. These data consist of inpatient and outpatient service claims for persons with employer-sponsored health insurance coverage and their dependents. This analysis was restricted to adults 18 years of age and older with continuous enrollment in a commercial or Medicare Supplemental plan for at least one calendar year during the study period (a 45-day gap in coverage was allowed) who received outpatient prescription drug claims data feeds. Claims for hepatitis C antibody testing were identified using Current Procedural Terminology (CPT) codes (80074, 86803). We defined the annual hepatitis C testing rate as the number of patients with an HCV antibody test claim divided by the total number of study-eligible enrollees in a given calendar year. Testing rates were calculated for persons born between 1945 and 1965 and all other adults. There were 54,298,561 unique adults who were continuously enrolled for at least one calendar year during the study period. Among these, 4,629,040 (9%) had one or more inpatient or outpatient service claim with a CPT code for hepatitis C antibody testing during the study period. The overall estimated annual testing rate increased from 2.2% in 2011 to 5.3% in 2017. The testing rate increased from 1.7% to 7.8% among the 1945–1965 birth cohort and 2.5% to 4.0% in other birth cohorts. The average annual percent change in testing was 30.1% among the 1945–1965 birth cohort and 8.2% among other birth cohorts. Testing rate increased markedly (64.1%) between 2016 and 2017 in the 1945–1965 birth cohort, but not in other birth cohorts (7.7%). In this sample of individuals covered by commercial insurance, hepatitis C testing rates have increased slowly between 2011 and 2016. In 2017, there was a substantial increase in testing rates among the Baby Boomer cohort due most likely to an increase in awareness of CDC and USPSTF recommendations by both providers and individual patients associated with CDC health promotion efforts and increased marketing efforts by drug manufacturers. Efforts should continue to promote and increase the awareness of these recommendations and have people tested and treated for HCV. How the Moderator Intends to Engage the Audience in Discussions on the TopicThis panel will discuss strengths and weaknesses for monitoring hepatitis C testing using alternative data sources including self-reported data, insurance claims data, and laboratory testing data.

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Abstract

Objective To test the feasibility of using an Arabic version of CSHCN Screener in identifying CSHCN in the Egyptian setup and to estimate the prevalence of CSHCN among children aged 6-14 years in Alexandria, Egypt using the Arabic version of the CSHCN Screener. Introduction Children with special health care needs (CSHCN) are defined as: "those who have or are at increased risk for a chronic physical, developmental, behavioural, or emotional condition and who also require health and related services of a type or amount beyond that required by children generally." (1) The care of CSHCN is a significant public health issue. These children are medically complex, require services and supports well beyond those that typically developing children require, and command a considerable proportion of the pediatric health care budget. (2) Different tools were used to identify CSHCN. (3, 4) One of them is the CSHCN screener (5) which uses a non-condition specific approach that identifies children across a range and diversity of childhood chronic conditions and special needs. (6) It identifies children with elevated or unusual needs for health care or educational services due to a chronic health condition. It focuses on health consequences a child experiences as a result of having an ongoing health condition rather than on the presence of a specific diagnosis or type of disability. It allows a more comprehensive assessment of the performance of the health care system than is attainable by focusing on a single diagnosis. (7) The CSHCN screener is only available in English and Spanish. (8) In developing countries, obtaining reliable prevalence rates for CSHCN is challenging. Sophisticated datasets associated with governmental services and high quality research studies are less common due to fewer resources. Egypt has no screening or surveillance systems for identifying CSHCN. (9) Methods A community based survey was conducted among a representative sample of children aged 6-14 years from the 8 health districts of Alexandria, Egypt using a multistage cluster sampling technique. The final sample amounted to 501 children from 405 families. Data about the children and their families were collected by interviewing the mothers of the selected children using a pre-designed interviewing questionnaire. The questionnaire included their personal and family characteristics in addition to the Arabic translation of CSHCN screener. Permission to translate the questionnaire into the Arabic language was obtained from the Child and Adolescent Health Measurement Initiative. Validation and cultural adaptation of the translated CSHCN screener were done. The survey questions were generally understandable by Arabic speakers. As for the screener questions, the Arabic translation was straightforward and clear. The difference between the Arabic translation for the words "health conditions" and "medical conditions" in the 1st follow up questions was not clear for the respondents and the interviewers had to give an explanation for the two terms to help the respondents. So, it was easier for the respondents to answer the screener questions than the follow up questions. Results Out of the 501 children included in the study, 61 were identified by the screener to be CSHCN, making a prevalence of CSHCN of 12.2%. The prevalence of children with dependency on prescription medicine was 11.8%, while the prevalence of children with service use above that considered usual or routine was 11.8%. The prevalence of children with functional limitations was 12%. Among these domains, in almost all children, the reason was a medical, behavioral or health condition (98.3%) and the condition has continued or is expected to continue for at least 12 months in all children. Among CSHCN, the majority (91.8%) had these three domains combined. Sensory impairments ranked first among the most prevalent conditions requiring special health care with a prevalence of 2.8% which represented 23% of the conditions, followed by cognitive impairments with a prevalence of 2% representing 16.4% of all conditions requiring special health care. Impaired mobility was the third most common condition requiring special care with a prevalence of 1.8%. The table shows that CSHCN were more likely to be in the younger age group (6-<10 years), to be males, to be the first in order among their siblings and to have an illiterate or just read and write father. On the other hand, CSHCN were less likely to have a university educated mother, to be living with both parents and to be from a family without an enough income. The only significant factor was the type of family (cOR=0.88, 95% CI = 0.85-0.91). Conclusions The study showed the feasibility to use the CSHCN screener in the Egyptian National health care services to easily identify the majority of children that need to be the focus of the National health care services. It could also be an easy tool to assess the quality of the ongoing school health programs in responding to the overall needs of school children. With the present Egyptian policy of reform giving special attention to people in need particularly sensitive groups such as school children, it is therefore recommended that the school health services, in addition to the ongoing diagnostic, preventive and curative services add an additional measure, namely the screener for CSHCN, which is a simple easily administered screening tool which will also assist to depict existing gaps in the health care system to ensure being comprehensive. References McPherson M, Arango P, Fox C, et al. A new definition of children with special health care needs. Pediatrics 1998;102:137-40. 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Abstract

Objective To determine whether data from the Office of the Medical Examiner are useful for conducting injection drug use surveillance in Maricopa County, Arizona, and to describe the characteristics of decedents who died from a drug overdose, were investigated by the county's medical examiner, and had an indication of injection drug use. Introduction The rate of drug overdose deaths in the United States has increased steadily since 2000. Injection drug use, a practice associated with infectious disease transmission, has likely increased along with this upward trend in drug overdoses. Injection drug use surveillance is difficult to conduct at a public health department because there are no specific Internal Classification of Diseases codes to identify this risk behavior in hospital discharge or vital registration data. Maricopa County Department of Public Health Office of Epidemiology aimed to identify indications of injection drug use within data from the Office of the Medical Examiner Methods The Office of Epidemiology receives toxicology results for deaths which were ruled by the Maricopa County's medical examiner as substance use related, also referred to as overdose deaths. We explored data from decedents who were investigated by the Maricopa County's medical examiner between 7/1/2016-6/30/2017, had a cause of death from a drug overdose, and screened positive for at least one commonly injected drug (i.e., opioids - general, heroin, methamphetamine, or cocaine). To narrow our search for indications of injection drug use, we requested preliminary investigation reports and medical examiner reports for a random sample of reports (10% from each drug class) from the Office of the Medical Examiner. Preliminary investigation reports, produced by a scene investigator, included the decedent's medical history, risk factors, circumstances of death, circumstances of death discovery, and scene characteristics. Medical examiner reports included toxicology screen results, autopsy findings, and the cause of death. The Office of the Medical Examiner provided these reports to the Office of Epidemiology in portable document format (PDF) for this analysis. We built a query to identify keywords related to injection drug use (e.g. inject, syringe, needle) and injection injuries (e.g. cellulitis, abscess). We used PDF XChangeViewer's Optical Character Recognition (OCR) function to convert the PDF reports to text data and used Python's String and Collections modules to parse text data for occurrences of keywords within the reports. Reports that included at least one keyword were manually reviewed and classified as probable or ruled out for injection drug use, and characteristics of those with a probable indication of injection drug use were described. Results During the period of interest, 1,127 deaths were caused by drug overdose, of which 930 decedents screened positive for opioids (N=673, 59.7% of drug overdose deaths), heroin (358, 38.5%), methamphetamine (445, 39.5%), and/or cocaine (100, 11%). Indications of injection drug use were identified within 48 (32.7%) of the 147 preliminary investigation and medical examiner reports that were reviewed (Table). Common indicators of injection drug use included: history of drug use as a reported risk factor; presence of prescription drugs, illicit drugs, or drug paraphernalia at the scene; body position at the scene; and injuries associated with needle use identified during the autopsy. The most common terms that indicated injection drug use were "syringe", "intravenous", "needle", and "inject". Among persons who had an indication of injection drug use, 85.4% were male, 52.1% were between the ages of 20 and 39 years, and 85.4% were white. Conclusions Data from the Office of the Medical Examiner's preliminary investigation and medical examiner reports provided rich context for understating the underlying risk factors and circumstances that contributed to drug overdose deaths. Injection drug use paraphernalia found at the scene of death and injuries found during autopsy were well-documented in these reports, which helped us quantify the proportion of decedents who died from overdose that may have injected drugs, by drug class. We were able to describe basic characteristics of this sample, which were consistent with previously published reports describing people who inject drugs. This surveillance method has limitations, however. Decedents reviewed by a medical examiner represent a subset of the drug using population, and findings may not be generalized to the full population. Other data sources and analytical methods must be employed to accurately estimate the number of people who inject drugs in Maricopa County and to describe their characteristics and experiences.

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Abstract

Objective   The objective of this study is to explore individual, household and population-level health indicators collected in the home via smart thermostats. The study's approach is to (a) identify if it is possible to isolate specific user behaviours using the motion and thermostat sensor data, and (b) develop Remote Monitoring of healthy behaviours at population level. Furthermore, this study is interested in identifying if observed patterns will suffer variations. As a result, it will be possible to understand human behaviours and consequently understand lifestyle habits of a person or a group of people. Introduction Public health surveillance relies on surveys and/or self-reported data collection, both of which require manpower, time commitment, and financial resources from public health agencies and participants. The survey results can quickly become outdated due to fast-paced changes in our society. The health habits of Canadians have rapidly evolved with technology and research indicates we are becoming a sedentary society, thus the levels of physical activity (PA) are very important population level health indicators. We will present a novel method to gather data at a granular level in near real-time, with minimal effort from participants. Simple thermostats are found in nearly every house in Canada, and smart thermostats enable efficient temperature adjustment, saving energy costs by adjusting according to human activity. Thermostats are ubiquitous in Canadian homes and the current expansion of smart thermostats make them an ideal data source over traditional methods. Utilizing technology that can be deployed at a population level will enable vast granular data collection beyond capabilities of traditional surveys. In this project UbiLab[1] is exploring the use of the zero-effort technology using sensor data collected by smart thermostats and other associated sensors to develop an innovative health surveillance platform and monitor an individual's health at the household level as well as health indicators at population level. Utilizing the smart wi-fi thermostat, we able to report on PA, sedentary behaviour, and sleep patterns at the household level. The thermostat and remote sensors (RS) contain temperature and motion sensors, which can be used to monitor activity in the home (i.e. lack of travel indicates sedentary behaviour), as well as sleep characteristics. This is beneficial as no action is required from participants, allowing individuals to go about their lives unperturbed. This powerful system will be able to deliver real-time health insights to public health professionals. Methods Zero-effort-technologies[2] represent the future of ambient assisted living (AAL), in which sensors gather data generated by the person without conscious effort by the user. Such data could be integrated with other technologies to give the system the ability to tackle unsolved remote monitoring issues challenged the traditional data collection method barriers. For example, when the RS is placed in the bedroom, they can provide insights on sleep duration and quality. This addresses the challenges of declining participant engagement, low response rates in surveys and focus groups, and technical barriers to wearable technology. This eliminates recall bias, common when asking participants to quantify the amount of PA and types of behaviours they engaged in. Using the motion data, we can quantify the amount of PA in the home to determine individual levels of PA. The UbiLab partnered with ecobee[3], a Canadian smart wi-fi thermostat company, leveraging data from over 10,000 households in North-America collected through the Donate Your Data (DYD)[4] program. A small pilot study (n = 8) was done to validate the use of motion sensor readings of movement between rooms through a cross comparison with Fitbit[5] step data. And the DYD dataset was analyzed for patterns using Python[6], pandas[7], Elasticsearch[8], and Kibana[8]. This method will enable the delivery of personalized insights to monitor individual- and population-level health behaviours. Results Physical Activity, Sedentary Behaviour and Sleep (PASS) indicators[9] are measured through surveys (i.e. Canadian Health Measures Survey and Canadian Community Housing Survey) administered by Statistics Canada. Using this technology public health agencies will enable to collect novel health indicators, monitor health in real-time and deliver health insights to Canadians to increase health literacy. A positive association between Fitbit and ecobee data was found (Spearman's Correlation coefficient = 0.7, p > 0.001) from 380 person hours from the pilot study. Indicators (sleep, interrupted sleep, daily indoor activity, sedentary) based on the PASS Indicators Framework from the Public Health Agency of Canada (PHAC)[2] were measured using DYD data. Single occupant ecobee households in Canada averaged 7.2 hours of sleep in 24-hours, 2.1 hours of interrupted sleep, were active for 85 minutes daily, and spent 4.44 hours being sedentary. Recently, we have improved data collection adding Fitbit Charge 2 HRs, to capture sleep and heart rate not previously possible with the Fitbit Zip. Adding more sensors functionality is crucial for algorithm modifications, this includes collecting additional data via the Samsung SmartThings Hub[10]; presence, light usage, and luminance. ecobee is sharing participants and data from their own study, increasing variability within data. We have improved our data storage and analysis process, moving the big data architecture from python to Elasticsearch for real-time data streaming and analysis. We are also actively collaborating with PHAC and improving our algorithm and analysis process using their feedback. Conclusions This is a key opportunity to innovate traditional data collection methods, empowering patients through education and leveraging technology infrastructures to enable healthcare and policy decisions to be made with relevant and real-time data. Lessons learned at the individual and community health levels will be shared with community members and researchers. Implications include understanding short-term impacts with minimal effort and new health policies at the community

level. Increased awareness and improvement can help to better physical activity, sleep and sedentary behaviour which may lead to improvements in overall health and wellbeing. References 1. Waterloo U of. Ubilab. https://uwaterloo.ca/ubiquitous-health-technology-lab/. 2. Public Health Agency of Canada - Canada.ca. https://www.canada.ca/en/public-health.html. Accessed October 26, 2018. 3. ecobee | Smart Home Technology |. https://www.ecobee.com/. Accessed October 26, 2018. 4. Donate your Data | Smart WiFi Thermostats by ecobee. https://www.ecobee.com/donateyourdata/. Accessed September 21, 2017. 5. Fitbit Official Site for Activity Trackers & More. https://www.fitbit.com/en-ca/home. Accessed September 21, 2017. 6. Welcome to Python.org. https://www.python.org/. Accessed November 22, 2017. 7. Python Data Analysis Library — pandas: Python Data Analysis Library. https://pandas.pydata.org/. Accessed January 14, 2018. 8. Elasticsearch. https://www.elastic.co/. Accessed October 26, 2018. 9. Physical Activity, Sedentary Behaviour and Sleep (PASS) Indicator Framework for surveillance - Canada.ca. https://www.canada.ca/en/services/health/monitoring-surveillance/physical-activity-sedentary-behaviour-sleep.html. Accessed January 14, 2018. 10. Samsung. Samsung Smart thing hub. 2018. https://www.smartthings.com/products/smartthings-hub.

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Abstract

Objective Using Florida's syndromic surveillance data, to describe the increase in seizure activity in the days after Hurricane Irma made landfall in 2017 Introduction On September 10, 2017, Irma made landfall in the Florida Keys as a Category 4 hurricane and subsequently tracked up the west side of the state. Due to the size of the storm, it impacted nearly all of Florida. The Electronic Surveillance System for the Early Notification of Community-based Epidemics (ESSENCE-FL), the state's syndromic surveillance system, captures 98% of the emergency department (ED) visits statewide and has historically served a vital function in providing near real-time ED data that are used to track post-disaster morbidity and mortality. After previous hurricanes and tropical storms, increases in carbon monoxide poisonings, animal bites, and injuries have been documented. During post-Irma surveillance, an additional increase in seizure-related ED visits was observed. Methods Twice-daily Hurricane Irma surveillance reports were produced from Sept 10-22, 2017. In addition to specialized queries specific to storm surveillance, analysis was conducted using ESSENCE-FL's syndrome and subsyndrome categories. The subsyndrome category of Seizure captures ED visits which list the words seizure or convulsion in the patient chief complaint. Daily number of seizure visits were compared against a 28-day baseline using an exponentially weighted moving average algorithm. Additionally, daily seizure visits as a percentage of total ED visits were calculated and plotted. Results On September 11, 12, and 13, ED visits for seizures were increased above the expected levels. On these dates respectively, 336 visits (270 expected, p < 0.01), 349 visits (278 expected, p < 0.01), and 306 visits (267 expected, p < 0.01) seizure visits occurred statewide. September 10 showed the largest increase in seizure visits as a percent of all visits. Conclusions Routine post-storm surveillance was able to identify an increase in seizure visits at EDs in Florida. This hurricane-related increase, while not detected using our syndromic surveillance system during previous storms, supports findings of increased emergency medical service calls for convulsions and seizures after Hurricanes Katrina and Rita (both in 2005) found by other researchers (Davis et al., 2013). Due to the size, strength, and projected path of Hurricane Irma, stress (a known seizure trigger) is a possible biological explanation for the increase that was observed. A greater understanding of storm-related public health threats allows the Florida Department of Health to better plan for these events and communicate this information to the public and our partners. Post-storm analysis was complicated by large changes in overall ED volumes during and immediately following the hurricane, and further exploration of the association found in this study is encouraged. References Davis JS, Allan BJ, Pearlman AM, Carvajal DP, Schulman CI., Optimal emergency personnel allocation after a natural disaster, Am J Disaster Med. 2012 Winter;7(1):31-6.

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Roles of Health Literacy in Relation to Social Determinants of Health and Recommendations for Informatics-Based Interventions: Systematic Review

Abstract

Objective To create an interactive, user friendly platform for partners and data users to increase awareness around relevant health disparities and strengths within the urban AI/AN community. Introduction Historically, there has been a lack of data available to assess the health and well-being of urban American Indian/Alaska Natives (AI/ANs) in the United States. Furthermore, there has been limited data showing the increasing disparities that exists between urban AI/ANs and non-Hispanic Whites (NHW). Organizations looking to address these disparities have limited resources and mechanisms to address this rising problem.1 In 2017, Urban Indian Health Institute (UHI) released a series of Community Health Profiles (CHPs) detailing the health status of urban AI/AN communities to provide detailed information to assist in program planning, grant writing and advocacy through increased documentation of current health disparities faced by urban AI/AN populations. Methods Historically, there has been a lack of data available to assess the health and well-being of urban American Indian/Alaska Natives (AI/ANs) in the United States. Furthermore, there has been limited data showing the increasing disparities that exists between urban AI/ANs and non-Hispanic Whites (NHW). Organizations looking to address these disparities have limited resources and mechanisms to address this rising problem.1 In 2017, Urban Indian Health Institute (UHI) released a series of Community Health Profiles (CHPs) detailing the health status of urban AI/AN communities to provide detailed information to assist in program planning, grant writing and advocacy through increased documentation of current health disparities faced by urban AI/AN populations. Results Key findings from the results showed that urban AI/AN people continue to face significant socio-economic disparities when compared to non-Hispanic whites, for example more than twice as many urban AI/ANs over 16 were unemployed between 2010-2014 when compared to their NHW counterparts (15.8% vs. 7.4%). However, urban AI/ANs experience significantly lower rates of suicide when compared to NHW communities. Additionally, although urban AI/AN women gave birth at younger ages on average when compared to NHW women of reproductive age, they were significantly less likely to deliver by cesarean section. Lastly, significantly fewer urban AI/ANs reported using alcohol in the past month when compared to NHWs (44% vs. 60%). Conclusion This analysis of national surveillance data highlights the strengths of the urban AI/AN community around suicide and alcohol use in the past month and point to areas for improvement. By translating these results into a Tableau dashboard, this data is more user friendly and can be used to support programs in identifying health priorities. References 1. NCAI Policy Research Center. Retrieved July 23, 2018, from http://www.ncai.org/policy-research-center/research-data/data

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Abstract

Objective Assessing mental health and opioid addiction comorbidities among chronic pain patients using a large longitudinal clinical, operational, and laboratory data set. Introduction The National Institute for Drug Abuse Report, Common Comorbidities with Substance Use Disorders, states there are "many individuals who develop substance use disorders (SUD) are also diagnosed with mental disorders, and vice versa."(1) Prescription opioids are amongst the most commonly used drugs that lead to illicit drug use.(2)Much of the data about the starting point of the prescription opioid addiction is in the patient health history and is recorded within the provider electronic health record and administrative systems. Description There are a variety of addiction and misuse risk screening tools available and selecting appropriate tools screening can be confusing for providers. Examples of common screening tools: Opioid Abuse Risk Screener (OARS), Opioid Risk Tool (ORT), Screener and Opioid Assessment for Patients with Pain (SOAPP), Current Opioid Misuse Measure (COMM), Diagnosis, Intractability, Risk, and Efficacy (DIRE). These opioid risk screening tools are interview based and vary in how they survey for psychosocial factors. The screening tools are useful, but are meant only to alert the provider to conduct further investigation.(3) Understanding how the comorbidities recorded in the patient's clinical interactions may help improve risk assessment investigations and ongoing monitoring programs. Studying the chronic pain patients' longitudinal clinical, operational, and laboratory records provides the basis for better study controls than those using population based on emergency department admission and mortality events. Methods The analysis leverages IBM"s Explorys electronic health record (EHR) data, a large integrated source of real world clinical, operational and lab data across 39 large integrated delivery networks that span the continuum of care. In addition to demographic characteristics of drug abusers, we will describe common comorbidities of selected mental health diagnoses, examine coding-related issues, distinguish chronic and episodic addiction and look for regional differences due to state/local level prescribing training and provider addiction awareness. How the Moderator Intends to Engage the Audience in Discussions on the TopicPromote the event through interatction with the @ISDS twitter account and #ISDS19 hashtag. Solicit question for presenters-panelists through social media before the briefing, and meet with presenters before the event to tune the presenations to areas of interest. Conduct a demographic poll of the audience to get them engaged. Ask audience to stand to show their organization-role. e.g. state-local public health, provider, vendor. This helps the presenters adapt to the audience profile. After each panelist speaks, have the panelist ask a question to the audience about a lingering question that arose during the research. Limit the audience to ~1 minute to answer. Allow panelists to ask a few more questions if the process is working, but limit to overall event time schedule. Finish with Q&A from the audience. References 1. Abuse NI on D. Part 1: The Connection Between Substance Use Disorders and Mental Illness [Internet]. [cited 2018 Sep 29]. Available from: https://www.drugabuse.gov/publications/research-reports/common-comorbidities-substance-use-disorders/part-1-connection-between-substance-use-disorders-mental-illness 2. Lankenau SE, Teti M, Silva K, Bloom JJ, Harocopos A, Treese M. Initiation into prescription opioid misuse amongst young injection drug users. Int J Drug Policy. 2012 Jan 1;23(1):37–44. 3. Hudspeth RS. Safe Opioid Prescribing for Adults by Nurse Practitioners: Part 1. Patient History and Assessment Standards and Techniques. J Nurse Pract. 2016 Mar;12(3):141–8.

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Roles of Health Literacy in Relation to Social Determinants of Health and Recommendations for Informatics-Based Interventions: Systematic Review

Abstract

Objective Using data from the 2011–2015 IBM MarketScan® Commercial Claims and Encounters, we sought to assess the relationship between mental health outcomes and chronic hepatitis C infection after adjusting for important confounders. Persons with HCV antibody and RNA test results between 2011 and 2015 and continuous enrollment in fee-for-service plans were included in the analysis Introduction Hepatitis C virus (HCV) infection is a leading cause of liver disease-related morbidity and mortality in the United States and HCV incidence has been increasing. Mental illness may impact the likelihood of initial HCV infection, progress and adherence to treatment along the hepatitis C care cascade, and risk of subsequent reinfection for those cured of hepatitis C. The relationship between HCV infection and mental illness is not well understood and many studies have lacked sufficient sample size to adjust for important confounders. We sought to explore the association between chronic HCV infection and mental illness after adjusting for important confounders. Methods We obtained data from the 2011–2015 IBM MarketScan® Commercial Claims and Encounters and Medicare Supplemental and Coordination of Benefits databases. These data consist of inpatient and outpatient service claims for persons with employer-sponsored health insurance coverage and their dependents. Persons with HCV antibody and RNA test results between 2011 and 2015 and continuous enrollment in a fee-for-service plan were included in the analysis. Chronic HCV infection was defined by a positive HCV RNA test result. Controls without chronic HCV infection had a negative HCV antibody test result and no positive HCV antibody or RNA test result in the preceding or following year. The index date was defined by the date of the earliest positive HCV RNA or negative HCV antibody test. Demographic characteristics were obtained from the MarketScan® enrollment tables. All enrollees in the study population were at least 18 years old during the year of the index date. The analysis sample was restricted to persons who were identified as receiving outpatient prescription drug claims data feeds. We estimated adjusted odds ratios (OR) for the association between mental illness (ICD-9 code 295 or 296) and HCV RNA status. Multivariate models included age (18-44, 45-64, 65+ years), sex, region, and an adjusted Charlson Comorbidity Index which excluded liver disease and hepatocellular carcinoma. Results We identified 2,847 individuals with chronic HCV infection (HCV RNA+) and 57,418 controls who were HCV antibody negative. With respect to age, 83% of HCV RNA+ individuals were aged 45-64 years while only 43% of the HCV antibody negative individuals were in the same age range. Similarly, for sex, 62% and 40% of HCV RNA+ individuals and controls, respectively, were male. For unadjusted analyses, age, sex, region, comorbid conditions, and mental illness (OR= 2.25 [95% CI; 1.52 - 3.34]) were all statistically associated with HCV RNA+. For the multivariate adjusted models, these same variables remained statistically significant. For the multivariate model, individuals with a mental illness were more likely to be HCV RNA+ relative to HCV antibody negative controls. (OR= 1.95 [95% CI; 1.30 - 2.93]). Conclusions This study demonstrated a strong association between mental illness and HCV chronic infection after adjusting for important confounders including other comorbid conditions. A growing body of research suggests that persons with mental illness are at increased risk for contracting and transmitting HCV due to high rates of substance use and high-risk sexual behavior among infected persons as well as high rates of sexual victimization. HCV prevention efforts should be directed toward individuals with mental illness or seeking treatment for mental illness.

Roles of Health Literacy in Relation to Social Determinants of Health and Recommendations for Informatics-Based Interventions: Systematic Review

Abstract

Objective We study how multimorbidity prevalence is related to socio-economic conditions in Memphis, TN. In addition, we demonstrate that the accumulation of chronic conditions, which is measured by affinity in multimorbidity, is unevenly distributed throughout thecity. Our research shows that not only are socio-economic disadvantages linked to a higher prevalence in each major chronic condition, but also major chronic conditions are heavily clustered in socially disadvantaged neighborhoods. Introduction Chronic diseases impose heavy burdens onhealth systems, economies, andsocieties (1). Half of all Americans live with at least one of the chronic conditions and more than 75% of health care cost is associated with people with chronic diseases (2). Multimorbidity, the coexistence of two ormore chronic conditions in an individual or a population, often require complex and ongoing care and a deep understanding of different risk factors, and their indicators.Multimorbidity has been increased over the past years and the trend is expected to continue across the U.S. Knowing how different chronic conditions are related to one another andwhat are the underlying socioeconomic factorsis crucial to design and implement effective health interventions. We introduce "multimorbidity network affinity", which measures the degree of how multiple chronic conditions are clustered within a geographic unit. Accurate estimations of how chronic conditions are spatially clustered and linked to other sociomarkers(3) and socio-economic disadvantages facilitate designing effective interventions. Methods Multiple datasets including major chronic condition data from the Center for Disease Control and Prevention (CDC) 500 cities, and socio-demographic data from the U.S. Census Bureau and the Environmental Systems Research Institute (ESRI) demographics data have been consistently integrated. Then, network analytics have been performed to examine the inter-relations among a selected number of major chronic conditions and their manifestations in Memphis. To checkwhether a distinctive geographic pattern in multimorbidity is present, we carried out a test using global Moran's I and Getis-Ord Gi*statistics. If apattern is detected, we use robust regression to explore how affinity isassociatedwithhe socio-economic disadvantages of the area. Results The network analysis confirms the existence of close relationships between various chronic conditions. Ourspatial analysisshowthat the geo-distinctive patterns of clustered comorbidities are associated with socio-economic deprivation. Statistical results suggest that neighborhoodswith higherrates of crime, poverty, and unemployment are associated with an increased likelihood of having dense clusters of chronic conditions. Conclusions This study shows the importance of geospatialfactors in multimorbidity network surveillance. Moreover, it demonstrates how socio-economic disadvantages and multimorbidity network are connected. The healthdisadvantages are disproportionately accumulated in socially disadvantaged areas. Network analysis enables us to discover the links between commonly co-observed chronic diseases and explore the complexity of their interactions. This will improve the surveillance practice and facilitate timely response as well as public health planning and decision making. References 1. Wu S-Y, Green A. The Growing Crisis of Chronic Disease in the United States. RAND Corporation. 2000. 2. Anderson G, Horvath J. The growing burden of chronic disease in America. Public health reports. 2004;119(3):263-70. 3. Shin EK, Mahajan RM, Akbilgic OA, Shaban-Nejad A. Sociomarkers and Biomarkers: Predictive Modeling in Identifying Pediatric Asthma Patients at Risk of Hospital Revisits. npj Digital Medicine (2018) 1:50; doi:10.1038/s41746-018-0056-y.

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Roles of Health Literacy in Relation to Social Determinants of Health and Recommendations for Informatics-Based Interventions: Systematic Review

Abstract

Objective To investigate the important mediator linking from obesity to childhood asthma Introduction The mediating pathways in the obesity-asthma link are largely unknown. We aimed to investigate the mediating pathways and to search for the most prominent pathological mechanism between central obesity and childhood asthma. Methods In Taiwan Children Health Study, we collected data on an open cohort of children ranged from 9 to 13 years old. Children"s respiratory outcomes, atopic conditions, obesity measures, and pulmonary function were surveyed annually between 2010 and 2012. Fractional exhaled nitric oxide concentrations were recorded in 2012. Generalized estimating equations and general linear models were used to examine the associations among central obesity, possible mediators, and asthma. Structural equation models were applied to investigate the pathways that mediate the link between central obesity and asthma. Results Central obesity (waist-to-hip ratio) most accurately predicted childhood asthma. In the model of active asthma, the percentage of mediation was 28.6% for pulmonary function, 18.1% for atopy, and 5.7% for airway inflammation. The percentage of mediation for pulmonary function was 40.2% in the model of lifetime wheeze. Pulmonary function was responsible for the greatest percentage of mediation among the three mediators in both models. Conclusions Decline in pulmonary function is the most important pathway in central obesity–related asthma. Pulmonary function surveillance should be applied to obese children for asthma risk prediction.

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Abstract

Objective To discuss the use of electronic health records (EHRs) for estimation of overweight and obesity prevalence in children aged 2 to 19 years and to compare prevalence between the convenience sample obtained from EHRs to prevalence adjusted for potential selection bias. Introduction Although recent data suggests childhood obesity prevalence has stabilized, an estimated 1 in 3 U.S. children are overweight or obese.1 Further, there is variation by racial and ethnic groups, location, age, and poverty2, resulting in a need for local data to support public health planning and evaluation efforts. Current methods for surveillance of childhood weight status rely on self-report from community-based surveys. However, surveys have long time intervals between data collection periods, are expensive, and are not often able to produce precise small-area estimates. EHRs have been increasingly proposed as an alternative or supplement to community surveys. Childhood weight and height is collected as a part of routine care, and leveraging these data from EHRs may provide rapid and locally precise estimates of childhood weight status. A concern for the use of EHRs is the potential for selection bias. EHRs represent only those seeking healthcare and may not generalize to the population. Additionally, the type of clinical visit (e.g., wellness vs. acute) may affect the prevalence estimates and the likelihood of collecting height and weight data in the EHR. Thus, in addition to EHRs being a convenience sample, there may be additional selection biases based on the type of visit and whether height and weight was measured and recorded. The current work sought to quantify the effect of visit type on childhood overweight and obesity prevalence and generate weights to adjust prevalence for potential EHR-related selection bias. Methods Two years (2014-2015) of EHR data were obtained from the Indiana Network for Patient Care, a community health information exchange. Data included clinical encounters of patients living in the eight-county metropolitan area of Indianapolis, Indiana. BMI was calculated using recorded height and weight from the most recent encounter. Encounters were screened for valid BMI entries by examining records in the 0-5th and 95-100th percentiles. BMI results were validated using the following procedure: censoring records with one encounter; removing encounters with implausible values (5 < BMI < 100); calculating the mean BMI across remaining encounters; calculating the percent difference from the mean BMI for each encounter; and removing encounters with BMI results greater or less than 10% from the mean BMI. Records which could not be validated were censored and treated as missing height and weight. Using the age- and sex- specific Centers for Disease Control and Prevention growth charts, patients were classified as underweight (0-5th percentiles), normal weight (5-85th percentiles), overweight (85-95th percentiles), and obese (>95th percentile). Wellness visits were identified using the following ICD-9-CM or ICD-10-CM diagnosis codes: V20.2, V70.0, V70.9; and Z00.121, Z00.129, Z00.00, Z00.01. To adjust for potential selection bias, two stabilized inverse probability weights (SIPW) were constructed. First, to account for potential selection bias induced by visit type and, second, to account for potential selection bias due to censoring (i.e., missing height and weight data). The SIPW were generated using logistic regression models to calculate the predicted probabilities for visit type and uncensored observations as a function of the covariates race, ethnicity, age, gender, and insurance. The SIPW weights were specified as depicted below, where W=1 is a wellness visit, L=observed covariates, and C=0 is uncensored for each child, i. [Insert formulas here] The final weight (SWFinal) was applied to the sample to create a pseudo-population in which there is no association between covariates, L and visit type and which has the same distribution of covariates, L, as the censored individuals not included in the pseudo-population, thus making censoring occur at random, given the observed covariates. Under the assumption of exchangeability and no unmeasured or residual confounding, the pseudo-population will no longer have selection bias due to differences in visit type and missing data. Results The sample consisted of 130,626 unique individuals between the ages of 2 and 19 years, of which 92,755 (71%) had at least one recorded height and weight result. Of the 10,184 records screened for BMI results, 5,242 (51%) were validated using measurements from previous encounters. The final sample consisted of 87,804 records with a valid BMI result (67%) and 42,822 records censored due to missing data (33%). Compared to the U.S. Census, the EHR sample over-represented older girls (e.g., 31.2% vs. 41.2% 15-19 year-old girls) and under-represented younger girls (e.g., 34.3% vs. 29.5% for 5-9 year-old girls). Wellness visits were associated with censoring due to missing data; only 3% of censored encounters were wellness visits compared to 33% of uncensored encounters [P($\chi^2$1>14437 =< 0.0001)]. In the unweighted sample, the overall prevalence of overweight or obesity was 36.5%. The overweight or obesity prevalence was lower among wellness visits (33.9%) than other visits (37.8%; P($\chi^2$1>124.2=< 0.0001). Similarly, wellness visits had lower prevalence estimates when stratified by sex, race, age, ethnicity, and insurance (Table 1). After weighting the sample by SWFinal, the overall prevalence of overweight or obesity was 36.2% and the difference between wellness (35.1%) and other visits (36.7%) was attenuated, though statistically significant [P($\chi^2$1>22.2 =<0.001). Likewise, the differences between wellness and other visits in the weighted pseudo-population were attenuated when stratified by covariates, compared to unweighted analyses (Table 1). While the SIPW method demonstrated some adjustment for selection bias due to visit type and censoring due to missing data, the adjustment was incomplete, likely as a result of unmeasured and imperfectly measured covariates. Conclusions Wellness

visits were associated with lower childhood overweight and obesity prevalence and were more likely to have weight and height measurements recorded in the EHR than other visit types. Adjusting prevalence for EHR-related selection bias using stabilized inverse probability weights may produce more valid estimates but the lack of social determinant data in EHRs results in imperfect adjustment. Future work should integrate individual- or community-level social determinants of health data into the weighting models. References 1. Skinner, AC, & Skelton, JA. Prevalence and trends in obesity and severe obesity among children in the United States, 1999-2012. JAMA Pediatr. 2014; 168(6). 2. Ogden CL. et al. Differences in Obesity Prevalence by Demographics and Urbanization in US Children and Adolescents, 2013-2016. JAMA. 2018;319(23).

Roles of Health Literacy in Relation to Social Determinants of Health and Recommendations for Informatics-Based Interventions: Systematic Review

Abstract

Objective Using administrative claims for privately insured and Medicare Advantage enrollees from a large, private, U.S. health plan, we estimated the prevalence of hepatitis C testing among individuals who were recommended to be tested (i.e., baby boomer cohort born between 1945 and 1965) by the CDC and United States Preventive Services Task Force. This panel will discuss strengths and weaknesses for monitoring hepatitis C testing using alternative data sources including self-reported data, insurance claims data, and laboratory testing data. Introduction Hepatitis C virus (HCV) infection is the most common blood-borne disease in the US and the leading cause of liver-related morbidity and mortality. Approximately 3.5 million individuals in the US were estimated to be living with HCV in 2010 and approximately half of them were unaware that they were currently infected. Among HCV infected individuals, those born between 1945 and 1965 (usually referred to as the baby boomer cohort) represents approximately 75% of current cases. Because of the substantial burden of disease among this age group, CDC expanded its existing HCV risk-based testing recommendations to include a one-time HCV antibody test for all persons born between 1945-1965. The United States Preventive Services Task Force (USPSTF) subsequently made the same recommendation in June 2013. Methods We obtained health plan enrollment information and claims data from the 2011 - 2017 OptumLabs® Data Warehouse, and utilized data from patients enrolled in either commercially insured programs or Medicare Advantage. We examined trends in HCV testing for the birth cohort born between 1945 and 1965 and compared their trend in testing to individuals who were not in the birth cohort. We developed two different estimates for HCV testing incidence in order to make comparisons to other commercial claims datasets. The denominator for both estimates was the number of adults continuously enrolled in one or more health plan(s) in a given calendar year (allowing up to a 45-day gap in coverage). The numerator for the first estimate was the number of people receiving any HCV related test in the current calendar year who had not received any HCV related test including HCV antibody test, HCV RNA test or HCV genotype test in the previous calendar years. The numerator for the second estimate was the number of people who were given an HCV antibody test (CPT: 86803 and 80074) in a given calendar year, irrespective of previous testing history. Results During the study period 2011 - 2017, there were 20,332,848 unique adults who met the inclusion criteria in the OptumLabs® data. Approximately 7.1 million (35.0%) of these individuals were born between 1945 and 1965. On average, there were approximately 2.8 million birth cohort enrollees for any given calendar year. For the birth cohort, the annual incidence of HCV testing was about 2% per year during the time period between 2008 and 2011 (data not shown). In general, between 2011 and 2017, the trends in testing rates were consistent across both estimation methods. Specifically for the birth cohort, the HCV testing rate increased substantially between 2012 and 2017, peaking in 2017 at 8.56% [95% CI: 8.53-8.59%] and 10.24% [95% CI: 10.21-10.27%]. The greatest increase occurred between 2016 and 2017 when the testing rate almost doubled. In contrast, for the non-birth cohort, the HCV testing rate started in 2012 at a rate similar to the birth cohort but did not increase in a similar fashion and did not see a substantial increase in HCV testing in 2016 or 2017. Conclusions Since CDC and USPSTF recommended universal testing for the birth cohort in 2012 and 2013, respectively, hepatitis C testing rates have been increasing across all age groups. The rate of increase for the birth cohort was substantially greater than that for the non-birth cohort. CDC and USPSTF recommendations are likely a strong contributing factor impacting hepatitis C testing rates in the US. Efforts to promote hepatitis C testing should continue.

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Abstract

Objective The study describes the characteristics of attendances for low back pain (LBP) in the French emergency departments (ED) network Oscour®, in order to give an overview of this disease before launching a prevention campaign. Introduction LBP is one of the leading contributors to disease burden worldwide [1]. In France, LBP is a frequent reason of general practice consultations. According to a study published in 2017 and based on 2014 data issued of the National Health Insurance Cross-Schemes Information System (Sniiram) [2], this pathology stands for 30% of thickness leave and 4 of 5 people will suffer of low back pain during their own life. Most often, LBP is a chronic pathology with acute episodes which most often require emergency care. In order to prevent chronicity, French health care insurance launched into a mainstream national prevention campaign during spring 2018. This campaign was also targeted for health professional to inform them of the best recommendations to provide to their patients. Then the French society of emergency medicine (SFMU) has been asked to relay this campaign to emergency departments (ED) where LBP is a frequent reason of attendance. Since 2004, the French syndromic surveillance system SurSaUD® [3] coordinated by the French Public Health Agency (Santé publique France) daily collects morbidity data from the emergency departments (ED) network Oscour®. Almost 92% of the French ED attendances were recorded by the system in 2017. The availability of this large ED dataset on the whole territory since several years gives the opportunity to describe LBP attendances before the potential fallout of the national prevention campaign. Methods For each ED attendance, the SurSaUD® system daily collects individual data containing demographic (age, gender, zip code), administrative (ED unit, date of attendance, transport…) and medical information (medical diagnosis (ICD10), chief complaint, severity, hospit.). These data are routinely analyzed to detect and follow-up various expected or unusual public health events all over the territory [3] and also constitute a large database to perform in-depth studies on specific public health issues. ED attendances with a medical diagnosis of LBP have been identified using at least one of the following ICD10 codes "M545", "M5450", "M5456", "M5457", "M5458", "M5459". Those data have been analyzed from 01/01/2014 to 31/12/2017 (504 ED) for the following age groups; less than 18 years old (yo), 18 to 34 yo, 35 to 49 yo, 50 to 64 yo, 65 to 84 yo and 85 yo and over, at national and regional levels. ED attendances have been also described by month, day of week and hour of day. Hospitalizations after discharge, stay duration in ED services, transport and associated diagnoses were also analyzed. Results From 2014 to 2017, 481,291 ED attendances for LBP were recorded corresponding to 1.12% of the total number of ED attendances with a coded diagnosis. 60% of annual ED attendances for LBP concern 18 to 50 years old adults. The proportion of LBP attendances among the all-cause activity remains stable between 2014 and 2017. At the regional level, LBP proportion among the all-cause activity is similar to the national value in metropolitan regions (0.8% in Brittany to 1.6% in Corsica) and is lower than the national value in overseas regions (0.4% in Mayotte to 0.8% in Guyane) except for Saint-Barthélémy (1.8%). At the national level, almost 10% of ED attendances for LBP are hospitalized after discharge. This proportion increases with age to reach 43% for the 85 years old and more. Proportion of hospitalization ranges between 5.6% (in Paris area) and 17.1% (in Brittany) in metropolitan regions and between 2.8% (Guyane) and 9.3% (Reunion island) in overseas regions. From 2014 to 2017, ED attendances for LBP remain stable by month. However, we observed a slight decrease along the week with more attendances on Monday (17.8% of LBP attendances) than the other days. The attendances are more frequent in the morning (between 6 and 12 AM). At the national level, mean stay duration for LBP attendances in ED is almost 5 hours whereas median stay duration is 2 hours and 45 minutes. Stay duration is longer for patient arrived during night hours (from midnight to 6 AM) and for those hospitalized after discharge. Stay duration is also increasing with age. At the regional level, mean stay duration varies from 3 to more than 6 hours. Conclusions The broad coverage of the French ED network on the whole territory since several years enables to give an overview of ED attendances for acute LBP and their characteristics. One strength of the system is its strong partnership between epidemiologists and the ED physicians. It enables to verify that the results of the study are consistent with their perception on the field. The results of this study will be used as reference to evaluate potential benefits of this campaign. Finally, this study is a good illustration of how the syndromic surveillance system in collaboration with ED physicians, can quickly provide valuable data to support political strategies. References [1] Maher et al, Non-specific low back pain Lancet 2017; 389: 736–47 Published Online October 10, 2016, http://dx.doi.org/10.1016/ S0140-6736(16)30970-9 [2] Assurance Maladie, Le patient adulte atteint de lombalgie commune; Livret d'information Octobre 2017 données SNIRAAM 2014, https://www.ameli.fr/sites/default/files/Documents/346618/document/lombalgie-professionnels-de-sante_assurance-maladie.pdf [3] Caserio-Schönemann C, Bousquet V, Fouillet A, Henry V, pour l'équipe projet SurSaUD®. Le système de surveillance syndromique SurSaUD®. Bull Epidémiol Hebd. 2014;(3-4):38-44.

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Roles of Health Literacy in Relation to Social Determinants of Health and Recommendations for Informatics-Based Interventions: Systematic Review

Abstract

Objective Using a large nationally representative dataset, we estimated the prevalence of self-reported hepatitis C testing among individuals who were recommended to be tested (i.e., baby boomer cohort born between 1945 and 1965) by the CDC and United States Preventive Services Task Force. Introduction Hepatitis C virus (HCV) infection is the most common blood-borne disease in the US and the leading cause of liver-related morbidity and mortality. Approximately 3.5 million individuals in the US were estimated to have been living with hepatitis C in 2010 and approximately half of them were unaware that they were infected. Among HCV infected individuals, those born between 1945 and 1965 (usually referred to as the baby boomer cohort) represents approximately 75% of current cases. Because of the substantial burden of disease among this age group, CDC expanded its existing hepatitis C risk-based testing recommendations to include a one-time HCV antibody test for all persons born between 1945 and 1965. The United States Preventive Services Task Force (USPSTF) subsequently made the same recommendation in June 2013. Description Methods The following question \"Have you ever had a blood test for hepatitis C?\" has been administered annually from 2013 through 2017 on the National Health Interview Survey (NHIS). The NHIS is a nationally representative cross-sectional face-to-face household interview of civilian noninstitutionalized individuals in the U.S. The NHIS survey uses a complex multistage probability design that includes stratification, clustering, and oversampling. We estimated the prevalence of hepatitis C testing for adults in the US during the study period from 2013 to 2017. In addition, we carried out stratified analyses comparing those with private insurance to those who did not have private insurance. We reported weighted estimates taking into account the NHIS survey design. The R statistical software (R Core Team, 2018) was used to estimate weighted prevalence estimates for hepatitis C testing. Results During the study period from 2013-2017, there were 148,674 adults who responded to the ever tested for hepatitis C question. In addition, 33.56% of these individuals were born between 1945 and 1965; among all adults, the weighted percentage of individuals that responded yes they had received a hepatitis C screening test was 12.82% (95% CI: 12.54-13.10%) while for baby boomers the estimate was 13.93% (95% CI: 13.51-14.35%). Figure 1 presents the annual trend in the hepatitis C test prevalence over the study period by birth cohorts. For both cohorts, there were significant increases over time in hepatitis C testing prevalence. The two trend lines began to diverge in 2015 with the baby boomer cohort reporting higher rates of hepatitis C testing. For the baby boomer cohort, there was also a substantial increase in reported hepatitis C testing in 2017 relative to 2016. Similar trends were found for the samples when we restricted the sample to only those with private insurance. Compared to the people with private insurance, the baby boomers with "Non-private' insurance, including Medicaid, Medicare, or military- government sponsored insurances, reported higher rates of testing. Conclusion Across the five-year period from 2013 through 2017, we found increasing rates of self-reported hepatitis C testing among non-institutionalized U.S. adults. For the baby boomer cohort, we saw a substantial increase in testing in 2017, which was likely due in part, to increased awareness among both physicians and patients of the CDC and USPSTF recommendation to have all baby boomers tested. Efforts to increase the awareness of these recommendations should continue. Additional targeted promotions among hard to reach populations should also be considered. How the Moderator Intends to Engage the Audience in Discussions on the TopicThis panel will discuss strengths and weaknesses for monitoring hepatitis C testing using alternative data sources including self-reported data, insurance claims data, and laboratory testing data.

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Abstract

Objective   We developed a machine learning-based algorithm to identify patients with chronic hepatitis C infection in health insurance claims data.   Introduction   Hepatitis C virus (HCV) infection is a leading cause of liver disease-related morbidity and mortality in the United States. Monitoring the burden of chronic HCV infection requires robust methods to identify patients with infection. Insurance claims data are a potentially rich source of information about disease burden, but often lack the laboratory results necessary to define chronic HCV infection. We developed a machine learning-based algorithm to identify patients with chronic HCV infection using health insurance claims alone and compared it a previously developed ICD-9 code-based algorithm. Methods We obtained insurance claims, demographics, enrollment information, and hepatitis C laboratory results from the IBM MarketScan® Commercial Claims and Encounters databases. We defined chronic HCV infection cases as a patient with one or more positive HCV RNA result and required controls to have a negative HCV antibody result and no positive HCV RNA or antibody results. Patients were required to be continuously enrolled in a health insurance plan during the six months before and after the first positive or negative test result (index date). Outpatient and inpatient insurance claims for the six months before and after the index date were included in the analyses. The study period spanned from 2011 to 2014. Subjects were randomly divided into a training sample (80%) and test (20%) sample. We trained a random forest classifier using age, sex, region, Charlson comorbidity index, and variables defining the presence and frequency of 67 ICD-9 diagnosis codes and CPT procedure codes related to HCV and liver disease. We up-weighted cases to account for the low prevalence of infection in our sample. We generated forests of 1,000 trees for all models. The initial model included all variables. Permutation-based variable importance scores from this initial model were used to select variables for the final model. The previously developed algorithm defined chronic HCV infection as either two claims with codes for chronic hepatitis infection > 60 days apart after an HCV RNA test claim or three claims with codes for chronic HCV infection on different dates after an HCV RNA test claim. We compared the predicted classification to HCV laboratory result-defined classification and calculated percent agreement, Kappa, sensitivity, specificity, positive predictive value, and negative predictive value. We then applied the final classifier to all individuals continuously enrolled in commercial and/or Medicare supplemental insurance to estimate the prevalence of chronic HCV infection in this population in 2014. Analyses were performed in SAS version 9.4.   Results   We identified 5,780 (5.6%) cases with chronic HCV infection and 97,831 controls with negative HCV test results. The training dataset consisted of 82,888 individuals with approximately six million inpatient and outpatient claims. The final model included 23 variables related to hepatitis C (e.g., number of HCV RNA test claims), liver disease (e.g., cirrhosis diagnosis code), and comorbidities. In the training dataset, percent agreement, Kappa, sensitivity, specificity, positive predictive value, and negative predictive value were 99.2%, 0.92, 92.3%, 99.6%, 93.2%, and 99.5%, respectively. The presence of a CPT code for HCV RNA testing had the highest variable importance score. The test dataset included 20,723 individuals with approximately 1.5 million inpatient and outpatient claims. In the test dataset, percent agreement, Kappa, sensitivity, specificity, positive predictive value, and negative predictive value for the final classifier were 98.9%, 0.89, 89.9%, 99.4%, 89.0%, and 99.4%, respectively. Percent agreement, Kappa, sensitivity, specificity, positive predictive value, and negative predictive value for the previously developed algorithm were 96.3%, 0.50, 35.0%, 99.9%, 96.7%, 96.3%, respectively. Among the 35.6 million individuals with continuous commercial and/or Medicare supplemental insurance in 2014, 317,932 (0.9%) were classified as having chronic HCV infection. Conclusions Our machine learning-based algorithm was able to identify chronic hepatitis C cases in commercial health insurance claims data with relatively high estimates for percent agreement, Kappa, sensitivity, specificity, positive predictive value, and negative predictive. Future analyses and models will explore the ability of the algorithm to estimate the prevalence of HCV infection in different populations covered by different health plan types (e.g., commercial, Medicaid, Medicare, or no insurance) and for populations where laboratory testing data is not available or collected.

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Abstract

Objective We introduce the Semantic Platform for Adverse Childhood Experiences (ACEs) Surveillance (SPACES). It facilitates the access to the relevant integrated information, enables discovering the causality pathways and assists researchers, clinicians, public health practitioners, social workers, and health organization in studying the ACEs, identifying the trends, as well as planning and implementing preventive and therapeutic strategies. Introduction Adverse Childhood Experiences (ACEs) have been linked to a variety of detrimental health and social outcomes. In the last 20 years, the association between ACEs with several adult health risk behaviors, conditions, and diseases including suicides, and substance abuse [1], mental health disturbances and impaired memory [2], nervous, endocrine and immune systems impairments [3], and criminal activities [4] have been studied. One of the challenges in studying and timely diagnosis of ACEs is that the links between specific childhood experiences and their health outcomes are not totally clear. Similarly, an integrated dataset builtfrom multiple sources is often required for effective ACEs surveillance. The SPACES project aims at providing a semantic infrastructure to facilitate data sharing and integration and answer causal queries [5] to improve ACEs surveillance. Methods We create the ACEs ontology to facilitate the integration of data coming from various distributed sources (e.g. ontologies, databases, surveys, interviews, and literature) and maintain interoperability between the data sources. We re-used some of the existing bio-ontologies in the domain, although they captured the domain's knowledge in different levels of granularity, e.g., Homeless is defined in SNOMED CT and Medical Dictionary for Regulatory Activities (MedDRA) with different hierarchies, or some related concepts may be disconnected, e.g., SNOMED CT defines Abuse but not Verbal Abuse while MedDRA defines Verbal abuse but not as an Abuse. In order to improve reasoning with the aggregated data, we perform two different kinds of inference. Semantic inference uses the ACEs ontology to creates new conclusions by connecting similar concepts. On the other hand, statistical inference is used to formulate rules that link co-occurring concepts. These two kinds of inference, statistical and semantic, work in tandem and the conclusions from one method can then be used as the basis for the other kind of inference. Results The ACEs Ontology is a unique resource for capturing knowledge in the domain of Adverse Childhood Experiences. The ontology will be openly and freely available via the relevant online community's portals (e.g. The NCBO BioPortal). The logical validation of the ontology is performed using description logic reasoners. A set of use-case scenarios are designed to demonstrate the feasibility and usability of the ontology for data integration and intelligent query answering. Conclusions In this paper, we present the SPACE project that aims to develop a platform to improve adverse childhood experiences surveillance. The tool uses semantic and statistical methods to improve data access, integration, and reasoning. References [1] Vincent J. Felitti, Robert F. Anda, Dale Nordenberg, David F. Williamson, Alison M. Spitz, Valerie Edwards, Mary P. Koss, and James S. Marks. Relationship of childhood abuse and household dysfunction to many of the leading causes of death in adults: The adverse childhood experiences (ace) study. American Journal of Preventive Medicine, 14(4):245–258, 5 1998. [2] Robert F Anda, Vincent J Felitti, J Douglas Bremner, John D Walker, Charles Whitfield, Bruce D Perry, Shanta R Dube, and Wayne H Giles. The enduring effects of abuse and related adverse experiences in childhood: A convergence of evidence from neurobiology and epidemiology. European archives of psychiatry and clinical neuroscience, 256(3):174–186, 04 2006. [3] Andrea Danese and Bruce S. McEwen. Adverse childhood experiences, allostasis, allostatic load, and age-related disease. Physiology & Behavior, 106(1):29 – 39, 2012. Allostasis and Allostatic Load. [4] James Garbarino. Aces in the criminal justice system. Academic Pediatrics, 17(7, Supplement): S32 – S33, 2017. Child Well-Being and Adverse Childhood Experiences in the US. [5] Okhmatovskaia A, Shaban-Nejad A, Lavigne M, Buckeridge DL. Addressing the challenge of encoding causal epidemiological knowledge in formal ontologies: a practical perspective. Stud Health Technol Inform. 2014; 205:1125-9.

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Roles of Health Literacy in Relation to Social Determinants of Health and Recommendations for Informatics-Based Interventions: Systematic Review

Abstract

Objective The purpose of this study is to review the extant literature for evidence on the validity of ICD-9-CM and -10-CM codes for the purpose of identifying cases of chlamydia, gonorrhea, and syphilis. Introduction Administrative data refers to data generated during the processes of health care. These data are a rich source of patient health information, including diagnoses and problem lists, laboratory and diagnostic tests, and medications. Established standards are used to code each data into the appropriate coding systems. The International Classification of Diseases, Ninth and Tenth Revisions, Clinical Modification (ICD-9-CM and ICD-10-CM) codes are the coding standard for diagnoses and have been frequently used to identify cases for the creation of cohorts in examining care delivery, screening, prevalence, and risk factors[1,2]. However, while some studies have assessed the validity and reliability of ICD-CM codes to identify various conditions such as cerebral palsy and rheumatoid arthritis[3,4], the evidence for using ICD codes to accurately identify sexually transmitted infection (STI) cases is largely unexamined. The purpose of this study is to review the extant literature for evidence on the validity of ICD codes for identifying cases of chlamydia, gonorrhea, and syphilis. Our findings will inform efforts to improve the use of administrative data for STI-related health service and surveillance researches. Methods Our systematic review followed a protocol consistent with the Preferred Reporting Items for Systematic Reviews and Meta-Analysis (PRISMA). We comprehensively searched PubMed and Scopus databases for peer-reviewed articles published before February 2018. Articles were identified with search terms related to our STIs of interest (chlamydia, syphilis or gonorrhea), pelvic inflammatory disease (PID), administrative codes, and validation studies. PID was included as 33%-50% of PID cases are due to chlamydia or gonorrhea[5]. Only empirical publications appearing in peer-reviewed English language journals were included. Further, we excluded articles classified as letters to the editor, policy briefs, perspectives, commentaries, summaries of future research plans, and grey literature. Additionally, articles without abstracts were also excluded. The screening process used by our review is outlined in Figure 1. Briefly, all articles were subjected to a two-step screening process. First, we reviewed articles based on title and abstract. We eliminated studies that did not focus on STIs or on validation in the context of STIs. Articles were included if they focused on any combination of the STIs of interest, or on PID, and were validation studies on diagnostic testing or administrative codes. Second, selected articles were then reviewed in full to identify studies which included the STIs of interest, assessed and listed ICD-9-CM or -10-CM codes, and measured validity. The snowball technique was used on included articles, whereby we reviewed all references found in the references of the included articles. Results Our search strategy identified 1,754 articles to be screened by title and abstract. Of these, only five (0.29%) articles met the initial inclusion criteria. After full text review, only two articles[6,7] met the final inclusion criteria to be included in the systematic review. Both articles focused on PID with no assessment of syphilis. They utilized ICD-9-CM codes to identify cases with PID and performed chart reviews to determine true PID status. Results of both articles found positive predictive value (PPV) of PID to be between 18%–79%. Only one article[7] examined the PPV of chlamydia (56%; 5/9 cases) and gonorrhea (100%; 4/4 cases) separately. Conclusions We identified just two studies that evaluated the validity of ICD codes in identifying the STIs of interest. Both studies focused on PID cases in which chlamydia and gonorrhea diagnoses and tests might be documented. Additionally, since both studies were published before 2015, neither evaluates the use of administrative data following the U.S. transition to ICD-10 codes. Given these findings, further studies are required to examine the predictive value of ICD-9 and -10 codes for all three diseases in the general population. References 1. Tao G, Zhang CX. HIV Testing of Commercially Insured Patients Diagnosed With Sexually Transmitted Diseases. Sexually Transmitted Diseases. 2008;35(1):43-6. 2. Evans HE, Mercer CH, Rait G, et al. 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Abstract

Objective The objective of this research is to develop the model for calculating the forecast of the Lyme disease dynamics what will help to take effective preventive and control measures using the intelligent multi-agent approach. Introduction Climate warming, globalization, social and economic crises lead to the activation of natural foci of vector-borne infections, among which a special place belongs to Lyme disease (Ixodic tick borreliosis – ITB), the vectors of which are the Ixodes ticks. More than 5,000 cases are registered in the United States every year [1]. In European countries, the number of cases may reach up to 8,000-10,000 per year. Incidence rate for ITB in France is 39.4 per 100,000 population, in Bulgaria – 36.6 [2]. In Ukraine, among all ticks, 10-70% are infected with Borrelia; from 10% to 42.2% of Ukrainian population had contact with the causative agent of ITB. Mathematical modeling as an element of monitoring of natural focal infections makes it possible to assess the epidemiological potential of foci in the region and in individual territories, to forecast the trends of the epidemic process and to determine the main priorities and directions in the prevention of ITB. The most modern and effective method of simulation is multi-agent simulation, which is associated with the concept of an intelligent agent, as some robot, purposefully interacting with other similar elements and the external environment under given conditions. An intelligent agent is an imitation model of an active element, the state and behavior of which in various situations of achieving the goal vary depending on the state and behavior of other agents and the environment, in analogy with the intellectual behavior of a live organism (including a human) under similar conditions. As the epidemic process of Lyme disease is characterized by vector transmission, heterogeneous tick population, variable pathogen infectivity, heterogeneous environment, and seasonal changes in tick activity, the use of classical statistical methods for predicting the dynamics of morbidity cannot show high accuracy. The multiagent approach to simulation of the epidemic process of Lyme disease allows considering all of the above features, and since the dynamics of the modeled system is formed from the behavior of local objects (humans and ticks), we expect that a model constructed using a multiagent approach will yield a higher accuracy of prognosis morbidity. The multiagent model will allow not only to calculate the forecast, but also to reveal the factors influencing increase of the incidence of Lyme disease the most. Methods The research is based on official reports of new Lyme disease cases registered during 2006-2017. The data were collected by the State Institution Kharkiv Laboratory Center of the Ministry of Health of Ukraine from the healthcare facilities of Kharkiv Oblast of Ukraine as a part of passive routine disease surveillance. In total, 1016 cases of Lyme disease registered during the study period were included in this research. The multi-agent approach to simulation of epidemic process has been used for the model development. The epidemiological model of Lyme disease is based on the Gromashevsky's concept of the epidemic process, according to which the epidemic process exists with the continuous interaction of the three main components - source of infection, mechanism of transmission and susceptible organism. The most profitable type of agent in the study of epidemic process is an emotionally-motivated intellectual agent for the most complete and accurate model of human behavior. Let's consider the agent as a set of properties: $a=<s,st,c,ta,l>$, $a \in A$, $s \in S$, $c \in C$, $ta \in Ta$, (1) where st is time in state s, A is set of all agents, S is set of different agent's states, C is set of working area's cells, Ta is set of possible agent's types, l is length of life. The set of agent states is predefined and is constant. Depending on the process being studied, the set can be supplemented by different states, the initial set is: S={Susceptible, Exposed, Infected, Dead}. (2) The composition of the workspace leads to the appearance of a set of cells, as conditional abstract objects. It is assumed that one cell can simultaneously include a number of agents as well as one object-vector of infection (tick). It is assumed that depending on the type of working area where the agent is located the specific nature of the epidemic process is changed. The vector transmission of the disease from tick to agent is realized as follows. To begin with, the possibility of contact with tick is checked. It is believed that this is possible if other agents are also processed in the same cell along with the tick processed as well. Each pair agent-tick is compared. If tick is infected, it is believed that with a certain probability healthy agent can become infected. To automate the prediction of the incidence of Lyme disease, a software package has been developed using C# programing language that allows to calculate prognosis morbidity based on existing statistical data in real time. In the developed model, the configuration of the software package includes data for the period 2006-2017. This data include incidence rate of ITB per 100,000 population, the population"s seeking healthcare providers for tick bites, the results of studies of ticks removed from humans for the presence of Borrelia, the number and proportion of ticks infected by Borrelia collected by the flagging method. Results The calculated prognosis shows the expected increase in the number of cases with a certain three-year cycle: an increase in the number of cases of Ixodic tick borreliosis within 2 years with a slight decrease for the next year. A comparative analysis of the accuracy of forecasting by moving average method to 3 years [3] and multiagent simulation showed that the latter describes the existing data better, therefore, the forecast will be more accurate. The accuracy rates using the moving average method is 85.4%, with the use of multiagent simulation 96.6%. Conclusions A comparative assessment of the accuracy of predicting the dynamics of the epidemic process using the moving average method [3] and the multiagent approach was carried

out. A higher accuracy is noted with the use of multi-agent simulation (96.6% against 85.4% using moving average method), based on which a software package has been developed, which makes it possible to calculate the expected morbidity rate of Lyme disease. That means that the hypothesis made of the research was confirmed. The adequacy of the tested prognosis was verified on the real statistical data collected by the State Institution Kharkiv Laboratory Center of the Ministry of Health of Ukraine on the incidence of Lyme disease in Kharkiv Oblast (Ukraine) from 2006 to 2017. The obtained forecast revealed the expected persistence of the unstable epidemic situation with respect to Lyme disease, which dictates the need to develop a set of preventive measures aimed at reducing the morbidity of people by ITB. Virtual verification of the effectiveness of such events will be the next step in our study. References Gulia-Nuss M. Genomic insights into the Ixodes scapularis tick vector of Lyme disease [Text] / M. Gulia-Nuss, A.B. Nuss et al. // Nature Communications, Vol. 7, Iss. 10507. – 2016. Lindgren E., Jaenson T.G.T. Lyme borreliosis in Europe: influences of climate and climate change, epidemiology, ecology and adaptation measures // World Health Organization, 2016. – 35 p. Chumachenko T., Chumachenko D., Sukhorukova M. Simulation of the epidemic process of Ixodes tick borreliosis // CBEP Ukraine Regional One Health Research Symposium and Peer Review Session. – Kyiv: Cooperative Biological Engagement Program (CBEP), 2017. – pp. 168.

Roles of Health Literacy in Relation to Social Determinants of Health and Recommendations for Informatics-Based Interventions: Systematic Review

Abstract

Objective To leverage existing healthcare transaction messages to automate the aggregation of antimicrobial usage statistics in a method compatible with submission to the National Healthcare Safety Network (NHSN) Antimicrobial Usage module. Introduction Antimicrobial stewardship is crucial to the ongoing viability of existing therapies. To facilitate this stewardship, NHSN allows hospitals to submit data on their antimicrobial usage and receive feedback on how their usage compares to other facilities.1 This feedback can be used by hospital personnel to assess whether their antimicrobial policies are consistent with current best practices. Participation in this program has so far been limited. There are several barriers to participating, including the challenge of mapping local medication information to the NHSN list of antimicrobials, the burden of tabulating the necessary statistics, and the technical requirements of generating appropriate CDA documents for submission. An automated solution that obtained the necessary data from existing HL7 interfaces and generated CDA documents in the correct format could significantly lower some of the barriers to submitting antimicrobial usage information to NHSN. Methods A continuous feed of HL7 ADT and RAS messages was established between a multi-hospital health system and the EpiCenter syndromic surveillance system. Medication administration data elements included time of administration, patient location, and a facility-specific medication identifier. Patient data included time of admissions, transfers and discharges and all relevant patient locations. Facility medication codes were reconciled to NHSN antimicrobial identifiers via a multi-step, semi-automated process. A medication formulary was provided by the health system mapping their codes to National Drug Code (NDC) identifiers. The RxNorm API2 was queried to map NDC identifiers to RxNorm identifiers. A second round of RxNorm API queries linked the formulation-specific RxNorm identifiers to related parent RxNorm identifiers for antimicrobials provided by NHSN. The final mapping from facility medication codes to NHSN antimicrobial identifiers was manually reviewed and edited to remove duplicates and to add links by name that were not found automatically. NHSN requires reporting by administration route, which was provided in most cases by the formulary. In rare cases, that route was not sufficiently specific and had to be refined by looking at the site of administration for individual doses. Therapy days were calculated as the total number of unique patient identifiers receiving at least one dose of a given antimicrobial; these were totaled per day, per route, and per inpatient location. Days present were calculated as the total number of unique patient identifiers associated with a given inpatient location at any time during each day. Facility-wide inpatient admissions were calculated as the total number of unique patient identifiers associated with an admission to any inpatient location during each day. Results The RxNorm API yielded mapping between 15,472 NDC identifiers and 847 RxNorm codes, covering 86 (96%) NHSN antimicrobials. An initial merge using the NDC identifiers from the provided formulary yielded 252 matches to NHSN antimicrobials. Manual reconciliation eliminated duplicates to leave 239 unique antimicrobials from the formulary. Since not all NDC identifiers in the formulary could be associated with an RxNorm code, there was the potential for additional antimicrobials to be present but not matched to an NHSN code. The names of the NHSN antimicrobials were used to search the generic and brand names of medications in the formulary, yielding 6 additional antimicrobials with appropriate routes. After these steps of automated and manual reconciliation and excluding formulations administered via nonreportable routes, a total of 216 antimicrobial formulations were identified that can be reported to NHSN. These covered 67 (74%) NHSN antimicrobials. For July 2018, 206,921 medication administration messages were received, including 11,637 administrations of 48 NHSN antimicrobials at 14 NHSN inpatient locations were observed across all four NHSN routes. These represented 7% of completed administrations. They accounted for 6,909 days of therapy with all antimicrobials via all routes at all locations. Figure 1 shows the time series of days of therapy by NHSN route of administration. A total of 950 (0.6%) administrations had medication code 99999 and could not be identified. An additional 189,717 ADT messages for 5,420 distinct visits were received. These yielded 13,885 facility-wide days present and a 14,797 location-specific days present summed across all inpatient locations and facilities, from 4,054 facility-wide admissions. Figure 2 shows the time series of facility-wide days present and summed location-specific days present for each facility. Conclusions Reconciling local facility formularies with a national standardized list of antimicrobials can be a complicated task requiring some amount of human intervention. Once completed, however, HL7 messages from existing interface engines can supply sufficient information for calculating the necessary antimicrobial usage statistics to report to NHSN. References 1. Centers for Disease Control and Prevention [Internet]. Atlanta: National Health Safety Network; 2017 Dec 29. Antimicrobial Use and Resistance (AUR) Module; 2018 Jan [cited 2018 Sep 10]. Available from: https://www.cdc.gov/nhsn/PDFs/pscManual/11pscAURcurrent.pdf 2. Peters LB, Bodenreider O. 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Roles of Health Literacy in Relation to Social Determinants of Health and Recommendations for Informatics-Based Interventions: Systematic Review

Abstract

Objective This abstract describes an ISDS initiative to bring together public health practitioners and analytics solution developers from both academia and industry to define a roadmap for the development of algorithms, tools, and datasets to improve the capabilities of current text processing algorithms to identify negated terms (i.e. negation detection). Introduction Despite considerable effort since the turn of the century to develop Natural Language Processing (NLP) methods and tools for detecting negated terms in chief complaints, few standardised methods have emerged. Those methods that have emerged (e.g. the NegEx algorithm [1]) are confined to local implementations with customised solutions. Important reasons for this lack of progress include (a) limited shareable datasets for developing and testing methods (b) jurisdictional data silos, and (c) the gap between resource-constrained public health practitioners and technical solution developers, typically university researchers and industry developers. To address these three problems ISDS, funded by a grant from the Defense Threat Reduction Agency, organized a consultancy meeting at the University of Utah designed to bring together (a) representatives from public health departments, (b) university researchers focused on the development of computational methods for public health surveillance, (c) members of public health oriented non-governmental organisations, and (d) industry representatives, with the goal of developing a roadmap for the development of validated, standardised and portable resources (methods and data sets) for negation detection in clinical text used for public health surveillance. Methods Free-text chief complaints remain a vital resource for syndromic surveillance. However, the widespread adoption of Electronic Health Records (and federal Meaningful Use requirements) has brought changes to the syndromic surveillance practice ecosystem. These changes have included the widespread use of EHR-generated chief complaint "pick lists" (i.e. pre-defined chief complaints that are selected by the user, rather than text strings input by the user at a keyboard), triage note templated text, and triage note free-text (typically much more comprehensive than traditional chief complaints). A key requirement for a negation detection algorithm is the ability to successfully and accurately process these new and challenging data streams. Preparations for the consultancy included an email thread and a shared website for published articles and data samples leading to a structured pre-consultancy call designed to inform participants regarding the purpose of the consultancy and to align expectations. Then, health department users were requested to provide data samples exemplifying negation issues in the classification process. Presenting developers were asked to explain their underlying ideas, details of method implementation, size and composition of corpora used for evaluation, and classification performance results. Results The consultancy was held on January 19th & 20th 2017 at the University of Utah's Department of Biomedical Informatics, and consisted of 25 participants. Participants were drawn from various different sectors, with representation from ISDS (2), the Defense Threat Reduction Agency (1), universities and research institutes (10), public health departments (5), the Department of Veterans Affairs (4), non-profit organisations (2), and technology firms (1). Participants were drawn from a variety of different professional backgrounds, including research scientists, software developers, public health executives, epidemiologists, and analysts. Day 1 of the consultancy was devoted to providing an overview of NLP and current trends in negation detection, including a detailed description of widely used algorithms and tools for the negation detection task. Key questions included: Should our focus be chief complaints only, or should we widen our scope to emergency department triage notes?, How many other NLP tasks (e.g. reliable concept recognition) is it necessary to address on the road to improved negation detection? With this background established, Day 2 centered on presentations from five different United States local and regional health departments (King County WA, Boston MA, North Carolina, Georgia, and Tennessee) on the various approaches to text processing and negation detection utilized across several jurisdictions. Several key areas of focus emerged as a result of the consultancy discussion. First, there is a clear need for a large, easily accessible corpus of free-text chief complaints that can form a standardised testbed for negation detection algorithm development and evaluation. Annotated data, in this context, consists of chief complaints annotated for concepts (e.g. vomiting, pain in chest) and the negation status of those concepts. It is important that the annotation include both annotated clinical concepts and negation status to allow for the uniform evaluation and performance comparison of candidate negation detection algorithms. Further, the annotated corpus should consist of several thousand (as opposed to several hundred) distinct and representative chief complaints in order to compare algorithms against a sufficient variety and volume of negation patterns. Conclusions The consultancy was stimulating and eye-opening for both public health practitioner and technology developer attendees. Developers unfamiliar with the everyday health-monitoring context gained an appreciation of the difficulty of deriving useful indicators from chief complaints. Also highlighted was the challenge of processing triage notes and other free-text fields that are often unused for surveillance purposes. Practitioners were provided with concise explanations and evaluations of recent NLP approaches applicable to negation processing. The event afforded direct dialogue important for communication across professional cultures. Please note that a journal paper describing the consultancy has recently been published in the Online Journal of Public Health Informatics [2]. References [1] Chapman W, Bridewell W, Henbury P, Cooper G, Buchanan B. A simple algorithm for identifying

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Roles of Health Literacy in Relation to Social Determinants of Health and Recommendations for Informatics-Based Interventions: Systematic Review

Abstract

Objective The objective was to design and develop a dashboard prototype (DP) that integrates HIV data from disparate sources to improve monitoring and reporting of HIV care continuum metrics in Indiana. The tool aimed to support Indiana State Department of Health (ISDH) to monitor key HIV performance indicators, more fully understand populations served, more quickly identify and respond to crucial needs, and assist in planning and decision-making. Introduction In 2015, ISDH responded to an HIV outbreak among persons using injection drugs in Scott County [1]. Information to manage the public health response to this event and aftermath included data from multiple sources (e.g., HIV testing, surveillance, contact tracing, medical care, and HIV prevention activities). During the outbreak, access to timely and accurate data for program monitoring and reporting was difficult for health department staff. Each dataset was managed separately and tailored to the relevant HIV program area's needs. Our challenge was to create a platform that allowed separate systems to communicate with each other and design a DP that offered a consolidated view of data. ISDH initiated efforts to integrate these HIV data sources to better track HIV prevention, diagnosis, and care metrics statewide, support decision-making and policies, and facilitate a more rapid response to future HIV-related investigations. The Centers for Disease Control and Prevention (CDC) through its Info-Aid program provided technical assistance to support ISDH's data integration process and develop a DP that could aggregate these data and improve reporting of crucial statewide metrics. After an initial assessment phase, an in-depth analysis of requirements resulted in several design principles and lessons learned that later translated into standardization of data formats and design of the data integration process [2]. Methods Specific design principles and prototyping methods were applied during the 9 months that lasted the DP design and development process starting from June 2017. Requirements elicitation, analysis, and validation The elicitation and analysis of the requirements were done using a dashboard content inventory tool to gather and analyze HIV reporting needs and dashboard requirements from stakeholders. Results of this analysis allowed us to validate project goals, list required functionalities, prioritize features, and design the initial dashboard architecture. The initial scope was Scott County. Design mapping The design mapping exercise reviewed different scenarios involving data visualization using DP, clarified associations among data from different programs and determined how best to capture and present them in the DP. For example, we linked data in separate datasets using unique identifier or county name. This step's output was to refine DP architecture. Parallel design In a parallel design session, we drew dashboard mockups on paper with end users. These mockups helped illustrate how information captured during design mapping would be translated into visual design before prototype implementation. Drawings were converted to PowerPoint mockups for validation and modifications. The mockup helped testers and future users, interact and rapidly understand the DP architecture. The model can be used for designing other DP. Integration Data integration was conducted in SAS by merging datasets from different program areas iteratively. Next, we cleaned (e.g., deleted records missing crucial information) and validated data. The integration step solved certain challenges with ISDH data (e.g. linking data across systems while automating data cleaning was planned for later), increased data consistency and reduced redundancy, and resulted in a consolidated view of the data. Prototyping After data integration, we extracted a reduced dataset to implement and test different DP features. The first prototype was in Excel. We applied a modular design that allowed frequent feedback and input from ISDH program managers. Developers of the first prototype were in two locations, but team members kept in close contact and further refined the DP through weekly communications. We expanded the DP scope from Scott County to include all counties in Indiana. Beta Version To enable advanced analysis and ease collaboration of the final tool across users, we moved to Tableau Desktop Professional version 10. All Excel screens were redeveloped and integrated into a unique dashboard for a consolidated view of ISDH programs. After beta version completion, usability tests were conducted to guide the DP production version. Technical requirements All users were provided Tableau Reader to interact with the tool. DP is not online, but shared by ISDH through a protected shared drive. Provisions are made for the DP to use a relational database that will provide greater data storage flexibility, management, and retrieval. DP benefits from the existing security infrastructure at ISDH that allows for safeguarding personal identifiable information, secured access, backup and restoration. Results System content ISDH's data generated at the county and state level were used to assess the following domains: HIV Testing, HIV Surveillance, Contact Tracing, HIV Care Coordination, and Syringe Exchange. The DP was populated through an offline extract of the integrated datasets. This approach sped up the Tableau workbook and allowed monthly update to the uploaded datasets. The system also included reporting features to display aggregate information for multiple population groups. Stakeholders' feedback To improve users' experience, the development team trained and offered stakeholders multiple opportunities to provide feedback, which was collected informally from ISDH program directors to guide DP enhancements. The initial feedback was collected through demonstration to CDC domain experts and ISDH staff. They were led through different scenarios and provided comments on overall design and suggestions for improvement. The goal of the demos was to assess ease of use and benefits and determine how it could be used to engage with stakeholders inside and outside of

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ISDH. DP Action Reporting The DP reporting function will allow users to download spreadsheets and graphs. Some reports will be automatically generated and some will be ad-hoc. All users, including the ISDH Quality Manager and grant writers, can use the tool to guide program evaluations and justifications for funding. The tool will provide a way for ISDH staff to stay current about work of grantees, document key interactions with each community, and track related next steps. In addition, through an extract of the integrated dataset (e.g., out-of-care HIV positives), DP could support another ISDH program area, Linkage to Care. Conclusions We describe the process to design and develop a DP to improve monitoring and reporting of statewide HIV-related data. The solution from this technical assistance project was a useful and innovative tool that allows for capture of time-crucial information about populations at high risk. The system is expected to help ISDH improves HIV surveillance and prevention in Indiana. Our approach could be adapted to similar public health areas in Indiana. References 1. Peters PJ et al. HIV infection linked to injection use of oxymorphone in Indiana, 2014–2015. N Engl J Med. 2016;375(3):229-39. 2. Ahmed K et al. Integrating data from disparate data systems for improved HIV reporting: Lessons learned. OJPHI. 2018 May 17;10 (1).

Roles of Health Literacy in Relation to Social Determinants of Health and Recommendations for Informatics-Based Interventions: Systematic Review

Abstract

Objective Providing an integrative tool for public health experts to rapidly assess the epidemiological situation based on data streams from different surveillance systems and relevant external factors, e.g. weather or socio-economic conditions. The efficient implementation in a modular architecture of disease- or task-specific visualisations and interactions, their combination in dashboards and integration in a consistent, general web application. The user-oriented development through an iterative process in close collaboration with epidemiologists. Introduction The mission of the Infectious-Disease-Epidemiology Department at the Robert Koch Institute is the prevention, detection and control of infections in the German population. For this purpose it has a set of surveillance and outbreak-detection systems in place. Some of these cover a wide range of diseases, e.g. the traditional surveillance of about 80 notifiable diseases, while others are specialised for the timely assessment of only one or a few diseases, e.g. participatory syndromic surveillance of acute respiratory infections. Many different such data sources have to be combined to allow a holistic view of the epidemiological situation. The continuous integration of many heterogeneous data streams into a readily available and accessible product remains a big challenge in infectious-disease epidemiology. Methods The first step in the development of visualisation and analysis dashboards was the identification of relevant epidemiological questions. This was done through the review and analysis of existing epidemiological tools and workflows, among others through surveys and interviews. With the help of domain experts we identified the relevant data sources for specific tasks. We then chose data visualisations that are common in the field of infectious-disease epidemiology, e.g. disease maps, epicurves and age pyramids, as well as visualisations that were suggested by experts, e.g. time-series graph with severity thresholds. In an iterative process of propositions and expert feedback, we refined the user experience, adjusting variables, control parameters and the layout. We have used two different technologies for the dashboard development. For tasks that needed extensive data integration and statistical computing we used the Shiny web-framework of the statistical programming language R, which allows for a seamless integration of data-wrangling, statistical methods and web design with interactive visualizations. For tasks where a more flexible and fluid user experience is desired and for the integration in a general web application, we used the more versatile single-page application (SPA) framework AngularJS in combination with ASP.NET. In both approaches we used standard open-source visualisation libraries such as Leaflet or Plotly. The dashboards were designed in a modular way, abstracting data sources and visualisations in order to reuse them and adapt them easily to other data sources. Where applicable, interfaces to live data bases and OLAP cubes where developed and implemented. Results We have developed a set of dashboards that allow the exploration of infectious-disease data, each designed for a specific epidemiological task. While still under active development, the dashboards are accepted and routinely used by epidemiologists of the Robert Koch Institute. The expansion to other user groups (e.g. local health agencies) is planned for the near future. Further dashboards will be developed as new epidemiological tasks are identified. A general dashboard (\"Signals Dashboard\", see Figure 1 A) is displaying laboratory confirmed cases and their distribution across time, space, age and sex in linked widgets. Additionally it highlights anomalous clusters of cases in all widgets and lists the anomalies in an interactive table. The dashboard is available for all (approx. 80) notifiable diseases. The \"Severity Dashboard\" (Figure 1 B) integrates influenza-related syndromic data, virological information and laboratory confirmed cases. The indicators transmissibility, seriousness and impact, as defined by the PISA guidelines of the World Health Organization, are displayed in time-series charts (absolute and cumulative) and tables; parameter-adjustable severity assessments are computed on the fly. This dashboard has then been adapted to monitor in real time the severity of rotavirus infections. One further dashboard focusses on vaccine-preventable diseases and allows the simultaneous exploration of incidences and vaccination rates through synchronized maps and histograms. Lastly, a \"Context Dashboard\" enables the exploration of possible connections between tick-related diseases such as TBE and Lyme disease on the one hand, and weather and environment as external factors on the other. It provides visual comparisons through maps and time-series charts, correlation analysis and statistical modeling. The user can choose a set of (lagged) variables to be included in a linear statistical model, which is immediately trained. The contributions and significance of the chosen factors, as well as the fit and prediction accuracies, are displayed in tables, scatter plots and time series. Both \"Signals\" and \"Severity\" dashboards serve the rapid assessment of the epidemiological situation and as such display live data as read from internal databases and cubes. The others are at present rather meant for retrospective analyses but will be connected to live data streams in the future. Conclusions Dashboards can provide a way to integrate different epidemiological data streams and statistical methods, offering experts a useful tool to assess the epidemiological situation. Close collaboration between epidemiologists and data scientists in the design and development is beneficial to the relevance and sustainability of such a tool.

Roles of Health Literacy in Relation to Social Determinants of Health and Recommendations for Informatics-Based Interventions: Systematic Review

Abstract

Objective While there is a growing torrent of data that disease surveillance could leverage, few effective tools exist to help public health professionals make sense of this data or that provide secure work-sharing and communication. Meanwhile, our ever more-connected world provides an increasingly receptive environment for diseases to emerge and spread rapidly making early warning and collaborative decision-making essential to saving lives and reducing the impact of outbreaks. Digital Infuzion"s previous work on the Defense Threat Reduction Agency (DTRA)"s Biosurveillance Ecosystem (BSVE) built a cloud-based platform to ingest big data with analytics to provide users a robust surveillance environment. We next enhanced the BSVE data sources and analytics to support an integrated One Health paradigm. The resulting BSVE and Digital Infuzion"s HARBINGER platform include: 1) identifying and ingesting data sources that span global human, animal and crop health; 2) inclusion of non-health data such as travel, weather, and infrastructure; 3) the data science tools, analytics and visualizations to make these data useful and 4) a fully-featured Collaboration Center for secure work-sharing and communication across agencies. Introduction After the 2009 H1N1 pandemic, the Assistant Secretary of Defense for Nuclear, Chemical and Biological Defense indicated "biodefense" would include emerging infectious disease. In response, DTRA launched an initiative for an innovative, rapidly emerging capability to enable real-time biosurveillance for early warning and course of action analysis. Through competitive prototyping, DTRA selected Digital Infuzion to develop the platform and next generation analytics. This work was extended to enhance collaboration capabilities and to harness data science and advanced analytics for multi-disciplinary surveillance including climate, crop, and animal as well as human data. New analysis tools ensure the BSVE supports a One Health paradigm to best inform public health action. Digital Infuzion and DTRA first introduced the BSVE to the ISDS community at the 2013 annual conference SWAP Meet. Digital Infuzion is pleased to present the mature platform to this community again as it is now a fully developed capability undergoing FedRAMP certification with the Department of Homeland Security's National Biosurveillance Integration Center and Is the basis for Digital Infuzion"s HARBINGER ecosystem for biosurveillance. Methods We integrated over 170 global One Health data sources using cloud-based automated data ingestion workflows that provide unified access with data provenance. We used modular automated workflows to implement data science including Natural Language Processing (NLP), machine learning, anomaly detection, and expert systems for extraction of concepts from unstructured text. A first of its kind ontology for biosurveillance permits linking of data across sources. This ontology allows users to rapidly find all relevant data by looking at semantic relationships within and across data sets having varying quality, types, and usages to understand the best, most complete indicators of impending threats. We applied the following principles to the development of data science tools: 1) mathematics should be fully automated and operate "under the hood" without need for user intervention; 2) "At-a-Glance" visualizations should summarize Information, draw attention to key aspects and permit drill down into underlying data; 3) data science analytics and tools need to be validated with real-world data and by disease surveillance experts and 4) secure collaboration capabilities are essential to biosurveillance activities. This was a highly complex effort. We worked closely with surveillance analysts from multiple agencies and organizations to continuously guide the development of capabilities. We drew upon subject matter expertise in public health, machine learning, social media, NLP, semantics, big data integration, computational science, and visualization. A high level of automation, security and immediacy of data was applied to support rapid identification and investigation of potential outbreaks. Results The platform now provisions integrated One Health information. Data sources were harmonized and expanded, along with historical information, to better predict and understand biothreats. These include global social media, human, plant, animal, and weather data. An Analyst Workbench delivers logical, intuitive and interactive visualizations enabling disease surveillance professionals to identify critical, predictive information without extensive manual research. Over 700 approved users currently have access to the prototype. Biosurveillance activities can be performed collaboratively among governmental agencies, public health officials, and the general public using the Collaboration Center and its sharing and messaging systems. Data sharing is HIPAA compliant and distinguishes public from private data using carefully controlled and approved role- and attribute-based access for security. To speed disease surveillance workflows, the workbench generates suggestions to the user on their current work. Anomaly detection to alert to potential developing disease events employs fully automated analytics to conduct over 43 million calculations daily for more than 500 diseases in over 170 data sources, distilling this into a table that ranks the most significant anomalous increases that may indicate an outbreak and warrant investigation. A predictive disease modeling tool based on current and historical data uses fuzzy logic to identify the likeliest outcome, even early in an outbreak when there is much uncertainty about the disease and its characteristics. A complex automated workflow identifies health-related topics that are trending in Twitter and evaluates their severity using novel lexicons and new reactive sentiment analysis. Searches use the ontology to gather all relevant information and are supported by the most advanced NLP with custom surveillance rules to provide succinctly extracted information. This alleviates the need for extensive reading by identifying exactly which data is

needed and extracting key concepts from it. Intuitive methods of visual representation, interactive displays, and drill-down capabilities were leveraged in all analytics for rapid understanding of results. Finally, we added a software development kit to enable third party developers to continuously enhance the platform capabilities by adding new data sources and new analytic apps. This allows the platform to be adapted for specific needs and to keep pace with new scientific and technical discoveries and has resulted in over 50 analytic apps. Conclusions The addition of One Health data and analytics, and the integration of health data with unconventional data sources and modern approaches to data science and complex workflows, resulted in enhanced situational awareness and decision-making capabilities for users. The expanded Collaboration Center within the workbench, enables users to partner and collaborate with other agencies and biosurveillance professionals both nationally and internationally to maximize the rapidity of responses to serious disease outbreaks.

Roles of Health Literacy in Relation to Social Determinants of Health and Recommendations for Informatics-Based Interventions: Systematic Review

Abstract

Objective Illustrate how the Utah Department of Health automatically processes antimicrobial susceptibility results that are received electronically. Introduction The emerging threat of antimicrobial resistant organisms is a pressing public health concern. Surveillance for antimicrobial resistance can prevent infections, protect patients in the healthcare setting and improve antimicrobial use. In 2018, the Utah Department of Health mandated the reporting of antimicrobial susceptibility panels performed on selected organisms. Utah utilizes the Electronic Message Staging Area (EMSA), a home-grown application to translate, process, and enter electronic laboratory results into UT-NEDSS, Utah's integrated disease surveillance system. Processing these results electronically is challenging due to the need to interpret results based on the antimicrobial agent combined with the organism it was performed on. The receipt of antimicrobial susceptibility panels has required enhancements to EMSA for these results to be automatically processed. Methods Stand-alone antimicrobial susceptibility LOINCs are configured within EMSA to concatenate during the preprocessing stage. This tells EMSA that when this LOINC is sent within an HL7 message to find the organism name in the corresponding OBR 26.3 (the parent result field). EMSA then creates a new fabricated code that combines the antimicrobial agent with the organism identified from the culture (example: '18906-8 Pseudomonas aeruginosa' is the fabricated code for Ciprofloxacin susceptibility to Pseudomonas aeruginosa). Once these new fabricated antimicrobial susceptibility codes are created, interpretation rules are programmed using current Clinical and Laboratory Standards Institute (CLSI) breakpoints for each unique organism/antimicrobial combination to determine if the result is Susceptible/Intermediate/Resistant. The interpreted test is then run through a set of condition-specific rules to determine how it should be included into UT-NEDSS. Results Antimicrobial susceptibility panels performed on Acinetobacter species, Escherichia coli, Klebsiella species, Pseudomonas aeruginosa, Enterobacter species, Candida auris/haemulonii, Mycobacterium tuberculosis, Neisseria gonorrhoeae, Salmonella species, Shigella species, Streptococcus pneumoniae and invasive Staphylococcus aureus are now included in Utah's Communicable Disease Reporting Rule. Currently, there are 36 antimicrobial agents programmed into EMSA and there are a total of 217 antimicrobial susceptibility codes programmed into the system. Conclusions Processing electronic antimicrobial susceptibility results presents unique challenges for processing. Interpretation of results can vary based on test method, performing laboratory, and organism. Enhancing functionality within EMSA was necessary for combining the antimicrobial agent and organism it was performed on. Implementing systems capable of automatically processing complicated antimicrobial susceptibility results should be a priority for any health department interested in expanding their communicable disease rule to include antimicrobial susceptibility testing.

Roles of Health Literacy in Relation to Social Determinants of Health and Recommendations for Informatics-Based Interventions: Systematic Review

Abstract

Objective To enhance the process by which outpatient providers report surveillance case information to public health authorities following a laboratory-confirmed diagnosis of a reportable disease. Introduction Traditionally, public health agencies (PHAs) wait for hospital, laboratory or clinic staff to initiate case reports. However, this passive approach is burdensome for reporters and produces incomplete and delayed reports, which can hinder assessment of disease in the community and potentially delay recognition of patterns and outbreaks (1). Modern surveillance practice is shifting toward greater use of electronically transmitted disease information. The adoption of electronic health record (EHR) systems and health information exchange (HIE) among clinical organizations and systems, driven by policies such as the 'meaningful use' program, is creating an information infrastructure that public health organizations can take advantage of to improve surveillance practice (2). Methods Using an existing HIE infrastructure, we developed, tested and implemented an intervention that pre-populates an electronic version of the official Indiana State Department of Health communicable disease reporting form following detection of a notifiable disease in an electronic laboratory message. Pre-populated form fields included patient demographics, notifiable disease confirmatory test results, and provider information. The intervention was delivered electronically to the provider using the HIE network. Seven representative, high priority diseases were included: chlamydia, gonorrhea, syphilis, salmonella, hepatitis B, hepatitis C, and histoplasmosis. The intervention was implemented in seven diverse primary care clinics in central Indiana. Control clinics were all other outpatient settings connected to the HIE that reported at least one communicable disease case to the county PHA during the same time period. The primary outcome measure was reporting rate (provider reports received as a percent of all case reports received by the PHA for individuals with a notifiable disease). Clinic-submitted case reports were collected between 9/9/2013 – 3/15/2014 and 9/15/2014 – 6/12/2016 from all clinics (intervention and non-intervention) that reported to the county PHA before and during the intervention period. We grouped case reports into non-intervention and intervention groups based on whether or not the laboratory test occurred at an intervention clinic during the clinic"s intervention period. Reports received from intervention clinics outside of the clinics' intervention period were classified as non-intervention reports. To evaluate the impact of the intervention on the outcome measures, we employed a difference-in-difference approach in which the change in reporting rates among intervention clinics before and after implementation was compared to the change in reporting rates among non-intervention clinics during the same timeframes. The analysis utilized generalized linear models with logistic regression using the logit link function for reporting rate. All statistical tests were performed using the NLestimate macro within Enterprise SAS Version 9.4. Results Of 16,172 unique cases observed across all time periods, 1,453 (9%) were reported by intervention clinics. During intervention time periods, provider reporting rates significantly increased from 20% to 50% in intervention clinics while falling from 12% to 10% in the control clinics (p<0.001). The most prevalent conditions observed overall were hepatitis B (5,362; 33.5%), chlamydia (5,157; 32.2%), and hepatitis C (3,236; 20.2%). Only chlamydia, gonorrhea, and hepatitis C possessed enough observations during the intervention periods for robust comparisons. With respect to the change in reporting rates for specific diseases, rates increased for chlamydia (56.9% vs. 66.4%), gonorrhea (55.6% vs. 58.3%), and Hepatitis C (6.5% vs. 7.3%) in the intervention clinics. However, only the increase for chlamydia was statistically significant (p<0.001). Rates for all three diseases decreased in control clinics during the same time period. Conclusions The results of the study indicate that electronic, pre-populated case reporting forms integrated into providers' EHR systems and workflow, enabled by an interoperable HIE network, can be effective at increasing clinic reporting rates. These results are encouraging and offer hope for initiatives that aim to help PHAs leverage the expanding health IT infrastructure created through policies like 'meaningful use.' References 1. Revere D, Hills RH, Dixon BE, Gibson PJ, Grannis SJ. Notifiable condition reporting practices: implications for public health agency participation in a health information exchange. BMC Public Health. 2017;17(1):247. 2. Dixon B, Grannis S. Public Health Informatics Infrastructure. In: Magnuson JA, Fu JPC, editors. Public Health Informatics and Information Systems. Health Informatics: Springer London; 2014. p. 69-88.

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Roles of Health Literacy in Relation to Social Determinants of Health and Recommendations for Informatics-Based Interventions: Systematic Review

Abstract

Objective Automatically collect and synthesize global notifiable disease data and make it available to humans and computers. Provide the data on the web and within the Biosurveillance Ecosystem (BSVE) as a novel data stream. These data have many applications including improving the prediction and early warning of disease events. Introduction Government reporting of notifiable disease data is common and widespread, though most countries do not report in a machine-readable format. This is despite the WHO International Health Regulations stating that "[e]ach State Party shall notify WHO, by the most efficient means of communication available." 1 Data are often in the form of a file that contains text, tables and graphs summarizing weekly or monthly disease counts. This presents a problem when information is needed for more data intensive approaches to epidemiology, biosurveillance and public health. While most nations likely store incident data in a machine-readable format, governments can be hesitant to share data openly for a variety of reasons that include technical, political, economic, and motivational2. A survey conducted by LANL of notifiable disease data reporting in over fifty countries identified only a few websites that report data in a machine-readable format. The majority (>70%) produce reports as PDF files on a regular basis. The bulk of the PDF reports present data in a structured tabular format, while some report in natural language or graphical charts. The structure and format of PDF reports change often; this adds to the complexity of identifying and parsing the desired data. Not all websites publish in English, and it is common to find typos and clerical errors. LANL has developed a tool, Epi Archive, to collect global notifiable disease data automatically and continuously and make it uniform and readily accessible. Methods A survey of the national notifiable disease reporting systems is periodically conducted noting how the data are reported and in what formats. We determined the minimal metadata that is required to contextualize incident counts properly, as well as optional metadata that is commonly found. The development of software to regularly ingest notifiable disease data and make it available involves three to four main steps: scraping, detecting, parsing and persisting. Scraping: we examine website design and determine reporting mechanisms for each country/website, as well as what varies across the reporting mechanisms. We then design and write code to automate the downloading of data for each country. We store all artifacts presented as files (PDF, XLSX, etc.) in their original form, along with appropriate metadata for parsing and data provenance. Detecting: This step is required when parsing structured non-machine-readable data, such as tabular data in PDF files. We combine the Nurminen methodology of PDF table detection with in-house heuristics to find the desired data within PDF reports3. Parsing: We determine what to extract from each dataset and parse these data into uniform data structures, correctly accommodating the variations in metadata (e.g., time interval definitions) and the various human languages. Persisting: We store the data in the Epi Archive database and make it available on the internet and through the BSVE. The data is persisted into a structured and normalized SQL database. Results Epi Archive currently contains national and/or subnational notifiable disease data from thirty-nine nations. When a user accesses the Epi Archive site, they are able to peruse, chart and download data by country, subregion, disease and time interval. Access to a cached version of the original artifacts (e.g. PDF files), a link to the source and additional metadata is also available through the user interface. Finally, to ensure machine-readability, the data from Epi Archive can be reached through a REST API. http://epiarchive.bsvgateway.org/ Conclusions LANL, as part of a currently funded DTRA effort, is automatically and continually collecting global notifiable disease data. While thirty-nine nations are in production, more are being brought online in the near future. These data are already being utilized and have many applications, including improving the prediction and early warning of disease events. References [1] WHO International Health Regulations, edition 3. http://apps.who.int/iris/bitstream/10665/246107/1/9789241580496-eng.pdf [2] van Panhuis WG, Paul P, Emerson C, et al. A systematic review of barriers to data sharing in public health. BMC Public Health. 2014. 14:1144. doi:10.1186/1471-2458-14-1144 [3] Nurminen, Anssi. \"Algorithmic extraction of data in tables in PDF documents.\" (2013).

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Roles of Health Literacy in Relation to Social Determinants of Health and Recommendations for Informatics-Based Interventions: Systematic Review

Abstract

Objective The objective of this presentation is to discuss the new features that are under development for ESSENCE in 2019. This is a chance to describe the features, the use cases for the features, and open a dialogue with the community on potential new enhancements that are available. Introduction The ESSENCE system is a community-driven disease surveillance system. Installed in over 25 jurisdictions across the US, the system is built on a single codebase that is shared across all instances. While each individual location can customize many of the settings, data sources, and configurations, the underlying code and functionality is shared. This means that when one jurisdiction works with the Johns Hopkins University Applied Physics Laboratory (JHU/APL) to create a new feature, it is available to all sites. Methods The roadmap for ESSENCE in 2019 is based upon ongoing and future projects between jurisdictions and JHU/APL. While specifics can change before features are deployed, the following list of new features have exceptional capabilities. These include: Social Elements to the User Experience: Ability for users to share what they are doing within ESSENCE with their peers. Ability for users to see what others are querying and find interesting. Support sharing both within a system and across jurisdictions. Text Analysis: Text analysis and visualizations to help support the user in building new free-text queries.Provide correlation, trend, and association analytics for words and phrases to help the user determine what should or should not be included in their queries. Site Monitoring: Back-end tools and checks to better monitor an ESSENCE system for issues and data irregularities. This administrative tool will help the system maintain its day-to-day availability and improve visibility of errors and issues that may develop over time. Longitudinal Surveillance: Visualizations and cohort clustering analytics to determine the types of patients who are using the healthcare systems that provide data to ESSENCE. These tools can show patient uses over time with trends to better inform utilization of healthcare resources in a community. Opioid Overdose Surveillance: Visualizations and analytics to better support the surveillance activities related to the opioid overdose crisis. Work with additional data sources (EMS, Poison Control, Death Records, etc.) to determine the benefit of fusing multiple pieces of information into a common picture for improved opioid surveillance. And other new features… Results The presentation will describe the current roadmap, demonstrate features that are mature enough in the software development process, share mock-ups for features still in the early stages of development and provide use cases for each of the new features discussed. Conclusions No organization can build a successful system without the participation and buy-in from its stakeholder community. ESSENCE is an excellent example of a tool built on collective input whose ongoing enhancements benefit all its users. By seeing the roadmap and understanding the new features for 2019, the community can prepare for upcoming enhancements and begin discussions about other needs and use cases that will drive the development of the next round of ESSENCE features.

Roles of Health Literacy in Relation to Social Determinants of Health and Recommendations for Informatics-Based Interventions: Systematic Review

Abstract

Objective Comparison of content in eCR and ELR cases reporting Review technical challenges and strategies for data management Introduction Communicable disease reporting from providers can be a time-consuming process that results in delayed or incomplete reporting of infectious diseases, limiting public health"s ability to respond quickly to prevent or control disease. The recent development of an HL7 standard for automated Electronic initial case reports (eICR) represents an important advancement for public health surveillance. The Illinois Department of Public Health (IDPH) participated in a pilot with the Public Health Informatics Institute and an Illinois-based provider group to accept eICR reports for Gonorrhea and Chlamydia. Methods The provider group working with their EHR vendor submitted a batch of CT and GC reports directly to IDPH in September 2017 according to the published eICR standard. A summary of the provider and PHII work has been presented previously in the STI eCR Learning Community. The eICR reports received from the provider were compared to case report data in the communicable disease surveillance system, I-NEDSS. Data was extracted from I-NEDSS that included race and ethnicity, timing of specimen collection, result, ELR submission surveillance action and treatment. Results IDPH received a batch of 89 files containing 77 unique persons, with 54 chlamydia (CT), 13 Gonorrhea (GC) and 10 co-infected case reports. The communicable disease surveillance system had captured 76 (98.7%) of the persons reported in the pilot. Among those, an Electronic Laboratory Report (ELR) was received for 72 (95%) cases, on average within 1 day of the lab report date. Data in I-NEDSS had a completion of 45% for race and ethnicity compared to 99% for race and 92% for ethnicity in the eICR files. Information on treatment in the surveillance system was reported for 18 (24%) cases compared to 67 (87%) cases. Conclusions This pilot was the first submission of real patient data submitted using the eICR standard to IDPH. Data was more complete from provider eICR reports for key demographic of race and ethnicity and treatment. A comparison with the current surveillance system showed near complete and timely case capture from ELR data. Integrated reporting of both ELR and eICR can produce a more complete case report through automated submissions and potentially reduce burden of data collection on health department communicable disease investigators. As public health reporting moves in this direction, public health agencies will have some substantial tasks to correctly ingest, map and interpret the increased amounts of information that are contained in the eICR. Further, the advantages of case reporting will be dependent on automated processes within the communicable disease system to merge data and apply business rules to automatically process completed case reports for high volume diseases, such as STIs. This work will continue as providers are ready to submit reports from different vendor products from a near real-time production environment.

Roles of Health Literacy in Relation to Social Determinants of Health and Recommendations for Informatics-Based Interventions: Systematic Review

Abstract

Objective To evaluate capacity of the BioSense ESSENCE platform and pre-defined overdose queries to identify emergency department admissions related to opioid overdose, in compliance with 2018 mandatory overdose reporting laws in Illinois Introduction Accuracy in identifying drug-related emergency department admissions is critical to understanding local burden of disease and assessing effectiveness of drug abuse prevention and overdose-reduction initiatives. In 2018 the Illinois Department of Public Health (IDPH) began implementation of a mandatory opioid overdose reporting law, applicable to all hospital emergency departments (ED). The mandate requires reporting of patient demographics, causal substance and antagonist ED administration within 48 hours of presentation. This reporting is not name-based. IDPH currently utilizes a near real-time syndromic surveillance (SyS) reporting system for all hospital ED, capturing most of the mandated criteria. Leveraging this existing system facilitates adherence to the mandate while imposing minimal additional burden of reporting on local hospitals. The Division of Patient Safety and Quality at IDPH has thus chosen to evaluate the completeness of overdose reporting and compliance with the opioid overdose mandate that have resulted from use of the current syndromic surveillance system. Methods Multi-level internal and external validation methods are being employed to evaluate the accuracy of opioid overdose reporting through syndromic surveillance. An initial internal evaluation compared overdoses captured using hospital discharge data (HDD) and SyS data. This analysis compared daily overdose counts in the two datasets from 166 Illinois facilities, from admissions from April 1 through June 30 2017, inclusive. The opioid overdose query from HDD referenced ICD-10 poisoning codes; SyS utilized the preset Opioid Overdose Version 1 (v1.0) query in the ESSENCE Tool from the CDC's National Syndromic Surveillance Program's BioSense Platform. Daily and quarterly overdose counts by surveillance method were compared and visualized by facility. Three facilities were chosen for a secondary, case-level data comparison based on: magnitude of overdose discrepancies, overall overdose burden, and availability of linked data elements. Individual overdose visits were matched across SyS and HDD datasets based on: date of birth, sex and approximate date of admit. Cases identified in SyS but missing from (1) discharge diagnosis query and (2) discharge database overall were quantified. Cases identified by HDD that were (3) not identified in the SyS overdose query or (4) missing from the SyS database entirely were also counted. Results From April 1 to June 30 2017, among the 166 providers analyzed, the HDD query identified 2,998 opioid overdose-related visits; SyS identified 3,266 (268 cases or 8.9% difference) (Figure 1, r=0.724). A total of 25 (15%) of facilities had equivalent overdose visit counts between datasets: all were among those with low case burden (13 or fewer overdose visits per facility over the quarter). Among facilities with a higher number of overdose presentations, differences in quarterly case counts (SyS minus HDD) ranged from –56 to 120. Discrepant counts were found in 85% of centers (Figure 2). HDD captured a larger number of overdoses in 93 facilities (56%). SyS captured a larger number of overdoses in 48 facilities (29%). The ten facilities with highest syndromic caseload accounted for 33% of overall case burden (1069); the ten with the highest discharge counts accounted for 29% (897 cases). However, the top ten facilities by surveillance type were notably different: the 2nd and 3rd highest using syndromic surveillance ranked 30th and 41st using discharge surveillance over the same period. The center with 5th highest caseload by discharge criteria ranked 38th using syndromic surveillance. In secondary case-level analyses: across datasets from three facilities, both HDD and SyS captured 43.5% of overdoses, while 56% were only in SyS data and 0.5% were only in HDD. Discrepancies in the all-visit ("denominator") datasets were found, requiring follow-up with facilities directly. Conclusions Next steps in these evaluations include further characterization of cases missed differentially by syndromic and discharge surveillance. An external validation phase will engage facility staff to query the Electronic Medical Record directly. Hospital personnel will review and confirm opioid overdose events captured by SyS and hospital facilities will investigate and resolve discrepancies in data quality. These analyses have the potential to inform more accurate definitions for opioid-related overdose seen in emergency departments. Such improved surveillance can aid allocation of medication (naloxone and naltrexone), promotion of intervention (i.e. methadone-assisted treatment programs), and drug abuse prevention. Engagement of facility staff in public health surveillance has resulted in 187 hospital-registered users for the BioSense Platform to date, demonstrating the ability of surveillance improvement efforts to foster public health partnership. Finally, optimizations of automated hospital surveillance systems can help reduce the burden of reporting overdoses and ED morbidity in general, to encourage time spent on monitoring and response.

Roles of Health Literacy in Relation to Social Determinants of Health and Recommendations for Informatics-Based Interventions: Systematic Review

Abstract

Objective The National Syndromic Surveillance Program (NSSP) Community of Practice (CoP) works to support syndromic surveillance by providing guidance and assistance to help resolve data issues and foster relationships between jurisdictions, stakeholders, and vendors. During this presentation, we will highlight the value of collaboration through the International Society for Disease Surveillance (ISDS) Data Quality Committee (DQC) between jurisdictional sites conducting syndromic surveillance, the Centers for Disease Control and Prevention's (CDC) NSSP, and electronic health record (EHR) vendors when vendor-specific errors are identified, using a recent incident to illustrate and discuss how this collaboration can work to address suspected data anomalies. Introduction On November 20, 2017, several sites participating in the NSSP reported anomalies in their syndromic data. Upon review, it was found that between November 17-18, an EHR vendor's syndromic product experienced an outage and errors in processing data. The ISDS DQC, NSSP, a large EHR vendor, and many of the affected sites worked together to identify the core issues, evaluate ramifications, and formulate solutions to provide to the entire NSSP CoP. Description On November 20, 2017, several sites participating in the NSSP reported anomalies in their syndromic data. Upon review, it was found that between November 17-18, an EHR vendor's syndromic product experienced an outage and errors in processing data. The ISDS DQC, NSSP, a large EHR vendor, and many of the affected sites worked together to identify the core issues, evaluate ramifications, and formulate solutions to provide to the entire NSSP CoP. How the Moderator Intends to Engage the Audience in Discussions on the TopicFollowing presentation of this information, the presenters will lead a discussion on how to improve the response, provide resolution, communicate expectations, and decrease the time required to resolve issues should a similar event happen in the future. Participants from all three stakeholder groups, sites conducting syndromic surveillance, the NSSP, and vendor representatives, will be invited to share their experiences, successes, and concerns.

Roles of Health Literacy in Relation to Social Determinants of Health and Recommendations for Informatics-Based Interventions: Systematic Review

Abstract

Objective To provide tools to generate national and local syndromic surveillance electronic messaging specifications and to test implementations in which the set of requirements have been implemented in order to confirm or refute the conformance to those requirements, thereby promoting healthcare information technology (HIT) interoperability in the public health sector. Introduction The ability to harness data science for use in improving population health and public health surveillance begins with the application of interoperability standards to electronic messaging for data exchange between HIT used by public health authorities (PHAs) and the providers who submit patient data to them. When electronic transmissions between these entities are not based on interoperability standards, the patient data that are exchanged may be incomplete, inaccurate, invalid, and/or untimely. As a result, local PHAs and the Centers for Disease Control and Prevention (CDC) may be unable to fulfill their goals of monitoring public health trends and improving population health. Methods As part of the effort to meet the need for the application of interoperability standards to electronic messaging for data exchange between HIT modules that submit and collect syndromic surveillance data for public health, the National Institute of Standards and Technology (NIST), in collaboration with the CDC and the International Society for Disease Surveillance (ISDS), developed and maintains a set of validation tools. These tools are focused on standardized syndromic surveillance messaging and are used for HIT certification testing by the Office of the National Coordinator (ONC) and for on-boarding by various public health jurisdictions in the US. In addition, ISDS informatics personnel are using the NIST Implementation Guide Authoring and Management Tool (IGAMT) for creating the first HL7-balloted version of a guide for syndromic messaging, the HL7 2.5.1 Implementation Guide for Syndromic Surveillance Release 1. This guide is a messaging specification that defines how disparate healthcare applications are to codify and transmit administrative and clinical data for public health surveillance and response. IGAMT is part of an integrated platform that also includes the NIST Test Case Authoring and Management Tool (TCAMT), a Testing Infrastructure and Framework, and the NIST General Validation Tool (GVT). This Web-based platform enables domain experts, such as the ISDS informatics experts, to control the automatic process for generating computable standards and associated testing tools. Results Developed through collaboration between NIST, the CDC, and ISDS, the 2015 Edition Syndromic Surveillance Test Suite has been used in the ONC HIT Certification Program for validating over one hundred HIT modules against the syndromic messaging guide developed by the CDC and the Public Health Information Network, the PHIN Guide for Syndromic Surveillance Messaging Release 2.0 and the associated Erratum. During the collaborative process, NIST contributed expertise based on many years of co-authoring and using HIT interoperability specifications, and the CDC and ISDS contributed expertise pertaining to the syndromic surveillance domain. Outcomes of this process included increased awareness by all involved parties regarding the challenges of writing computable standards and the challenges associated with testing HIT under constrained circumstances, such as with the ONC HIT Certification Program. The recognition of the need for well-defined standards, as well as testing using real-world scenarios and clinical data, led to the development of IGAMT and TCAMT for automating the production of these artifacts; and with these tools came the ability to automate generation of testing resources, such as syndromic surveillance validation tools that are customized to national-level specifications as well as to state/local-level specifications for use in on-boarding procedures. As of early 2017, states with jurisdictions requiring providers to validate the ability of their HIT modules to generate syndromic messages using the NIST national-level Syndromic Surveillance Test Suite in their on-boarding process included Arkansas, Florida, Indiana, Kansas, Maryland, South Carolina, and Washington. Now that a national-level HL7-balloted syndromic surveillance implementation guide has been generated using IGAMT, representatives of several additional PHAs have expressed interest in using the components of the NIST Integrated Platform for generating local-level specifications and testing tools. State and local jurisdictions often require certain data to be submitted in addition to the data required by the national-level specification. Local-level testing tools used during the on-boarding process would enable jurisdictions to validate syndromic messages created by submitters in order to confirm or refute the conformance to the local-level requirements. Conclusions Improving population health and public health surveillance by utilizing the power of data science requires the ubiquitous deployment of standards-based data exchange, that is, interoperability, between the numerous disparate HIT modules in use by providers and PHAs today. NIST has created a development platform that enables the domain experts at the CDC and ISDS to use automated tools to generate national- and local-level syndromic surveillance electronic messaging specifications and the associated testing tools that confirm or refute conformance to the requirements in these specifications. These tools promote interoperability as the foundation for harnessing data science for the benefit of the public and the public health entities that serve them.

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Roles of Health Literacy in Relation to Social Determinants of Health and Recommendations for Informatics-Based Interventions: Systematic Review

Abstract

Objective The objective of this study was to evaluate the impact of efforts made to improve the completeness of select varicella (chickenpox) case investigation variables. Introduction Routine childhood administration of varicella-containing vaccine has resulted in the number of varicella (chickenpox) cases in Pennsylvania falling from nearly 3,000 cases in 2007 to less than 400 cases in 2017. Prior to 2018, the completeness of varicella case investigation data documented in Pennsylvania's electronic disease surveillance system (PA-NEDSS) was not routinely monitored by Department of Health (DOH) staff. A pilot project was initiated in April 2018 to monitor and improve completeness of select varicella case investigation variables. Methods Varicella cases reported to PA-NEDSS during MMWR year 2018 (MMWR weeks 1 – 26) in Pennsylvania (excluding Philadelphia County) with a classification status of probable or confirmed were included in the pilot project (n=223). DOH epidemiology staff prioritized 11 key varicella investigation variables and developed a SAS program to identify cases with missing data, which were summarized in weekly reports and provided to DOH immunization staff for follow-up. DOH immunization staff reviewed missing data reports and communicated with case investigators to reconcile missing data. Varicella case data from the project period were compared with a 10-year baseline to evaluate the 11 targeted variables for change in percent completion. Results Percent completion of all 11 variables improved during the intervention period, with a median relative increase of 10.2% (range: 4.2% — 25.5%) compared to baseline. All but two variables (pregnancy status and number of days hospitalized) exhibited a statistically significant (p<0.05) improvement in percent completion. In addition, among eight variables that include an unknown response option, only one variable (number of varicella vaccine doses received) measured an increase in the percentage of unknown responses during the project period compared with baseline; however, this increase was not statistically significant (p=0.180). Conclusions Prioritization of key varicella investigation variables for improved completion was successful and did not result in significant increases of unknown responses. As varicella cases become less common, varicella case investigation data become increasingly important. Increased completeness of these data will enhance DOH communication of varicella surveillance findings, particularly for severe cases. Based on the success of this interagency collaboration, similar efforts are being developed for additional reportable conditions.

Roles of Health Literacy in Relation to Social Determinants of Health and Recommendations for Informatics-Based Interventions: Systematic Review

Abstract

Objective To identify the correlates of opioids as an underlying cause of death by linking coroner/medical examiner vital death records with emergency medical service (EMS) ambulance run data. By combining death data to EMS ambulance runs, the goal was to determine characteristics of the emergency response—particularly for opioid overdose events—that may connect to increased mortality. Introduction Opioid abuse has increased exponentially in recent years throughout the United States, leading to an increase in the incidence of emergency response activities, hospitalization, and mortality related to opioid overdose. As a result, states that have been hit particularly hard during this period—such as Wisconsin—have allocated considerable resources to addressing this crisis via enhanced public health surveillance and outreach, procurement and administration of medical countermeasures, prescription drug monitoring programs, targeted preventive and acute treatment, first responder and hospital staff training, cross-agency collaboration, and Incident Management System activities. Central to these efforts is the identification of the primary drivers of opioid overdose and death to improve the precision and efficacy of targeted public health interventions to address the opioid crisis. The present study sought to accomplish this end by syncing rich data sources at the point of emergency response (EMS ambulance runs) to ultimate mortality outcomes (vital death records). Methods In the State of Wisconsin, data systems supporting the surveillance of EMS ambulance runs and coroner/medical examiner death records are both maintained under the Department of Health Services, enhancing the ability of public health researchers to connect these records using matched identifiers. Two years of EMS ambulance run data (2016-2017) were matched to three years of vital death records (2016-2018) that listed opioids as a contributing cause of death. Ambulance runs and death records for individuals aged 10 years or younger were removed from the data prior to matching and were not included in the final analytic set. Records between these two systems were matched using patient first and last name, gender, date of birth, and zip code. Ambulance runs for a suspected opioid overdose were identified by mining text fields from EMS primary and secondary impressions as well as incident narrative details that identified an opioid as a likely cause of the event. Ambulance runs resulting in Narcan/naloxone administration were also identified as opioid-related overdose. Coroner/medical examiner death records that identified opioids as a contributing cause were classified as an opioid-related death. Analyses examining correlates of deaths with opioids as a contributing cause focused on patient demographics, Narcan/naloxone administration rates and dosage, date and time of the ambulance run, lag between EMS response and time of opioid-related death, physical location and urbanicity of the incident, and the type of response by EMS personnel (i.e. treated and transported, treated and released, no treatment, patient refusal, DOA). Results From 2016-2017, there were over 800,000 emergency ambulance runs among those aged 11 years and older. Opioid overdose ambulance runs accounted for 1.1% (9,761) of those runs. There were over 100,000 deaths in Wisconsin and 1.7% (1,797) were related to opioids (i.e. opioids were a contributing cause). Linking resulted in 268 people with opioid overdose ambulance runs who had an opioid-related death. Of these, 34% died at the scene of the ambulance run, 12% died later that day, 16% died within a week of the ambulance run, and 37% died after a week. While all of these deaths had a contributing cause of opioids, 97% also had an underlying cause of death of drug overdose. Comparing those who died to those who didn't die, those who died were more likely to be male, younger, and had the event occur on a Saturday. Additionally, while there were no differences in the likelihood of Narcan/naloxone receipt by opioid-related death, individuals who died were more likely to have received multiple Narcan/naloxone doses during the ambulance run than those who did not. Of those who died at the scene, the majority (32%) were aged 30 to 39 years. Of those who died later, the majority (32%) were aged 20 to 29 years. Also, for those who died at the scene, the majority of the events occurred from eight pm to midnight while for those who died later, the majority of events occurred from four to eight pm. Conclusions The majority of linked deaths to opioid ambulance runs were due to an underlying cause of drug overdose with opioids as a contributing cause. This demonstrates that the impressions of the EMS personnel were correct. The fact that so many of those who died did so at the scene highlights the continued need for community naloxone distribution. Additionally, there appear to be characteristic differences between those who died, those who died at the scene, and those who didn't die. The results from this study highlight the benefits of connecting multiple sources of data to facilitate the identification of emergency health care drivers of opioid-related death, but there is still work to be done. Future analyses from this project will seek to link the existing data to hospitalization and post-discharge care records to capture a more complete picture of opioid-related deaths across the entire patient lifecycle. This future work will serve to fill key gaps in the surveillance process, particularly for instances opioid overdose and death where EMS was not called into service.

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Roles of Health Literacy in Relation to Social Determinants of Health and Recommendations for Informatics-Based Interventions: Systematic Review

Abstract

Objective To monitor and improve the data quality captured in syndromic surveillance for Alabama Department of Public Health Syndromic Surveillance (AlaSyS). Introduction The public health problem identified by Alabama Department of Public Health Syndromic Surveillance (AlaSyS) was that the data reflected in the user application of ESSENCE (Electronic Surveillance System for the Early Notification of Community-based Epidemics) was underestimating occurrences of syndromic alerts preventing Alabama Department of Public Health (ADPH) from timely recognition of potential public health threats. Syndromic surveillance (SyS) data in ESSENCE were not reliable for up to a week after the visit date due to slow processing, server downtime, and untimely data submission from the facilities. For AlaSyS, 95 percent of data should be submitted within 24 hours from time of visit, for near real time results. The slow data processing caused latency in the data deeming it less useful for surveillance purposes, consequently the data was not meaningful for daily alerts. For example, if a user ran a report to assess the number of Emergency Department (ED) visits that mentioned heroin in the chief complaint (CC), depending on the status of the data coming from the facility (processing, sending, or offline), the number of visits visible to the user could vary from one to several days. With the opioid epidemic Alabama is currently facing, this delay poses a major public health problem. Methods During the data quality improvement review, AlaSyS PHRA addresses all three data quality metrics: (1) completeness – any data element of interest that is less than 95 percent complete, that field is reported to the facility along with some guidance to reference the Public Health Information Network (PHIN) messaging guide for assistance on how to correct; (2) validity – any data element of interest that is less than 95 percent conforming is flagged for corrections (this is not a very big data quality issue for production or onboarding); and (3) timeliness – data are requested to be sent in a timely manner (i.e., at least once every 24 hours); anything sent more than 24 hours after the visit is highlighted and sent to the facility in a report. Now that quality data is coming into ESSENCE, AlaSyS staff had to address the issue of latency to improve representativeness. AlaSyS has approximately 82 facilities sending data to production. When updates occur from the NSSP or a facility was not sending data in a timely manner, facilities in ESSENCE would appear to be offline. This bottleneck of data being processed caused a backlog of data sometimes in excess of 3 days. For example, the data coming to the ESSENCE platform would, in some cases, appear 7 days after the patient visit. These occurrences led to the development of the AlaSyS "Current Production" spreadsheet. This allows the AlaSyS Team to record the status of each facility in the event data is not current, e.g., a facility temporarily drops from production due to a vendor change or upgrade. At any given moment, AlaSyS staff know the count of facilities in production, regardless of the overall general status. AlaSyS PHRA has developed queries in R Studio to help monitor the data flow status. If the data drops, this is noted on the Current Production spread sheet and AlaSyS staff is aware, even before the disruption of the data flow is reflected in ESSENCE. The query returns the name of facilities that are sending data on a particular date. This has allowed AlaSyS staff to identify data drops earlier. Results After the implementation of the Current Production spread sheet, monitoring of the timeliness metric in syndromic surveillance data has improved. By analyzing the NSSP data validation reports for completeness and validity, and providing feed back to the vendors and facilities, the data quality of what is captured in ESSENCE has also improved. The data quality reports that target the onboarding facilities were used to transition seven facilities (six hospitals and one urgent care) from onboarding to production during the period. The completeness data quality reports were used to validate the completeness metric in order to support the transition to production. The data quality reports that targeted the production data generated conversations between the AlaSyS Team and the facilities regarding barriers that impeded their improvement. The timeliness metric for example, some facilities are set up to send data once every 24 hours. This results in a lag time to ESSENCE of up to almost 48 hours. Facilities may not be able to improve their timeliness measure without incurring a cost from the vendor for an upgrade. In other instances, facilities are able to send in real time. However, at the time of this document, the BioSense platform is only capable of accepting data in 15minute increments for ESSENCE. AlaSyS staff were able to improve representativeness using the Current Production Status spreadsheet. This communication tool allows users more reliability of the data by knowing the status of the facilities in the catchment area on any given day. For example, the user is able to know if a feed is down on a day they want to run a report. That same report, run again later, (when the feed is active) may show up as a fluctuation in the data. Understanding the nature of the data in this scope will help improve and support reliability. AlaSyS PHRA will incorporate the spreadsheet into an Access database to be displayed on the AlaSyS data management internal website. The Current Production Status spreadsheet as a validation tool, also supports the monitoring of the timeliness metric. An internal website for syndromic surveillance data management has been developed so users can be informed of the facility status and the latest data quality reports of each facility. The development of the "AlaSyS Data Intranet" web site will be available for registered ADPH staff who use ESSENCE. The AlaSyS data analysis and reporting (A&R) will be available for users to check the status of the data feed for facilities before making a report. This intranet will provide back door information so the ESSENCE user can have a window of confidence with

the data prior to creating a report. Conclusions By engaging the facilities with the data quality reports, AlaSyS staff was able to find out some of the barriers such as the facility not having funds to upgrade to a more timely system. Also uncovered was acknowledgment the capability (including limitations) of how quickly the NSSP server can process data. For example, while a facility may be able to submit in real time, (as opposed to near-real time) the ability to process data in real time is not option at the time of this document. AlaSyS staff also learned when data is not appearing in ESSENCE, this absence does not necessarily mean that the data is not being sent from the facility. Point to consider also, is the understanding, nature and behavior of the data helps to improve reliability. When reporting using AlaSyS data, it is important to be mindful of the limitations. Developing a check and balance system for data validation to find root cause for proper evaluation and resolve will support improvement to data quality. Utilizing properly calibrated measuring tools helps to ensure that data quality metrics are effective and measuring as intended.

Roles of Health Literacy in Relation to Social Determinants of Health and Recommendations for Informatics-Based Interventions: Systematic Review

Abstract

Objective The purpose of this project is to demonstrate the progress in development of a standardized public health (PH) emergency preparedness and response data ontology (terminology) through collaboration between the Centers for Disease Control and Prevention (CDC), Division of Emergency Operations (DEO), and the Logical Observation Identifiers Names and Codes (LOINC) system. Introduction The U.S. Department of Homeland Security National Incident Management System (NIMS) establishes a common framework and common terminology that allows diverse incident management and support organizations to work together across a wide variety of functions and hazard scenarios1. Using common terminology helps avoid confusion and enhances interoperability, particularly in fast-moving public health (PH) emergency responses. In addition, common terminology allows diverse incident management and support organizations to work together across a wide variety of functions and scenarios1. LOINC is one of a suite of designated standards for the electronic exchange of public health and clinical information. Implementation of LOINC facilitates improvement of semantic interoperability, including unified terminology2. More than 68,100 registered users from 172 countries use LOINC to move interoperable data seamlessly between systems3. The CDC Division of Emergency Operations (DEO) leads development of standardized PH emergency preparedness and response terminology to improve effective and interoperable communications between national and international partners. Realizing the scale of LOINC support and implementation across the global public health arena, CDC DEO collaborates with LOINC to further enhance and harmonize the current PH emergency response terminology and to attain critical PH emergency management and preparedness and response requirements. Methods DEO analyzed 87,863 LOINC terms that were included in LOINC version 2.64, released on 06/15/20183. Access to this LOINC version was obtained through the Regenstrief LOINC Mapping Assistant (RELMA). RELMA is a Windows-based LOINC utility developed by the Regenstrief Institute (Indiapolis, USA) for searching the LOINC database and mapping local codes to LOINC codes4. The relevance of LOINC terminology to PH emergency preparedness and response was assessed through evaluating existing LOINC terminology against terminology specified by the World Health Organization PH Emergency Operation Centers (EOC). The following functions were evaluated: 1) Managing and Commanding; 2) Operating; 3) Planning/Intelligence; 4) Logistics and 5) Finance/Administration5. LOINC terminology was also evaluated against the CDC PH EOC Minimum Data Set (MDS)6 that contains 315 standardized terms. Analysis of fully specified LOINC terms was conducted through assessment of such LOINC term parts (attributes) as the code, name (component), system, method and class. Recommendations of gaps and enhancements were coordinated with LOINC management for inclusion of the new terminology in the release of version 2.65 . Results A new LOINC method, "CDC.EOC", is under development. Currently, the "emergency management incident" terminology presented by LOINC is limited by such characteristics as event type, event location and event name and requires amplification regarding to PH operations (i.e., communication, logistics etc.). As a result of this investigation, emergency management terms are now being classified according to the type of incident or event (i.e., hurricane, outbreak, etc.) under LOINC code 80394-0. Similarly laboratory and clinical terms are being classified under a provisional LOINC code (89724-9). Two panels were created: 1) The emergency medical systems from the National Emergency Medical Services Information System (NEMSIS) was added under the NEMSIS.Panel (n= 177 terms) and 2) the Data Elements for Emergency Departments Systems (DEEDS) panel (n = 152 terms) was added with two subpanels: Attach.ED and Panel.ED. Assessing existing LOINC taxonomy and codification, DEO is working with the LOINC management team on evaluating additional options for reconciliation the PH emergency preparedness and response common information exchange reference model and LOINC standard. This process aims to further improve semantic interoperability of PH emergency preparedness and response information. Conclusions The LOINC terminology standardization is essential for improving PH preparedness and response data exchange and semantic interoperability. Collaboration with the Regenstrief Institute (LOINC) allows CDC to meet the terminology needs of PH emergency management and defines new opportunities for reconciliation data exchange between NIMS partners. This collaborative effort incorporates critically needed PH emergency and preparedness terminology and hierarchical structure in the LOINC standard. References 1.FEMA National Incident Management System. Third Edition, October 2017. At: https://www.fema.gov/media-library-data/1508151197225-ced8c60378c3936adb92c1a3ee6f6564/FINAL_NIMS_2017.pdf 2. US National Library of Medicine. Logical Observation Identifiers Names and Codes (LOINC). At: https://www.nlm.nih.gov/research/umls/loinc_main.html 3. LOINC. The international standard for identifying health measurements, observations, and documents. At: https://loinc.org/ 4. RELMA-the Reginstrief Institute LOINC Mapping Assistant. At: https://loinc.org/relma/ 5.WHO. Framework for a Public Health Emergency Operations Centre. 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Roles of Health Literacy in Relation to Social Determinants of Health and Recommendations for Informatics-Based Interventions: Systematic Review

Abstract

Objective The presenter will demonstrate complex health and environment surveillance data visualization techniques within the CDC's Environmental Public Health Tracking Network. Introduction In 2002, the United States (US) Centers for Disease Control and Prevention (CDC) launched the National Environmental Public Health Tracking Program (Tracking Program) to address the challenges and gaps in the nation's environmental health surveillance infrastructure. The Tracking Program's mission is to provide information from a nationwide network of integrated health and environmental data that drives actions to improve the health of communities. As a primary objective of the Tracking Program, the Environmental Public Health Tracking Network (Tracking Network) was developed as an online surveillance system with data available for 23 topics and over 450 different health, environmental, and population measures. The integration and display of such disparate data can be challenging. For data consumers without scientific training, or even scientists and public health professionals with limited time, it can be difficult to examine and explore the data in an online surveillance system. Additionally, casual data consumers may not require complex data details; a big picture perspective may be appropriate to their needs. The Tracking Network – which applies standardized data, a modern user interface, techniques catering to a variety of data consumers, and best practices in data visualization – provides a dynamic data query system that allows users to visualize different types of environmental health data in numerous ways including a variety of charting, mapping, and graphing options. Methods After the Tracking Program identifies important environmental health topics, data standards are developed to aid in data validation and to ensure consistency and comparability of the data. The data are aggregated into standardized stratifications, summarized, and used to calculate environmental health measures. Visualization requirements for each measure are determined and developed on the Tracking Network. In addition, public health content are developed to provide important context for the user. The final step is the release of the environmental health measures onto the National Tracking Network, where they can be queried, visualized, compared, and analyzed with all of the other environmental health measures on the Tracking Network. Results Launched in 2009, the Tracking Network developed at CDC is home to over 450 standardized environmental health measures spanning 23 topics and multiple years, and can be displayed at a geographic level of state, county, and census tract. The Tracking Network allows data consumers to interpret this data visually using tools including dynamic timeline maps, infographics, advanced charting and a streamlined user interface designed to be simple to use. With varying user levels in mind, this collection of tools provides a variety of avenues for the users to explore the data. Visualization results can be exported and embedded into other websites with data interpretation statements, benchmarks, and other visual cues that allow a broad audience to be able to access to environmental public health surveillance data. Conclusions While the internet contains a wealth of health and environmental datasets, the Tracking Network provides a centralized location to access over 450 environmental health measures and provides a variety of visualization tools to translate the data into useful information. The speaker will present a range of display options available on the Tracking Network, highlight ways to present data for easy understanding and consumption, and provide a brief look into the future of data visualization.

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Roles of Health Literacy in Relation to Social Determinants of Health and Recommendations for Informatics-Based Interventions: Systematic Review

Abstract

Objective To discuss how clinical decision support (CDS) for electronic case reporting (eCR) will evolve over time to provide multiple deployment models Introduction As the knowledge required to support case reporting evolves from unstructured to more structured and standardized formats, it becomes suitable for electronic clinical decision support (CDS). CDS for case reporting confronts two challenges: a) While EHRs are moving toward local CDS capabilities, it will take several years for EHR systems to consistently support this capability; and b) public health-related CDS knowledge, such as Zika infection detection and reporting rules, may differ from jurisdiction to jurisdiction. Therefore, there is an ongoing need to manage reporting rules in a distributed manner. Similarly, there is a need for more decentralized models of CDS execution to overcome some of the disadvantages of centralized deployment and to leverage local CDS capabilities as they become available over the next several years. Methods The Reportable Condition Knowledge Management System (RCKMS) is a project funded by the CDC, through the Council of State and Territorial Epidemiologists (CSTE), to develop a tool that allows jurisdictions to author rules that define whether a patient is reportable for certain conditions. RCKMS includes a Decision Support Service (DSS) that runs the jurisdictions' rules and determines if a patient is reportable, for which condition(s) and to which jurisdiction(s). RCKMS currently plays a significant role in the broader Digital Bridge project that has been working to provide structure and governance around the national planning and implementation effort of eCR. RCKMS is currently a centralized CDS service that can be accessed by EHRs until they all have local CDS capabilities; and a knowledge authoring environment that allows ongoing distributed rule authoring. RCKMS supports the strategy for public health knowledge management, and it will evolve over time to provide the systems and services to satisfy short-, mid-, and long-term public health CDS requirements. In addition, RCKMS will comply with emerging technical standards that support this work. Results RCKMS is currently being deployed as a single, central, national service on the APHL Informatics Messaging Services (AIMS) platform, which is operated and maintained by Association of Public Health Laboratories (APHL). The AIMS platform connects directly with reporters and provides a routing and validation service for incoming and outgoing messages. Two distributed CDS scenarios for decentralized eCR models have been identified. In the first scenario, the Decision Support Service component of the RCKMS software is installed within a clinical organization (as it would be in a centralized service) and executed locally. The second distributed CDS scenario for eCR involves the distribution of the Reporting Specification rules without the software. In this scenario, local electronic health record (EHR) implementations would be required to consume the Reporting Specifications and utilize them in a CDS capability within their EHR. Conclusions It is expected that given the diversity of organizations, systems, and architectures in the United States that multiple deployment scenarios for CDS for eCR will be simultaneously deployed for the foreseeable future. It cannot be stressed enough, however, that in all scenarios – centralized and distributed – there must be a centralized and uniform authoring of the Reporting Specification rules, since the specifications themselves originate from public health through a centralized process and must be administered nationally through a well-established process. It is also essential that all sites have all the rules available to them, since there may be multiple jurisdictions whose rules and reporting is required, with the determination of jurisdiction(s) based on where a patient lives and where they receive care.

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Abstract

Objective Our project goal is to enhance the capability of automating health surveillance[MOU1] by US Department of Defense (DoD) epidemiologists. We employ software tools that build and train Bayesian networks (BNs) to facilitate the development of analytic fusion of multiple, disparate data sources comprising both syndromic and diagnostic data streams for rapid estimation of overall levels of concern for potential disease outbreaks. Working with previously developed heuristic BNs, we evaluate the ability of machine learning algorithms to detect outbreaks with greater accuracy. We use historical training data on the ability to detect outbreaks of influenza-like illness (ILI). Introduction The motivation for this project is to provide greater situational awareness to DoD epidemiologists monitoring the health of military personnel and their dependents. An increasing number of data sources of varying clinical specificity and timeliness are available to the staff. The challenge is to integrate all the information for a coherent, up-to-date view of population health. Developers at the Johns Hopkins Applied Physics Laboratory, in collaboration with medical epidemiologists at the Armed Forces Health Surveillance Branch, previously designed a multivariate decision support tool to add to the DoD implementation of the Electronic Surveillance System for Early Notification of Community-Based Epidemics (ESSENCE). Data sources included clinical encounter records including free-text chief complaints, filled prescription records, and laboratory test orders and results. Filtered data streams were derived from these sources for daily monitoring, and alerting algorithms were customized and applied to the resulting time series. We built BNs to derive overall levels of concern from the collection of data streams and algorithm outputs to derive, in the form of daily fusion alerts, the overall level of various outbreak concerns. Visualizations made apparent which data features accounted for these concerns, including drill-down to the level of patient record details. Advantages of the BN approach are this transparency and the capacity for assessments using incomplete data and incorporating novel and report-based data streams. The need for such fusion was nearly unanimous in a global survey of public health epidemiologists [1]. Our proof-of-concept system based on commercial BN software was well received by a cross-section of DoD health monitors. The new software tools we apply in this project use freely available R packages which provide more comprehensive tools for BN training and development. These results will allow us to improve the analytic fusion abilities of DoD ESSENCE, as well as in civilian surveillance systems Our testing procedures and results are presented below. Methods We employ a 3.75-year dataset (2006-2010) with information from 502 US medical treatment facilities including 289 hospitals. Our data include time series of daily counts and alerting algorithm outputs from each facility for syndrome groups based on a) chief complaints and diagnosis codes from clinic visits, b) groups of laboratory test orders and influenza test results, and c) selected groups of filled prescriptions. For each facility group, the challenge is to combine these data streams into a daily assessment of levels of concern for an ILI outbreak. The software developed in this project facilitates the formation, training, and testing of BNs for outbreak alerting based on the datasets above. Underlying each BN is a directed acyclic graph whose leaf nodes represent discrete states of concern for each data stream, ranging from general streams such as ILI-related chief complaints to specific ones such as positive flu test results. The states are derived from both daily stream counts and alerting algorithm outputs. Internal nodes represent mid-level combinations of indicators, such as ILI concern based only on clinic data, and parent nodes which represent the calculated level of concern based on all data sources. The connectivity between the nodes, and the orientation of the edges of the graph are determined by the heuristic relationships adopted in previous projects [2]. Each node is associated with a conditional probability table (CPT). Training a BN requires state assignments for every node in the underlying graph, which must be obtained from a trusted source. These assignments can generate CPTs at each node of the BN such that, when given only a set of evidence nodes, the levels of concern can be propagated up the network to provide the desired levels of concern at the decision nodes. Truth data for ILI outbreaks comes from two sources: 33 documented outbreaks with dates supplied by DoD surveillance reports or media articles and, because many modest-sized outbreaks are unreported, 81 unconfirmed data-derived events with algorithmic alerts across multiple data sources. We use data from the more numerous unconfirmed events to train the BNs. To avoid commercial software constraints, we use the free R package gRain [3] to create, train, and test the BNs. We test multiple BNs for multivariate ILI outbreak detection, all based on the same nodal structure with 18 parent, intermediate, and leaf nodes. Candidate BNs are created and trained using either a) CPTs determined with a multivariate stochastic search in the previous project, augmented with ground truth data or b) a heuristic lookup table of state combinations. Results Table 1 shows the high odds ratios calculated for candidate BNs. These statistics are calculated for decision node outputs for event vs non-event dates in the truth data with the constraint that every event is detected for at least one date. The machine learning advantage from the training data is evident from comparing the two rows. To show the advantage of fusing data sources, Table 2 gives analogous odds ratios based on single-stream alerting algorithms. Aside from the lower detection statistics, single streams offer no corroboration of statistical alerts. Conclusions Analytic fusion is essential for the efficient, timely use of a growing collection of complex, streaming information by a limited workforce of human health monitors. This project builds upon

previous fusion capability for automated health surveillance by expediting new development and facilitating software implementation through open source tools. The detection results indicate a significant advantage in both sensitivity and alert rates of automated systems achievable with machine learning. Moreover, if basic challenges of multivariate data acquisition and determination of truth datasets for supervised learning can be met, further improvements are likely using BN structure discovery methods as well as other machine learning approaches. References 1. Hopkins RS, Tong CC, Burkom HS, et al. A Practitioner-Driven Research Agenda for Syndromic Surveillance. Public Health Rep. 2017;132(1_suppl):116s-126s. 2. Burkom H.S., Elbert Y., Ramac-Thomas L., Cuellar C., Hung V., Refinement of a Population-Based Bayesian Network for Fusion of Health Surveillance Data, Online Journal of Public Health Informatics, Vol 5, No 1 (2013), DOI: https://doi.org/10.5210/ojphi.v5i1.4413. 3. Højsgaard S., Graphical Independence Networks with the gRain Package for R, Journal of Statistical Software, (2012) 46(10), DOI: 10.18637/jss.v046.i10.

Roles of Health Literacy in Relation to Social Determinants of Health and Recommendations for Informatics-Based Interventions: Systematic Review

Abstract

Objective If public health agencies used direct communication channels to individuals by building on existing immunization networks, the public would receive correct information quicker during a pandemic. Furthermore, there is value that can be leveraged from social networks to advance public health efforts to manage disease events and encourage consumers being more proactive in managing their own health care. Introduction Epidemiologists and public health professionals work to ensure the risk and impact of existing and emerging diseases are minimized and do not turn into a pandemic. Timely and accurate information has become imperative as the world has become more interconnected through travel and technology. Recently, new information systems have played a key role in improving public health's early warning and case management for disease outbreaks. Improved analytics to predict risk in populations have helped researchers open new doors to disease cures and medicines. The role of technology and public health to support these efforts has become more valuable. Health information systems are traditionally used for electronic medical records or payer billing systems and are not paired with technology advancements. Efforts today to link information and technology to engage consumers are championed by health plans and healthcare providers. Empowering individuals to be proactive when presented with their medical records is not a simple problem to solve. Information must be actionable but it still may not achieve the desired success. What if the health community engaged consumers with a social mission to help them fight disease outbreaks by becoming frontline activists to report occurrences and outcomes, and become "intelligent connections" to extend the right information to their social networks? This would encourage consumer technology to be better integrated with health information technology with continued investment in sustaining critical public health ecosystems. A large part of health information systems are immunization information systems (IIS) where administered vaccines are documented in a confidential computer based system in a specific geographic area1. The IIS can be used for disease surveillance purposes and provide valuable information to public health authorities2. Recently, MyIR was created where any IIS, pharmacy or provider can provide patients direct access to family immunization records. Providers can communicate to patients using MyIR to increase engagement and send vaccine reminders. Methods A public-health engagement approach to empower consumers begins by offering individuals a mission they care about that will contribute to the social good and make them more attentive to their own healthcare. Our approach was to place a mission for every cell phone owner by using a commonly understood health event. The most significant public health event in the 20th century was the power of vaccines and the most significant action an individual can take to reduce their risk of a vaccine-preventable disease is to stay up-to-date on their immunizations3. However, there is a gap between believing in the value of immunizations and ensuring one's immunizations are current. The challenge is to engage individuals, empower them to be advocates of their own health and in an outbreak, become sources of trusted public health messages as they communicate in their social network. A few experiments were conducted using MyIR. Increase Sustainment Users who had not used MyIR in over 30 days were contacted. The baseline looked at users that were logging into MyIR more than once a month. The target was non-engaged users which were about 8,000 accounts. Customer Engagement I In November 2017, an email was sent to 7,772 users that asked them, \"Did you get your flu shot?\" If they clicked Yes, they received positive affirmation. If they clicked No, the message was an encouragement to get their flu shot before Thanksgiving 2017. Customer Engagement II In January 2017, a Healthy Lifestyle page was created within MyIR. It featured a food blogger who offers readers nutritious easy meal ideas. Outreach Efforts MyIR Louisiana users were targeted who had failed to complete the two step enrollment process to access their immunization histories. Efficacy of Flu In April 2018, 212 MyIR users in Washington and Louisiana were asked: Did you get a flu shot this year? Do you feel like you got the flu this year? Results Increase Sustainment 27% of people opened the email and 3.6% of these individuals used MyIR within 30 days to access their records. Customer Engagement I 9% answered the question with 80% saying "YES" they got their flu shot. As a result, 25 new immunizations were administered to these individuals within 60 days. Customer Engagement II A 7.1% increase in returning users were tracked and a 9.1% increase in engaged users. There was a 6.7% increase in average session duration. Outreach Effort 556 emails were sent which contained instructions to finalize enrollment for MyIR. There was a 30% open rate and 50 individuals completed the process. Efficacy of Flu 78% responded they did receive the flu shot this year. Of these, 61.5% felt they got the flu this year which equates to a 38.5% efficacy rate. In February, CDC had determined the interim estimates for the effectiveness of the influenza were 36%4. Conclusions Our aim was to show examples where public health agencies using direct communication channels to individuals could increase the efficacy of reaching the public with correct information. It was not designed to prove to be statistically effective but to show the potential of engaging individuals that have access to their immunization records. These early experiments and the growing data assets in IIS"s help create a framework and technical platform to accelerate the potential value of engaging individuals in response plans for pandemic preparedness. Immunization information systems and technology have reached a point where information is available across wide networks of stakeholders. While health plans, providers and

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pharmacists struggle to engage their networks, by encouraging patients to be proactive in their healthcare, public health immunization assets may be the tipping point to accelerate this movement. Continued investment of immunization programs, private sector innovation, and consumer empowerment are essential to evolve and sustain data assets. As these assets create added value to each stakeholder, the investment will create a positive return. The value of this virtual ecosystem is untapped and opportunities to use it to drive down healthcare costs and improve patient outcomes are unlimited. References 1. Centers for Disease Control Prevention (CDC). About Immunization Information Systems. Atlanta: CDC; 2012 May 15 [Cited 06 Jun 2018]. Available from: http://www.cdc.gov/vaccines/programs/iis/about.html 2. Derrough T, Olsson K, Gianfredi V, et al. Immunisation Information Systems – useful tools for monitoring vaccination programmes in EU/EEA countries. Eurosurveillance [Internet];22(17):30519. Available from: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5434883/#r1 3. Centers for Disease Control and Prevention (CDC). Ten great public health achievements--United States, 1900-1999. MMWR Morb Mortal Wkly Rep [Internet]. 1999 Apr 2;48(12):241-3 [Cited 06 Jun 2018]. Available from: https://www.cdc.gov/mmwr/preview/mmwrhtml/00056796.htm 4. Morbidity and Mortality Weekly Report (MMWR): Interim Estimates of 2017-18 Seasonal Influenza Vaccine Effectiveness – United States, February 2018. Centers for Disease Control and Prevention [Internet]. 2018 Feb [Cited 2018 Apr 24]. Available from: https://www.cdc.gov/mmwr/volumes/67/wr/mm6706a2.htm

Roles of Health Literacy in Relation to Social Determinants of Health and Recommendations for Informatics-Based Interventions: Systematic Review

Abstract

Objective We aim to better understand online social interactions and environments of individuals interested in weight management from a social media platform called Reddit. Introduction Overweight and obesity are recognized as one of the greatest modern public health problems1, yet worldwide prevalence of obesity has nearly doubled over the past 30 years2. As part of a strategy to control the obesity pandemic, the WHO recommends an obesity surveillance at the population level3. Empirical studies have shown the importance of social networks in obesity4 and new strategies focusing on social interactions and environments have been proposed5 to prevent the further increase in obesity prevalence. With the increasing use of the internet, online social networks, interactions, and environments (i.e., online social relational factors) deserve more attention. Nearly three- quarters of Americans go online daily6, for functions like connecting with individuals via social network sites7. Like face to face interactions, studies have suggested that social interactions and networks on the internet can influence behavior changes8. Previous studies examining social networking sites typically examine a few selected social networking sites (example studies9,10), although individuals could be members of multiple social networking sites. To better leverage online social relational factors for the purpose of characterizing and monitoring population obesity trends, we investigate weight management community members' other communities and their level of participation, a first step toward utilizing online multifactorial social interactions and environments. Methods In this study, we studied Reddit (http://www.reddit.com), a popular social interaction site, because Reddit hosts many subreddits (i.e., sub-communities), including weight management communities called r/loseit. First, we use a dataset11 — made available on Reddit — that had been used in many informatics studies12–14. For this study, we used a portion of the dataset from Jan 2015 to May 2015. In the first five months of 2015, 5,006,186 members were active in 96,462 subreddits, while submitting 17,851,561 posts and 266,268,920 associated comments. Second, we identified members with more than 3 posts on r/loseit in that period and removed 'bot' accounts by manually examining the top 20 frequent posters and their account IDs. Third, we extracted these members' entire discussions made on Reddit, regardless of the subreddits. Fourth, we identified these members' overall activities on Reddit and visualized in a network15. Results After removing bot accounts, we identified 7,734 members who had more than 3 posts in r/loseit from Jan 2015 to May 2015. On average, these members participated in 78.5 subreddits (standard error: 0.1; median: 49.0), while participating in 13,649 unique subreddits as a whole. Members' participated subreddits are summarized in Figure 1. The size of the nodes represents the number of participating members and the thickness of edges represents the number of members who participated in both subreddits. Conclusions We present preliminary findings towards better understanding the online multifactorial social interactions and environments on a social networking site called Reddit. We provide evidence that members encounter many social interactions that occur outside of the community of our interest, the weight management community. However, what members discuss outside of the weight management community as well as the interactions' influence on weight managements and changes remain unanswered. For example, many members also participate in a subreddit called r/fitness, a community that could share many similar interests with r/loseit. However, the purpose for participating in both communities is unknown. 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Abstract

Objective To utilize New Jersey's syndromic surveillance data in the study and comparison of trends in injection opioid use and infection with selected bloodborne pathogens (BBPs) over the years 2013-2017. Introduction When the opioid epidemic began in the early 1990s, pills such as oxycodone were the primary means of abuse. Beginning in 2010, injection use of, first, heroin and then synthetic opioids dramatically increased, which led the number of overdose deaths involving opioids to increase fivefold between 1999 and 2016.1 It would be expected that BBP rates would rise with this increase in injection use, and, nationally, there has been a rise in acute hepatitis C (HCV) rates, although the other two main BBPs, acute hepatitis B (HBV) and acute human immunodeficiency virus (HIV) have been flat and declining, respectively.2,3 In this study, we compared New Jersey's reported incidence of these three BBPs (acute HBV, acute HCV, and HIV) over five years (2013-2017) with syndromic surveillance data for opioid use over the same time period in order to test the hypothesis that emergency department (ED) visits for opioid use could be used as a predictor of BBP infection. Methods To indirectly track the number of injection opioid users, we wrote a custom classifier for EpiCenter, New Jersey"s statewide syndromic surveillance system, to search ED chief complaints for the number of visits related to injection opioid usage. Our custom classifier creation started with the CDC's National Syndromic Surveillance Program (NSSP) ESSENCE Chief Complaint Category classifier for opioid overdose.4 As we were looking to count not just overdoses but all visits likely to be associated with injection drug use, we chose not to omit the keyword "withdrawal," differing from CDC's classifier in which it is a negative indicator. Positive indicator keywords included "opioid," "heroin," "narcot," "opiate," "fentanyl," "naloxo," "narcan," \"ivdu,\" and the ICD-9 and ICD-10 codes e850.[0-2], 304, 305.5, f11, t40.[0-6], and 965. These keywords were used to target the chief complaints of people using injection opioids. Negative indicators included "patch," "allerg," and "med" to eliminate medical opioid use. Negative indicators also included "vicodin," "tramadol," "percocet," "oral," and t40.5 to filter out opioids most commonly used in pill form, as well as other drugs. Cases of acute HCV and acute HBV were totaled using CDRSS, New Jersey"s Communicable Disease Reporting and Surveillance System. In order to maintain consistency, we used the respective 2012 case definition for each disease. Numbers of new HIV infections were accessed from NJ's reportable disease list.5 All of the data sets followed the epidemiologic years 2013–2017 (based upon MMWR weeks). Results HIV diagnosis rates slightly decreased over time. HBV rates trend upwards, similar to the rates of injection drug use (IDU) for the first three years but start to drop after 2015. Aside from an unexplained dip in 2016, the HCV rates generally track the EpiCenter data for IDU (Figure 1). On a regional scale, NJ's Northwest region had the highest rates per capita of the five NJ regions and the most similar trending between the HCV and EpiCenter data sets (Figure 2). This result follows the nationwide trend of the opioid epidemic occurring more widely in rural areas, as this region is the most rural region in New Jersey.6 In figures 1 & 2, IDU (EpiCenter) and HIV are plotted on the primary (left) axis and HCV and HBV are plotted on the secondary (right) axis. Conclusions Both IDU related visits and cases of acute HCV show an ongoing upward trend. This result agrees with the initial hypothesis. However, the association between acute HBV cases and IDU wasn't as strong. This finding can be attributed to the fact that while HBV is a BBP, it is most commonly transmitted vertically from an infected mother to her child at birth, whereas HCV is primarily transmitted through the sharing of needles or syringes.7,8 There is no apparent relationship between HIV rates and injection drug rates, likely because HIV has a 0.3% infection risk rate from a single infected needlestick versus the 1.8% risk of acquiring HCV and 22-31% risk of acquiring HBV.9 References 1. Centers for Disease Control and Prevention (CDC), Understanding the Epidemic; August 30, 2017. https://www.cdc.gov/drugoverdose/epidemic/index.html. Accessed 13 July 2018. 2. CDC, Viral Hepatitis; May 19, 2016. https://www.cdc.gov/hepatitis/hbv/statisticshbv.htm. Accessed 24 July 2018. 3. CDC, HIV in the United States: At A Glance; June 26, 2018. https://www.cdc.gov/hiv/statistics/overview/ataglance.html. Accessed 24 July 2018. 4. 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Abstract

Objective To investigate whether Twitter data can be used as a proxy for the surveillance of the seasonal influenza epidemic in France and at the regional level. Introduction Social media as Twitter are used today by people to disseminate health information but also to share or exchange on their health. Based on this observation, recent studies showed that Twitter data can be used to monitor trends of infectious diseases such as influenza. These studies were mainly carried out in United States where Twitter is very popular1-4. In our knowledge, no research has been implemented in France to know whether Twitter data can be a complementary data source to monitor seasonal influenza epidemic. Methods For this exploratory study, an R program allowing to the collection, pre-processing (geolocation and classification) and analysis of Tweets related to influenza-like illness was developed. Collection Stream API was used to collect Tweets in French language that contained terms "grippe","grippal", "grippaux" without to specify geolocation coordinates. Pre-process In order to identify Tweets localized in France, a combination of automated filters has been implemented. At the end, were retained: ● Tweets with geolocation coordinates in France (GPS coordinates, country code, country, place name) ● Tweets whose place indicated in user's profile matched with a city, department or region of France ● Tweets included FR-related time zone but excluding all Tweets reporting a FR time zone but a non-FR place-code. In the second time, a support vector machine (SVM) classifier was used to filter out noise from the database. To train the classifier, 1500 Tweets were randomly sampled. Each of these 1500 training Tweets was manually inspected and tagged as valid or invalid according to the likelihood that they indicated influenza-like illness. This hand-tagged training set was converted to vector representation using their term-frequency-inverse document frequency (TF-IDF) scores. These TF-IDF vectors were then input to the SVM for training. To evaluate performances of the classifier: accurency, recall and F- measure were calculated from a 1000 randomly sampled Tweets manually tagged. Analysis Data collected over the period from August 8, 2016 to March 26, 2017 were compared to those of the French syndromic surveillance system SurSaUD® (OSCOUR® and SOS Médecins network)5 by Spearman"s rank correlation coefficient. Ethical In accordance to the National Commission on Informatics and Liberty, information about user account were removed in database except location variables. Usernames contained in the text of the tweet have also been deleted. Results Over the study period, the system collected 238,244 influenza-related Tweets of which 130,559 were located in France. After a cleaning step, 22,939 Tweets were classified by the algorithm as an influenza-like illness (ILI). The performances of the classifier were 0.739 for accuracy, 0.725 for recall and 0.732 for F-measure. Figure 1 shows that the weekly number of ILI Tweets follows the same trend as the weekly number of ED visits and physicians consultations for ILI. Regardless of data source, Spearman"s correlation coefficients were positive and statistically significant at the national level and for each region of France (Table 1). Conclusions This exploratory study allowed to show that Twitter data can be used to monitor the epidemic of seasonal influenza in France and at regional level, in complementarity with existing systems. The system needs to be improved to confirm the trends observed during the next influenza epidemic. References 1.Broniatowski DA, Paul MJ, Dredze M. National and local influenza surveillance through Twitter: An analysis of the 2012-2013 influenza epidemic. PLoS One. 2013;8(12):e83672. 2.Gesualdo F, Stilo G, Agricola E, Gonfiantini MV, Pandolfi E, Velardi P, et al. Influenza-like illness surveillance on Twitter through automated learning of naïve language. PLoS One. 2013;8(12):e82489. 3. Paul MJ, Dredze M, Broniatowski D. Twitter improves influenza forecasting. PLoS Curr. 2014;6. 4. Allen C, Tsou MH, Aslam A, Nagel A, Gawron JM. Applying GIS and machine learning methods to Twitter data for multiscale surveillance of influenza. PLoS One. 2016;11(7):e0157734. 5. Ruello M, Pelat C, Caserio-Schönemann C, et al. A regional approach for the influenza surveillance in France. OJPHI. 2017;9(1):e089.

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Abstract

Objective We aim to better understand socio-cultural factors (i.e., attitudes or perceptions of cultural groups) associated with food consumption and weight loss via sentiment analysis on tweets, short messages from Twitter. Introduction Obesity can lead to the death of at least 2.8 million people each year1, yet the rate of obesity around the world has continuously increased over the past 30 years1. Societal changes, including increased food consumption and decreased physical activity, have been determined as two of the main drivers behind the current obesity pandemic2. Examining socio-cultural factors (i.e., attitudes or perceptions of cultural groups)3 associated with food consumption and weight loss can provide important insights to guide effective interventions and a novel surveillance approach to characterize population obesity trends from sociological perspectives. The primary goal of this study is to examine socio-cultural factors associated with food consumption and weight loss by conducting sentiment analysis on related online chatters. The secondary goal is to discuss the potential implications of being exposed to these different chatters in the online environment. Scientific evidence in support of using social media to understand socio-cultural factors and its potential implications can be illustrated in two concise assertions. First, online chatters, including discussions on social media, have been shown to be an effective data source for understanding public interests4,5. Second, prolonged participation in social media has been suggested to have impacts on users6–8. Methods In this study, we examined Twitter (www.twitter.com), a highly popular, free-to-use, micro-blogging social media platform that can instantly broadcast short messages to the world. These short messages are called Tweets and we collected weight loss related and food consumption related Tweets using Python library called Tweepy9. We used hashtags from a previous study10, including #weightloss, #diet, #fitness, and #health for collecting weight loss related tweets. Similarly, we used #Food, #FoodPorn, and #Foodie to collect food consumption related tweets. We then used a rule-based model called Vader11, a sentiment analysis tool (i.e., computational process of categorizing sentiment) developed for social media text, to measure tweets' sentiment. We used the compound score, which is a normalized and weighted composite score that ranges from -1.0 (most negative) to 1.0 (most positive). Lastly, we conducted independent sample t-test to compare the sentiments of two types of tweets. Results We collected 81,535 (from 41,436 unique user ID) weight loss related tweets from August 30th to September 2nd of 2018 and 86,277 (from 36,977 unique user ID) food consumption related Tweets from August 28th to September 2nd of 2018. The mean sentiment score for weight loss related tweets was 0.17 (sample standard deviation: 0.39), whereas the mean sentiment for food consumption related Tweets was more positive, scoring 0.26 with sample standard deviation of 0.34. The independent sample t-test suggests that the sentiment difference between the two types of tweets is statistically significant (t=52.10, p < .001). However, it is important note that the mean sentiment for both types of tweets was in the positive range. Conclusions We present preliminary findings concerning socio-cultural factors associated with food consumption and weight loss within twitter chatters. Our initial results suggest that individuals expressed more positive sentiment when tweeting about food consumption than when tweeting about weight loss. The results not only reflect the social norms of social media, Twitter in this particular study, but also suggest how social media can indirectly promote more food consumption over weight loss via social norms theory12 and how online social norms can reach individual members. This is especially important for young adults, the main demographic user group for social media13, as they develop lasting health related habits and behaviors. Although in its infancy, our research suggests that online sociocultural environment could be a potential socio-environmental risk factor for obesity. The next step is to utilize the findings to create online sociocultural environment that can promote the healthy choices. References 1. World Health Organization. Global Health Observatory (GHO) data: Obesity [Internet]. 2009. 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Roles of Health Literacy in Relation to Social Determinants of Health and Recommendations for Informatics-Based Interventions: Systematic Review

Abstract

Objective To describe the latest revisions and modifications to the "HL7 2.5.1 Implementation Guide for Syndromic Surveillance" (formerly the PHIN Message Guide for Syndromic Surveillance) that were made based on community commentary and resolution of feedback from the HL7 balloting process. In addition, the next steps and future activities as the IG becomes an "HL7 Standard for Trial Use" will be highlighted. Introduction In 2011, the Centers for Disease Control and Prevention (CDC) released the PHIN Messaging Guide for Syndromic Surveillance v. 1. In the intervening years, new technological advancements including Electronic Health Record capabilities, as well as new epidemiological and Meaningful Use requirements have led to the periodic updating and revision of the Message Guide. These updates occurred through informal and semi-structured solicitation and in response to comments from across public health, governmental, academic, and EHR vendor stakeholders. Following the Message Guide v.2.0 release in 2015, CDC initiated a multi-year endeavor to update the Message Guide in a more systematic manner and released further updates via an Erratum and a technical document developed with the National Institute of Standards and Technology (NIST) to clarify validation policies and certification parameters. This trio of documents were consolidated into the Message Guide v.2.1 release and used to inform the development of the NIST Syndromic Surveillance Test Suite (http://hl7v2-ss-r2-testing.nist.gov/ss-r2/#/home), validate test cases, and develop a new rules-based IG built using NIST's Implementation Guide Authoring and Management Tool (IGAMT). As part of a Cooperative Agreement (CoAg) initiated in 2017, CDC partnered with ISDS to build upon prior activities and renew efforts in engaging the Syndromic Surveillance Community of Practice for comment on the Message Guide. The goal of this CoAg is have the final product become an "HL7 Standard for Trial Use" following the second phase of formal HL7 balloting p in Fall 2018. Methods ISDS coordinated a multi-stakeholder working group to revisit the consolidated Message Guide, v.2.1 and collect structured comments via an online portal, which facilitated the documentation, tracking, and prioritization of comments for developing consensus and reconciliation and resolution when there were errors, conflicts, or differing perspectives for select specifications. Over 220 comments were received during the most recent review period via the HL& balloting process (April – June 2018) with sixteen elements captured for each comment, which included: Subject, Request Type, Clinical Venue Application, Submitter Name, IG Section #, Priority, Working and Final Resolution (Figure 1). The online portal was used to communicate with members of the Message Guide Workgroup to provide feedback directly to one another through a 'conversation tab'. This became an important feature in teasing out underlying concerns and issues with a given comment across different local, state, and private sector partners (Figure 2). Some comments were able to be fully described and resolved using this feature. Following the HL7 balloting period, ISDS continued the weekly webinar-based review process to delve into specific issues in detail. Each week ISDS staff would lead the webinars structured around similar comment types (e.g. values sets, DG1 Segments, IN1 Segments, Conformance Statements, etc.). This leveraged the expertise of individuals and institutions with concerns revolving around a specific domain, messages segment, or specification described within the Message Guide. Comments for which consensus and resolution was achieved were "closed-out' on the portal inventory and new assignments for review would be disseminated across the Message Guide Workgroup for consideration and discussion during the subsequent webinar. Results To date this review process has identified and updated a wide-range of specification and requirements described within the Message Guide v.2.0. These include: specifications for persistent patient ID across venues of service, inclusion of the ICD-10-CM value set for diagnosis, removal of the ICD-9-CM requirement for testing and messages, modification of values such as pregnancy status, travel history, and medication list from "O" to "RE", and the update of value sets and PHIN VADS references for FIPS, SNOmed, ICD-10-CM, Acuity, Patient Class, and Discharge Disposition. Conclusions The results of this multi-agency comment and review process will be synthesized and compiled by ISDS. The updated version of the Message Guide (re-branded to the HL7 V 2.5.1 Implementation Guide for Syndromic Surveillance) will go through a second round of review and commentary thru HL7 in Fall 2018. This systematic and structured review and documentation process has allowed for the synthetization and reconciliation of a wide range of disparate specifications, historical hold-overs, and requirements via the perspectives of a diverse range of public health partners. As this review process continues it is anticipated that the final HL7 balloted "Standard for Trial Use" IG 2.5 will represent a more refined and extensible product that can support syndromic surveillance activities across a wider and more diverse range of clinical venues, EHR implementations, and public health authorities. ISDS and CDC have recommended that future modifications to the Promoting Interoperability (PI) Programs (formerly Meaningful Use) reference and require the utilization of the revised Implication Guide for Certification. The HL7 2.5.1 Implementation Guide can be found: https://cdn.ymaws.com/www.healthsurveillance.org/resource/resmgr/docs/Group_Files/Message_Guide/IG_SyS_Release_1.pdf

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Roles of Health Literacy in Relation to Social Determinants of Health and Recommendations for Informatics-Based Interventions: Systematic Review

Abstract

Objective To describe and provide examples of the Electronic Surveillance System for the Early Notification of Community-based Epidemics (ESSENCE) application programming interface (API) as a part of disease surveillance workflows. Introduction The ESSENCE application supports users' interactive analysis of data by clicking through menus in a user interface (UI), and provides multiple types of user defined data visualization options, including various charts and graphs, tables of statistical alerts, table builder functionality, spatial mapping, and report generation. However, no UI supports all potential analysis and visualization requirements. Rapidly accessing data processed through ESSENCE using existing access control mechanisms, but de-coupled from the UI, supports innovative analyses, visualizations and reporting of these data using other tools. Methods The ESSENCE API gives users the ability to query ESSENCE data and functionality via a Representational State Transfer (REST) web API designed to use HTTPs protocol. As with logging into the ESSENCE application normally, use of the API also requires users to authenticate with their username and password by including it in the code. This makes programmatic interfaces with the application possible whereby a tool or program makes a request to the API endpoint and the API returns the result of the query in a structured form. The ESSENCE API is a collection of endpoints that return different sets of data, including ESSENCE time series graphs, time series data, data details data, aggregated data created using the table builder functionality, number of unique facilities or regions (i.e. counties) reporting for a query, and results from the detector algorithms and alert list. All of the query parameter information is stored in the API URL, which the user can create programmatically or by first creating their query from within ESSENCE, and then clicking the "API URL" to generate the necessary URL. API results are generally available in both json and csv formats. Results Epidemiologists in the CDC NSSP have developed R code that uses these APIs to create customized Rmarkdown reports and visualizations not possible within the ESSENCE application, as well as to automate extraction of data from ESSENCE to support routine reporting for other CDC program areas (e.g., influenza-like illness, and suspected opioid encounters). Anecdotally, some Sites utilize the API to populate publically facing dashboards with aggregated data from ESSENCE. Programmatic access to processed ESSENCE data via the APIs also supports easily sharable exploratory analysis and visualization that can serve as a sandbox for testing new methods for future inclusion within ESSENCE. Conclusions The development and use of the ESSENCE APIs in public health surveillance will support more efficient and timely access to machine-readable data de-coupled from point and click user interfaces, and has the potential to spur new and innovative ways of using data that has traditionally been less programmatically accessible to users. New tools and programs can leverage the data in web or mobile applications, traditional reports, and more easily integrate disparate data sources for comprehensive surveillance.

Roles of Health Literacy in Relation to Social Determinants of Health and Recommendations for Informatics-Based Interventions: Systematic Review

Abstract

Objective To describe the use of uni-grams, bi-grams, and tri-grams relationships in the development of syndromic categories. Introduction The use of syndromic surveillance systems has evolved over the last decade, and increasingly includes both infectious and non-infectious topic areas. Public health agencies at the national, state, and local levels often need to rapidly develop new syndromic categories, or improve upon existing categories, to enhance their public health surveillance efforts. Documenting this development process can help support increased understanding and user acceptance of syndromic surveillance. This presentation will highlight the visualization process being used by CDC's National Syndromic Surveillance Program (NSSP) program to develop and refine definitions for syndromes of interest to public health programs. Methods Development of a syndromic definition is an iterative process that starts with an analyst testing how different terms, which are assumed to be associated with the topic of interest, and diagnostic codes are noted in the chief complaint and discharge diagnosis code fields. The analyst then manually scans through the resulting line list of patient chief complaint text and diagnostic codes to determine whether the query terms match the intended syndromic concept. Typically, more terms and diagnostic codes are then added to the query using Boolean operators, and other terms are negated and removed. To facilitate summarization of the resulting terms and diagnostic codes CDC's NSSP program developed programs with R that extracted data using the ESSENCE application programming interface (API), and the chief complaint query validation data source (CCQV). We use N-gram analysis, which is extensively used in text mining, to show co-occurrences of words in a consecutive order. The co-occurrences of words can be a uni-gram which represents a single word, bi-gram for two words, and tri-grams for three words. The process tokenizes the chief complaint text and diagnosis code fields, with some pre-processing of the text and removal of stopwords. Uni-grams, bi-grams, and tri-grams are then calculated for the top 200 combinations along with term and diagnostic code co-occurrence. Other visualizations that can be used are network graphs, which show the connections between different chief complaints terms and also between discharge diagnosis codes and chief complaint terms. The use of these graphs provides an insight into the frequency and relationship between terms and codes. Results To support the development of new syndrome definitions we used the R program to produce two time series graphs. The first time series graph is used to show the volume of visits over the user's indicated time period and the second shows the median chief complaint compared over the user's indicated time period. A series of histograms showing frequency of the uni-gram, bi-grams, and tri-grams are also used during the development process. Lastly, two network diagrams are used to show the co-occurrence between term and diagnostic codes. The use of this range of graphs during the syndrome definition development process provides multiple ways to view the characteristics of the chief complaint and discharge diagnosis fields. The sample graphs below can be used by the analyst to illustrate key information. Conclusions Through this development process and the use of graphs the relationship between the syndrome definition and search terms can be visualized. In addition when using this process, the analyst could be specific as to the syndrome of interest or be broad, allowing a generic trend series monitoring of the syndrome. The search words can also be based on specific local or regional terms and the relationship terms set to include or exclude certain terms. Use of this process for the development of syndrome definitions can support the use of syndromic surveillance and offer the opportunity to further refine the process. After the syndrome has been developed, the analyst can consider spatial or temporal analysis.

Roles of Health Literacy in Relation to Social Determinants of Health and Recommendations for Informatics-Based Interventions: Systematic Review

Abstract

Objective We will describe the ZooPhy system for virus phylogeography and public health surveillance [1]. ZooPhy is designed for public health personnel that do not have expertise in bioinformatics or phylogeography. We will show its functionality by performing case studies of different viruses of public health concern including influenza and rabies virus. We will also provide its URL for user feedback by ISDS delegates. Introduction Sequence-informed surveillance is now recognized as an important extension to the monitoring of rapidly evolving pathogens [2]. This includes phylogeography, a field that studies the geographical lineages of species including viruses [3] by using sequence data (and relevant metadata such as sampling location). This work relies on bioinformatics knowledge. For example, the user first needs to find a relevant sequence database, navigate through it, and use proper search parameters to obtain the desired data. They also must ensure that there is sufficient metadata such as collection date and sampling location. They then need to align the sequences and integrate everything into specific software for phylogeography. For example, BEAST [4] is a popular tool for discrete phylogeography. For proper use, the software requires knowledge of phylogenetics and utilization of BEAUti, its XML processing software. The user then needs to use other software, like TreeAnnotator [4], to produce a single ("representative") maximum clade credibility (MCC) tree. Even then, the evolutionary spread of the virus can be difficult to interpret via a simple tree viewer. There is software (such as SpreaD3 [5]) for visualizing a tree within a geographic context, yet for novice users, it might not be easy to use. Currently, there are only a few systems designed to automate these types of tasks for virus surveillance and phylogeography. Methods We have developed ZooPhy, a pipeline for sequence-informed surveillance and phylogeography [1]. It is designed for health agency personnel that do not have expertise in bioinformatics or phylogeography. We created a large database of all virus sequences and metadata from GenBank [6] as well as a smaller database for selected viruses perceived to be of great interest for health agencies including: influenza (A, B, and C), Ebola, rabies, West Nile virus, and Zika virus. In Figure 1A, we show our front-end architecture, created in the style of the influenza research database [7], that enables the user to search by: virus, gene name, host, time-frame, and geography. We also allow users to upload their own list of GenBank accessions or unpublished sequences. Hitting "Search" produces a Results tab which includes the metadata of the sequences. We provide a feature to randomly down-sample by a specified percentage or number. We also allow the user to download the metadata in CSV format or the unaligned sequences in FASTA format. The final tab, \"Run\", includes a text box for specifying an email in order to send job updates and final results on virus spread. We also enable for the user to study the influence of predictors on virus spread (via a generalized linear model). Currently, we have predictors such as temperature, great circle distance, population, and sample size for selected countries. We also offer experts the ability to specify advanced modeling parameters including the molecular clock type (strict vs. relaxed), coalescent tree prior, and chain length and sampling frequency for the Markov-chain Monte Carlo. When the user selects "Start ZooPhy", a pre-processor eliminates incomplete or non-disjoint record locations and sends the rest for analysis. Results When initiated, the ZooPhy pipeline includes sequence alignment via Mafft [8] and creation of an XML template via BEASTGen for input into BEAST for discrete phylogeography. It then uses TreeAnnotator [3] to create an MCC tree from the posterior distribution of sampled trees. ZooPhy uses the MCC as input into SpreaD3 for a recreation of the time-estimated migration via a map. If the user selects the GLM option, the system runs an R script to calculate the Bayes factor of the inclusion probability for each predictor and draws a plot including the regression coefficient and its 95% Bayesian credible interval. We are currently working on new visualization techniques such as those demonstrated by Dudas et al. that combine time-oriented spread via a map and evolution on a phylogenetic tree annotated by discrete locations [9]. Conclusions Recent advances in phylodynamics, bioinformatics, and visualization have demonstrated the potential of pipelines to support surveillance. One example is NextStrain which can perform real-time virus phylodynamics [10]. The system has recently been added as an app to the Global Initiative on Sharing Avian Influenza Data (GISAID) database for influenza tracking using DNA sequences [11]. This presentation will highlight a pipeline for virus phylogeography designed for epidemiologists who are not experts in bioinformatics but wish to leverage virus sequence data as part of routine surveillance. We will describe the development and implementation of our system, ZooPhy, and use real-world case studies to demonstrate its functionality. We invite ISDS delegates to use the system via our web portal, https://zodo.asu.edu/zoophy/ and provide feedback on system utilization. References 1. Scotch, M., et al., At the intersection of public-health informatics and bioinformatics: using advanced Web technologies for phylogeography. Epidemiology, 2010. 21(6), 764-768. 2. Gardy, J.L. and N.J. 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Roles of Health Literacy in Relation to Social Determinants of Health and Recommendations for Informatics-Based Interventions: Systematic Review

Abstract

Objective To develop, evaluate, and implement a universal online platform - termed OPEN Stewardship - to promote responsible antimicrobial prescribing (antimicrobial stewardship). Introduction Antibiotic resistance is a mounting public health threat calling for action on global, national and local levels. Antibiotic use has been a major driver of increasing rates of antibiotic resistance. This has given rise to the practice of antibiotic stewardship, which seeks to reduce unnecessary antibiotic use across different care settings. Antibiotic stewardship has been increasingly applied in hospital settings, but adoption has been slow in many ambulatory care settings including primary care of humans. Uptake of antibiotic stewardship in veterinary care has been similarly limited. Audit and feedback systems of antibiotic use coupled with patterns of antibiotic use and best practice guidelines have proven useful in outpatient settings, but scale-up is limited by heterogeneous systems of care and limited resources. Methods A multi-sectoral team with partners from Canada, Israel and Sweden is developing a web-based platform for administering antibiotic stewardship across multiple care settings and sectors, for human and animal prescribers. There are several interventions which support behaviour change and can be applied to antibiotic stewardship programs. Systematic reviews have found beneficial effects of numerous behaviour change interventions for optimizing clinical practice such as computerized reminders [1], opinion leaders as champions for change [2], and audit and feedback [3]. A recent Cochrane review [4] found that interventions to enable correct use of antibiotics improved policy compliance, and that enabling interventions that included feedback were more likely to be effective. We will use antibiotic prescribing benchmarking, focused guidelines, and local patterns of antibiotic resistance as key components that can be deployed as feedback through this antibiotic stewardship platform. The OPEN Stewardship platform will be hosted on an AWS cloud-based server using industry standard encryption. The platform will function with a central administrator who will enroll and deliver feedback to participating prescribers. This platform will be evaluated prospectively in two countries (Canada and Israel) to evaluate user experience of the feedback as well as impact on antimicrobial prescribing. The evaluation will include prescribers from both human and animal health. After the prospective evaluation, the platform will be made available online for broad multi-sectoral use. Results We have designed the interface for a web-based platform for antibiotic stewardship which will be used in a multinational prospective primary care stewardship intervention in 2019 and 2020 and subsequently rolled out for broad public use (www.openasp.org). The platform layout can be seen in Figure 1. Data capture for aggregate prescriber level antibiotic use and local guidelines will be possible through both a manual graphical user interface and a dataset template upload. Antibiotic resistance data will be pulled from a companion database (www.resistanceopen.org). Administrators will be able to generate unique feedback forms containing visualizations and snapshots from antibiotic use, guidelines, and antibiotic resistance data (Figure 2). These can then be delivered by email on an individual or scheduled basis for one or multiple prescribers simultaneously. Participating prescribers will also have the option to login to view their own profile and browse antibiotic use, resistance and guidelines. Conclusions Antibiotic stewardship needs to be adopted in a fashion that is country and context specific and not administered from the top down. With our approach we seek to empower groups from any country or care setting to provide regional and tailored stewardship feedback through an open interface. We have here demonstrated the design of an web-based antibiotic stewardship platform which will be evaluated prospectively and subsequently made available for open and broad multi-sectoral use - in keeping with a One Health approach. References 1. Shojania KG, Jennings A, Mayhew A, Ramsay CR, Eccles MP, Grimshaw J. The effects of on-screen, point of care computer reminders on processes and outcomes of care. Cochrane Database Syst Rev. 2009 Jul 8;(3):CD001096. 2. Flodgren G, Eccles MP, Shepperd S, Scott A, Parmelli E, Beyer FR. 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Roles of Health Literacy in Relation to Social Determinants of Health and Recommendations for Informatics-Based Interventions: Systematic Review

Abstract

Objective To detect presence of circulating Rift Valley Fever virus (RVFv) in animals of Western and Central Uganda following its confirmation in humans. To establish and communicate reliable information using the one health platform Significnce: Although in E. Africa RVF was initially detected and known to be a disease endermic in Kenya, the people in Uganda were still hesitating wether the disease is already in existence. Following its first detection in 2016 in Humans there was need to carry out an investigation in the hot spot areas of the human infection to get the real picture and to inform the policy makers for informed decisions. Introduction Rift Valley fiver is viral zoonotic disease which was investigated and reported in Uganda in 20101. For some time now people are not aware whether the disease was still circulating or emerged in animals reared as a result of the inter country trade by the community of the cattle corridor in Uganda, since the last reports in 19682. The increase in the number of disease outbreaks in some parts of central and western Uganda from 2016 to date and the number of human patients investigated, diagnosed and confirmed with RVF by Ministry Of Health (MOH) under the one health program, has placed the disease to be among the top re-emerging diseases in the country3&4 and number 5 of the Multisectoral prioritization of zoonotic diseases in Uganda, 2017 under One Health perspective6. Methods Rift valley Fever was investigated in cattle, goats and sheep of Gomba,Mityana, Kiboga and Kiruhura in Central and Western Uganda. This followed 2 people that had been confirmed with RVF in 20161 Samples were aseptically collected from hot places from 543 victim's animals including those of the neighbouring areas covering the victims routes of movement plus those areas where people were still sick and where death had reportedly occurred. Samples were then delivered to NADDEC laboratory from where tests were conducted. Results Samples were screened using a competition IgG ELISA, then IgM ELISA to capture the recently infected animals. The positive samples from the IgM ELISA were then confirmed using RT-PCR; 169/543 (31%) tested positive to IgG screening ELISA indicating exposure to RVF. The actual infection was found to be 13% (22/169) with IgM ELISA and 3/22 (13.6%) with RT-PCR. Conclusions Zoonotic diseases continue to be a public health burden to the people of Uganda. Considering some people's behavior of eating the sick and dead animals, has posed a difficult situation to combat the ailment which has resulted in negative socioeconomic impacts, affecting the national policies that range from health security to control of diseases. Uganda has however developed capacity to investigate, test and confirm RVF disease. Since exposure was found in all animal species, detailed active surveillance plan and procedures have been set up to investigate any additional cases in animals to reduce chances of spread to humans and to cub international spread and also to determine the magnitude of exposure. References 1 Nabukenya, Investigation and response to Rift Valley Fever and Yellow Fever outbreaks in humans in Uganda, 2016 2 Nyakarahuka L.prevalence and risk factors of Rift valley in humans and animals from kabale, 2016 3 Wang LF, Crameri G.Emerging zoonotic viral diseases.Rev Sci Tech Int Epiz.2014;33 Institute of Medicine (U.S.), Committee on Achieving Sustainable Global Capacity for surveillance and 4 Response to Emerging Diseases of Zoonotic Origin, Keusch G. Sustaining global surveillance and response to emerging zoonotic diseases, 2009 5 Musa Sekamatte, Vikram K.Multisectoral prioritization of zoonotic diseases in Uganda, 2017, A One Health perspective 6 Munyua P, Bitek A, Osoro E, Pieracci EG, Muema J,Mwatondo A,et al, Prioritization of Zoonotic Diseases in Kenya,2015. PLOS ONE. 2016;11:e0161576. http://doi.org/10.1371/journal.pone.0161576 PMID:27557120

Roles of Health Literacy in Relation to Social Determinants of Health and Recommendations for Informatics-Based Interventions: Systematic Review

Abstract

Objective To evaluate public health and economic impact of intersectoral One Health enhanced surveillance strategies of canine rabies in the Philippines to inform vaccine procurement and provision plans. Introduction Rabies control programmes are being implemented across the Philippines, with a number of islands and provinces on track for the elimination of both human and dog rabies [1,2]. In spite of considerable progress in control programmes, costs of post exposure prophylaxis (PEP) remain high with bite incidence rapidly increasing every year. Indiscriminate PEP administration can strain healthcare budgets, and eventually redirect focus from essential mass dog vaccination campaigns. It is an ethical imperative to improve access to PEP for those at risk; however, under the current framework operating in the Philippines, indiscriminate PEP administration results in excessive expenditure on non-case patients and subsequent financial strains and vaccine shortages, whilst vulnerable communities remain undetected. At the same time, incursions represent an obstacle to achieving and maintaining rabies freedom [3,4]and have been shown to pose a threat to elimination goals [5]. The lack of formal surveillance is the primary cause, leading to late detection of disease at which point substantial secondary transmission within the dog population already occurs. There is, therefore, an urgent need to enhance and streamline surveillance to maximize detection potential for rapid outbreak response and to guide policy decisions regarding public health practice. Workable surveillance criteria are needed for more judicious and effectiveuse of PEP to identify high risk exposures and thus prevent unnecessary risk and further transmission when vaccine stocks are limited. Methods Integrated models that capture epidemiological and health dynamics are essential to evaluate cost-effectiveness of control strategies and have the potential to directly inform rabies control programmes. Here we sought to develop an epidemiological model for rabies transmission within the dog population and from dogs to humans, incorporating information on health-seeking behaviour collected through a longitudinal enhanced surveillance study of dog bite-injury patientsongoing atanti-rabies clinics in Albay province, Philippines.Through computational simulations, we investigated changes in rabies dynamics and economic benefits of three potential surveillance scenarios: (1) current practice of indiscriminate PEP administration with no investigation of bite-incident histories, (2) quarantine of suspect dogs identified through bite-histories of patients presenting at clinics and (3) quarantine of suspect dogs with detailed triage of patients and follow up outbreak investigations. Results Utilizing data collected at anti-rabies clinics, we found that bite incidence in Albay is high (monthly mean=796, sd=337) with PEP administered unsystematically. All patients presented at clinics received at least 1 dose of PEP, 95% of patients received 2 doses and 89% of patients received 3 doses. Only 3% of patients received the fourth dose, likely owing to the cost patients are charged for the last dose (first three doses are provided free of charge). Additionally, 17% received a dose of costly RIG. This is consistent with previous reports of generous use of PEP and RIG in the Philippines [6]. We found that in comparison to the current practices (scenario1) the integrated bite-case management strategies – quarantine of suspect dogs (scenario 2) and quarantine of suspect dogs with detailed triage of patients and outbreak investigations (scenario 3) – demonstrated a substantial reduction in costs through savings on expensive PEP and RIG despite additional expenditures on surveillance. The total costs for rabies prevention in humans would be reduced by 47% and 57% deploying scenarios 2 and 3 respectively. However, an ongoing risk of human deaths persists for as long as rabies continues to circulate in domestic dog populations. We have, therefore, investigated the impact of dog quarantine on rabies dynamics in the context of disease elimination and persistence. Scenarios 2 and 3 resulted in a clear decline in incidence of both dog and human cases. Moreover, under increased detection of infected dogs through field investigations (scenario 3) rabies appears to persist solely through repeat exogenous incursions. Conclusions Coalescing our understanding of health landscapes with that of transmission dynamics enables us to evaluate the demand of PEP provisioning, how this demand will evolve across the elimination timeframe, and the effectiveness of individual intervention strategies in preventing human deaths. Joint investigations foster intersectoral relationships and collaborative investments between public health and veterinary services. Triage of patients and investigations of suspect dogs allows for improved PEP recommendations and reduction of the current unnecessary expenditures whilst active field investigations lead to increased and early detection of rabies in dogs and identification of rabies exposed persons who would otherwise not seek care. Quarantine of rabies suspect dogs appears powerful in curtailing transmission, but large-scale vaccination of dogs is necessary for complete interruption of transmission of the virus and sustained elimination of rabies, given the enduring risk of re-introductions from neighbouring populations [7-9]. However, early detection of incursions is critical and can preclude an undesired outbreak. Integrated One Health approaches of rabies surveillance have the potential to substantially increase case detection [10, 11] and ultimately generate vital evidence for verifying freedom from disease [12]. 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Roles of Health Literacy in Relation to Social Determinants of Health and Recommendations for Informatics-Based Interventions: Systematic Review

Abstract

Objective The objectives of this study are to evaluate the current animal rabies surveillance system in the state and suggest recommendations. Introduction Rabies is a zoonotic, neglected viral disease. Every 10 minutes, the world loses a life, especially children, to dog-mediated rabies. Yet it is 100% preventable. Africa, including Nigeria, has major share of the disease. Eradication of human rabies relies majorly on control of rabies in animals and this cannot be achieved without good surveillance system of the disease in animal, especially dogs. There is little or no information as to whether the surveillance system in Nigeria is effective. Methods We reviewed the medical records of all rabies cases reported in the 10 government and 5 registered private veterinary health facilities in the 16 LGAs of the state. We extracted 44 cases of rabies in all, between review period of 2012-2017. We also interviewed 25 key stakeholders in the system using Key Informant Interview (KII) and questionnaires. We followed the steps stated in CDC guideline for evaluation of public health surveillance system to assess the key attributes and components of the system, and analysed the data using Microsoft Excel. Results Two (20%) of the government and only one in five private veterinary health facilities had records on rabies cases. All reported cases of suspected rabies involved dog bites. The confirmatory status of 32 (72.7%) of the suspected cases were unknown. Six (37.5%) LGAs did not have access to any veterinary health facility. Average of 1 technical staff per veterinary facility was seen. Overall, the system was useful and flexible. It was fairly simple, acceptable and representative. Both sensitivity and predictive Value Positive (PVP) were less than 1% while the timeliness, data quality and stability were poor Conclusions The surveillance system was performing below optimal level. There is need for improvement in the animal rabies surveillance system to achieve elimination of human rabies in Nigeria. References Adedeji, A. O., Okonko, I. O., Eyarefe, O. D., Adedeji, O. B., Babalola, E. T., and Ojezele, M. O. (2010). An overview of rabies - History , epidemiology , control and possible elimination. African Journal of Microbiology Research, 4(22), 2327–2338. Aliyu, T. (2010). Prevalence of Rabies Virus Antigens in Apparently Healthy Dogs in Yola , Nigeria. Researcher, 2(2), 1–14. Ameh, V. O., Dzikwi, A. A., and Umoh, J. U. (2014). Assessment of Knowledge , Attitude and Practice of Dog Owners to Canine Rabies in Wukari Metropolis , Taraba State Nigeria. Global Journal of Health Science, 6(5), 226–240. Burgos-Cáceres, S., and Sigfrido. (2011). 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Roles of Health Literacy in Relation to Social Determinants of Health and Recommendations for Informatics-Based Interventions: Systematic Review

Abstract

Objective The purpose of the study was to characterize the spatial distribution and temporal patterns of laboratory confirmed H5N1 outbreaks from January 2007 to December 2017 in Ghana. Introduction Highly pathogenic avian influenza (HPAI) subtype H5N1 virus causes a highly contagious disease in poultry with up to 100% mortality and occasionally causes sporadic human infection. The first outbreak of HPAI H5N1 in Africa was reported in Nigeria in 2006 and has since been reported in seven other African countries with confirmed human cases and outbreaks in poultry. Since the emergence of Highly Pathogenic Avian Influenza (HPAI), virus subtype H5N1 in Ghana in 2007, outbreaks in poultry have led to dire economic consequences for the poultry sector, resulting from mass destruction of affected flocks. An economy heavily dependent on agriculture, the persistence of outbreaks threaten the livelihood of farmers who depend on poultry production for survival. Despite significant efforts made in HPAI-H5N1 control and prevention in Ghana, outbreaks persist and continue to spread to new areas. It is uncertain to what extent different pathways contribute to the introduction and the dissemination of the virus in Ghana. There is a need to understand the complex nature of the interactions between local and migratory fowl, the risk of transmission due to human endeavor and trade mechanisms that increase the likelihood of HPAI-H5N1 outbreaks in Ghana. Methods Data for the study was sourced from national outbreak records at the Veterinary Services Directorate. The study analyzed outbreak data for the years 2007-2017. Data retrieved from outbreak reports included the date of onset of outbreak, location and geographic coordinates, type and number of poultry species affected, natural deaths of birds and type of farming system on outbreak farms. We calculated frequency distributions for the types of poultry species affected, the type of farming system and mortality rates on affected premises. We described the distribution of HPAI-H5N1 outbreaks using coordinate maps in ArcGIS and displayed relevant sites of waterfowl and wild bird habitation. To describe the temporal pattern of HPAI-H5N1 outbreaks in Ghana for the period, we created an epidemic curve by plotting the monthly number of outbreaks for the period January 2007 to December 2017 in Excel. We used space-time scan statistics to determine significant local clusters. Results A total of sixty-six (66) outbreaks of HPAI-H5N1 occurred in Ghana from January 2007 to December 2017. The outbreak sites were distributed in seven (7) out of ten (10) regions in Ghana. The affected regions are located in the southern and middle belt of Ghana. Most of the outbreaks (74.2%) occurred in densely populated areas of the Greater Accra region. Overall, layer flocks were mostly affected with 56% of affected premises constituting layer farms. Commercial farms and backyard farms made up the majority of affected farms (50% and 42.4%). Free ranging birds were the least affected farm type (7.6%). Two epidemic waves were identified for H5N1 in Ghana; the first wave with 6 outbreaks, lasted a period of four (4) months from April to July 2007, and the second with 60 outbreaks, spanned a period of 2 years from April 2015 to November 2016. Temporal distribution of the outbreaks showed that the outbreak peaked in May 2007 for the first wave and in July 2017 for the second wave with minor peaks observed in April and July 2016. The decrease in the number of the outbreaks after July in both waves is attributed to the onset of slaughter and trade restrictions for poultry in affected areas. Space-time scan statistics identified significant primary clusters of H5N1 outbreaks in the coastal belt of the Greater Accra region, characterized by major commercial activities and the presence of wetlands of relevance to wild birds and migratory waterfowl. Conclusions Two (2) major waves of H5N1 outbreaks occurred in Ghana between 2007 and 2017. The distribution of outbreaks and poultry species in both waves, show that the epidemiology of H5N1 virus in Ghana is changing. The findings highlight the importance of reviewing existing control and preventive measures as well as strengthening avian influenza surveillance in proposed high- risk areas. References Foreign Animal Diseases. Revised 2008 Seventh Edition. Committee on foreign and emerging diseases of the United States Animal Health Association. Avian Influenza, OIE terrestrial manual 2015 To K.K.W.et al. Avian influenza A H5N1 virus: a continuous threat to humans. Emerging Microbes Infections (2012) 1, e25. Watanabe Y. et al. The changing nature of avian influenza A virus (H5N1). Trends Microbiol. 2012 Jan; 20 (1):11-20. doi: 10.1016/j.tim.2011.10.003. Epub 2011 Dec 5

Roles of Health Literacy in Relation to Social Determinants of Health and Recommendations for Informatics-Based Interventions: Systematic Review

Abstract

Objective Identify cases of West Nile virus in Black Sea region of Georgia through active surveillance. Introduction Arbovirus infections are causing enormous global burden, while their geographic distribution expands and affects new regions and areas. West Nile virus (WNV), one of the most important pathogens among arboviruses, was historically associated with causing mild febrile illness, however, after the outbreak occurred in the North America, which caused more severe illness, it has received wider recognition. It is believed that the disease can reemerge after a hiatus of several years, and affect new territories, which has happened in 2018 in Greece, with 31 dead among 271 infections by the end of September. In Georgia, there is a lack of clinical suspicion on WNV because of the low awareness among medical society, and the existent passive surveillance system seems to be improved. Methods In order to assess the situation in Georgia, medical histories and Electronic Integrated Disease Surveillance System (EIDSS) database was studied, and active surveillance has been conducted with the following case selection criteria: residence - Black Sea region; diagnosis - fever of unknown origin (FUO). Enzyme-linked immunosorbent assay (ELISA) was performed. Mosquitoes were obtained by using light traps and aspirators, and are now being studied. Medical personnel was trained on using WNV case definition. Results Three laboratory positive cases were identified from 36 suspected cases. Two of them were males (66%). Age distribution – 28-35 y.o. All three cases resided in the city of Batumi in the Adjara region. A total of 572 mosquitoes were obtained. According to preliminary analysis, the species include: Culex pipiens, Aedes albopictus, A. aegypti, A. caspius, A. geniculatus, Anopheles claviger. Conclusions The preliminary data suggests that the burden of WNV in Georgia should be studied with more in-depth approaches and with just passive surveillance activities. It is very important to establish coordinated rapid efforts for disease identification by physicians and veterinarians; and to provide better harmonization of diagnostic tools and integrated national surveillance system. Disease transmission risk needs to be assessed for adequate planning of preventive measures. At this stage, no animals were studied, however, in order to fulfill the One Health approach, we are planning to study horses in the near future.

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Roles of Health Literacy in Relation to Social Determinants of Health and Recommendations for Informatics-Based Interventions: Systematic Review

Abstract

Objective Use United States cattle slaughter condemnation data as an animal health indicator for early detection of health events and to characterize trends in condemnation reasons. Introduction Data collected at livestock slaughter can be a useful source of non-specific health indicators including clinical signs, symptoms and proxy measures1. When monitored in near real-time, this data can enable the detection of both livestock and human health threats1. In the United States (US), the Federal Meat Inspection Act requires ante-mortem inspection of animals and post-mortem inspection of carcasses by veterinarians to ensure the meat product will be fit for human consumption2. Inspections are carried out by the United States Department of Agriculture (USDA) Food Safety Inspection Service (FSIS) and results are recorded in the Public Health Information System (PHIS), including the reason for condemnation if the animal or carcass is deemed unfit. Since April 2016 the USDA, Animal and Plant Health Inspection Service (APHIS), Veterinary Services (VS) has used data from the PHIS to monitor changes in the weekly count/rate of cattle condemnations for three cattle types, beef cows, dairy cows, and fed cattle (steers and heifers), and for selected condemnation reasons (central nervous system (CNS), dead, emaciation, mastitis, moribund, pneumonia, pyrexia, and septicemia). These eight reasons were chosen from 45 potential reasons recorded at condemnation as likely to identify clinical signs associated with foreign animal diseases of interest and to monitor trends in important animal health issues such as pneumonia and mastitis. Methods PHIS slaughter and condemnation data is downloaded weekly and stored and analyzed in an Access database. Tableau visualization software is used for mapping and time series signaling charts (example basin chart Figure 1). Only establishments slaughtering more than 600 cattle/week are included in analysis because smaller establishments may not operate weekly and many have very low slaughter volumes. With the small establishments excluded, our monitoring covers 93%, 90%, and 85% of slaughtered beef, dairy, and fed cattle, respectively. Weekly analysis is conducted by cattle type for each included establishment and for establishments grouped into geographic based catchment basins. The basins were created to identify signals occurring over a region, even if at the establishment level the increase is not large enough to produce a signal. Another purpose for basins is to allow sharing of results at a summary level that does not identify an individual establishment. Weekly normalized condemnation counts are created by dividing the actual condemn counts by the total number destined for slaughter that week, and then multiplying by the average number destined for slaughter per week for the past year. The Early Aberration Reporting System (EARS C3) time series alerting algorithm is used to identify unusual increases (signals) in these weekly normalized condemnation counts. An analyst characterizes establishment and basin signals as unremarkable, notable or needing follow up with FSIS. An unremarkable signal is defined as at least one previous signal or normalized count of similar magnitude in the past 12 months and no signal for that establishment the previous week. A notable signal is defined as no previous signal or normalized count of similar magnitude in the past 12 months or two or more signals occurring over sequential weeks. Basin signals are researched to determine which establishments are responsible for the signal. An analyst determines which highly notable basin and establishment signals need follow up with FSIS. Results are summarized in a weekly report for VS cattle commodity staff about any noteworthy increases in condemnations which could indicate the emergence of disease and may warrant further investigation. In addition a 2017 annual report was completed to describe, visualize, summarize and compare condemnations from 2015-17 by cattle type and condemnation reason. Results In 2017 the percentage of beef, dairy and fed cattle condemned for the eight monitored reasons out of all cattle presented for slaughter at the monitored establishments was 0.375%, 1.651%, and 0.022%, respectively. For beef cows the three most frequent reasons were pneumonia, dead and septicemia, accounting for 84.3% of monitored condemnations. Cows that either arrive at the establishment dead or die at the establishment prior to slaughter are included in the dead condemnation count. For dairy cows the three most frequent reasons were dead, septicemia and pneumonia, accounting for 93.6% of condemnations. For fed cattle the three most frequent reasons were pneumonia, dead, and septicemia, accounting for 98.2% of condemnations. Beef cow condemnations exhibited consistent seasonal trends for dead, emaciation, mastitis and pneumonia. Dairy cow condemnations exhibited consistent seasonal trends for dead, emaciation and pyrexia. Fed cattle condemnations were less influenced by seasonal trends with only dead and septicemia showing some consistent seasonality. During 2017 three notable establishment signals required follow up with FSIS: CNS in dairy cows, septicemia in fed cattle, and dead in beef cows. For 2018 (through August) 5 notable establishment signals required follow up: septicemia in both beef and dairy cows, emaciation and CNS in beef cows, and dead in dairy cows. Signals were attributed to various reasons including: changes in establishment protocol (CNS), relief inspectors classifying condemns differently and animals not responding to treatment on the farm (septicemia), a holiday effect with sick animals held longer in holding pens before slaughter (dead), a decrease in the quality of cattle purchased by the establishment (emaciation), and extremely hot weather (dead). Conclusions A higher percentage of dairy cattle were condemned overall and were more likely to be condemned for being dead on arrival or just prior to slaughter compared to beef or fed cattle. Culled dairy cows tend to be older than beef or fed cattle and are maintained in an intense production system, therefore they are more likely

to develop age related problems or chronic diseases3. In addition to timely identification of potential animal health issues, cattle producers could use this information to help focus on management practices which may decrease condemnations and result in improved animal health and revenue for producers2. Some limitations to this work are that trends described only apply to the cattle population slaughtered at FSIS inspected facilities and included in our monitoring. Condemnations are determined by FSIS inspectors at each individual slaughter establishment resulting in the potential for inspector bias to affect the data. References 1. Dupuy C, Morignat E, Dorea F, Cucrot C, Calavas D, Gay E. (2015) Pilot simulation study using meat inspection data for syndromic surveillance: use of whole carcass condemnation of adult cattle to assess the performance of several algorithms for outbreak detection. Epidemiol Infect 2015 Sep;143(12):2559-69. 2. White T, Moore D. (2009) Reasons for whole carcass condemnations of cattle in the United States and implications for producer education and veterinary intervention. JAVMA Oct;235(8). 3. Haredasht S, Vidal G, Edmondson A, Moore D, Silva-del-Rio N, Martinez-Lopez B. (2018) Characterization of the temporal trends in the rate of cattle carcass condemnation in the US and dynamic modeling of the condemnation reasons in California with a seasonal component. Front Vet Sci Jun;5(87).

Roles of Health Literacy in Relation to Social Determinants of Health and Recommendations for Informatics-Based Interventions: Systematic Review

Abstract

Objective To use novel technologies to develop a rapid response framework to reach opioid overdose patients in an area which is challenging from both a geography and population distribution standpoint. Introduction Clark County, Indiana is geographically located in between the urban area of Louisville, Kentucky and Scott County, Indiana. Scott County is the site for the largest HIV outbreak in the history of the United States, directly related to high rates of IV drug abuse. The unique geographic location of Clark County in combination with the recent HIV and Hepatitis C outbreaks in Clark and neighboring counties has greatly informed the development of an effective response to overdoses and the opioid epidemic in general. Furthermore, Clark County has a unique population distribution, with a population of over 125,000 and a land area of over 300 square miles. Despite this large area, over 80% of the population lives within 9 miles of the southern border of the county. This leads to a mix of both urban and rural challenges. There are several areas of the county that have greater than 15 minute emergency response times, which is often the difference between life and death in an overdose situation. These factors led to the development of the Clark County Rapid Response Project. The rapid response project is a community-based, multidisciplinary framework to address the opioid addicted patient, from initial use to successful recovery. The project uses data driven technology to initiate the care of opiate overdose patients and administer lifesaving interventions. Methods Clark County has partnered with the Indiana State Department of Health utilizing the early notification system that monitors statewide overdose activity. Once an alert is sent out, the response involves the use of two early notification systems. Everbridge is a one touch notification system that allows rapid dissemination of information to various community partners to allow them to initiate the appropriate response. Pulse Point is a smart phone application that allows CPR and trained community laypeople to respond to a cardiac arrest or overdose patient in a public place. It provides directions to the patient as well as to the nearest AED. Clark County has also simultaneously instituted a county-wide CPR training initiative and offered Narcan training as well. This is a major paradigm shift, as prior methods of deployment of trained laypeople essentially relied on the chance that an overdose will be reached by a first responder. Results Everbridge has allowed for the rapid notification of county entities and deployment of resources to overdose 'hot spot' areas. The Pulse Point initiative has dramatically increased the number of CPR and Narcan trained responders and provided means of delivering them to the appropriate patient population in a timely manner. Both these technologies have dramatically increased the delivery of resources to the overdose patient and decreased response times to the delivery of care. Conclusions Using data driven technology to inform how Clark County Health Department and first responders collectively address the opioid crisis is a novel approach. Since January 2018, Clark County Health Department has used ESSENCE (Electronic Surveillance System for the Early Notification of Community-based Epidemics) to determine where and when an increase of drug overdose activity is occurring throughout the county. This affords county health officials the ability to inform in "near real-time" first responders, the emergency department and other community stakeholders, relevant information thus allowing for the rapid deployment of county resources to the areas most affected. Our collective efforts to save lives is further enhanced by the county using of novel technologies like Pulse Point which is used to deploy both CPR and Narcan trained laypersons directly to sites in the community where overdoses are occurring. In a community, which is in large part considered rural and, in many places, has a greater than 15 minute emergency response time, using Pulse Point and Everbridge technologies has uniquely positioned Clark County to be on the cutting edge of saving lives as we leverage data and technology to address the opioid epidemic in our communities. This has markedly improved access to treatment and response times to overdose patients in Clark County, Indiana.

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Roles of Health Literacy in Relation to Social Determinants of Health and Recommendations for Informatics-Based Interventions: Systematic Review

Abstract

Objective ● Describe the diverse determinants of national health and how they are compositely graded in health care system rankings. ● Articulate intrinsic reasons why equity should not be subsumed within other evaluative categories. ● Design an equity-limited ratings framework for limiting maximum ratings of inequitible healthcare systems. Introduction Healthcare systems are often evaluated using comparative health care rankings. Simulations have shown that maximally inequitable health care systems can perform well in published, influential health care system rankings by excelling in non-equity categories1, resulting in highly ranked yet grossly inequitable healthcare systems. Recently, despite below average equity rankings, the healthcare systems of Australia and New Zealand ranked among the top four in The Commonwealth Fund's international comparative study Mirror, Mirror 20172. Equity rankings should logically limit non-equity rankings given the insignificance of healthcare system improvements to those lacking adequate healthcare coverage. We analyzed whether an equity-limited ranking methodology would limit overall rankings for significantly inequitable healthcare systems while maintaining the general findings of the Commonwealth Fund study. Methods We reanalyzed The Commonwealth Fund's 2017 international health care system comparison using a modified, equity-limited methodology. For each country, maximum non-equity domain summary scores were limited to the equity domain summary score. Countries were ranked using the mean of the five domain-specific performance scores. Overall rankings were compared to the original rankings. Results Seven of eleven countries had an overall rank change in the equity-limited model. Countries with above average overall ratings but poor equity ratings had the greatest changes in overall rank. Australia's overall ranking decreased from second to seventh, thereby matching its equity ranking of seventh. New Zealand changed from fourth to eighth overall, matching its equity ranking as well. Other changes were less significant, with changes of only one overall rank position. Notably, the bottom three countries and the top country were unchanged. Conclusions Equity-limited ranking methodologies can prevent inequitable health care systems from attaining high overall ratings. Such equity-limited rankings are logical considering the diminished significance of health care system improvements to those lacking adequate health coverage. Methodologies that incorporate equity limits should be used to produce fairer rankings that respect the dignity and rights of all individuals. References 1. Reisman S, Blumenkranz Z. Comparative health care system rankings can obscure maximal inequities: A simulation study. Society for Public Health Education (SOPHE) 69th Annual Conference. 2018, June. 2. Schneider EC, Sarnak DO, Squires D, Shah A, Doty MM. Mirror, Mirror 2017: International Comparison Reflects Flaws and Opportunities for Better U.S. Health Care. The Commonwealth Fund. 2017, July.

Roles of Health Literacy in Relation to Social Determinants of Health and Recommendations for Informatics-Based Interventions: Systematic Review

Abstract

Objective To see the level and trend of the vital registration system in India and its states form 2005-2015. To identify factors influencing civil registration in India Introduction Civil Registration system (CRS) in India has been in vogue for more than 100 years now. The registration of Birth and Deaths Act, 1969 came into force in 1970. Even after 4 decades of the enactment of the act, there are wide inter-state and intra-state variations. India is the second largest populated country in the world after China. Whereas as the level of registration of birth and deaths varies from (84.4 and 69.3) registrations. In India, more than 250 thousand of registration centers are involved in central registration system and estimated births per years are 26 million, and the corresponding figure for death is 8 million (Sethi 2016). Methods The present study uses National family health Survey (NFHS) 3 and 4 used for the analysis to see an assessment of birth registration system and the factors affecting in India and its states. Multivariate analysis used to see the effect of a socio-demography factor that affects the registration of birth. Results Figure 1 presents information on prevalence birth registration under age five years with civil authority in India from NFHS- 3 and NFHS-4; this includes 27 percent (NFHS -3) 62 percent of children with birth certificates and 14 percent (NFHS- 3) 18 percent are children which has registered the birth but don't have certificate. Table 1 demonstrates Prevalence of children under age five whose birth is registered with the civil authorities in India and its states from NFHS-3 and NFHS-4. Birth registration among children under age five years double between NFHS-3 and NFHS -4 (from 41% to 81 %). However, there is also an increase in all the states of India from 2005 to 2016. The percentage of births that were registered increase by more than 50 percentage points between 2005-06 and 2015-16 in Jharkhand, Bihar, Uttar Pradesh, Madhya Pradesh, and Rajasthan Table 2 present the percentage of children under age five years whose birth was registered with civil authorities accounting to background characteristics. The registration of birth was high in age group less than 2 in NFHS -3 (79 %) but in NFHS -4 high in 2-4 age group (53 %). The registration of male is high in NFHS- and NFHS-4 (52%) as compared to a female child (48%). In the religion, the registration is high in Hindu in both the survey. However, in caste, the low registration are found in Scheduled caste (NFHS- 3 (19.2%) & NFHS- 4 (21.4%)) and scheduled tribal. With the increase in wealth index, there is an increase in the birth registration system. Conclusions Birth registration and subsequent issuance of a certificate do not only promote human rights to citizenship but it also facilitates human rights to good health, education, social security, and overall human development. Therefore, timely registration of children should be pursued as a right issue. This study found that high levels of birth registration were related to a high level of awareness among the urban population regarding birth registration. However, findings of this study seem to suggest that it is more of a privilege for children whose parents are educated, wealthy and live in urban areas. References Sethi R C, Civil Registration System, Sample Registration System & Annual Health Survey: Issues and Policy Uses. The Global Summit on CRVS. http://www.slideshare.net/kdcgroups/ session-5a-rcsethi accessed on 10/10/2016.

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Roles of Health Literacy in Relation to Social Determinants of Health and Recommendations for Informatics-Based Interventions: Systematic Review

Abstract

Objective To inform asthmatic, health plan patients of air quality conditions in their specific geographic location and to assess if the communication is successful in reducing the number of emergency department visits for asthmatic/respiratory flare ups. Introduction Southwest states are prone to wildfires, dust storms, and high winds especially during the monsoon season (June – September). Wildfire smoke is a complex mixture of carbon monoxide, carbon dioxide, water vapor, hydrocarbons, nitrogen, oxides, metals, and particulate matter (PM). Dust storms are made up of aerosols and dust particles varying in size; particles bigger than 10 µm are not breathable, but can damage external organs such as causing skin and eye irritations. Particles smaller than 10 µm are inhalable and often are trapped in the nose, mouth, and upper respiratory tracts, and can cause respiratory disorders such as asthma and pneumonia. Numerous studies have characterized the epidemiological and toxicological impact of exposure to PM in dust or smoke form on human health.[1] All of these environmental conditions can have impacts on cardiovascular conditions such as hypertension and cause respiratory flare ups, especially asthma. Previous studies have shown a relationship between PM exposure and increases in respiratory-related hospital admissions.[1-4] In an analysis of the health effects of a large wildfire in California in 2008, Reid, et. al, observed a linear increase in risk for asthma hospitalizations (RR=1.07, 95% CI= (1.05, 1.10) per 5 µg/m3 increase) and asthma emergency department visits (RR=1.06, 95% CI=(1.05, 1.07) per 5 µg/m3 increase) with increasing PM2.5 during wildfires.[5] In a study specific to New Mexico, Resnick, et. al, found that smoke from the Wallow fire in Arizona in 2011 impacted the health of New Mexicans, observing increases in emergency department visits for asthma flare-ups in Santa Fe, Espanola, and Albuquerque residents.[6] This current study will evaluate the effectiveness of outreach to asthmatic members during times of poor air quality; informing them of the air quality, instructing them to limit their outdoor activity, and to remind them to carry or access their inhalers or other medical necessities if/when needed. Methods A recent 12-month eligible member list was generated including member ID, street address, zip code, and a count of the number of emergency department (ED) visits for the specified time period. The member list was then geocoded using the tool Quest. Any records that did not map to a latitude and longitude within the state boundary of New Mexico were excluded. The geocoded list was then joined to a list of members who had an indicator for asthma (a hospital admission or ED visit with a primary diagnosis for asthma). This list of asthmatic, eligible members was then mapped using QGIS 3.2. The New Mexico Environment Department's (NMED) air quality bureau operates a network of ambient air monitors across the state. Monitors range in size from neighborhood level to regional and pollutants measured include ozone, PM2.5, PM10, Nitrogen Dioxide, and Sulfur Dioxide. Each individual air monitor was mapped to a point location with individual buffer zones (dependent on the monitor's collection size). Asthmatic members were mapped to air monitor buffers using a spatial overlap program in QGIS. Each air monitor then had a list of asthmatic members who were tied to the air monitor and would be contacted if the air quality index (AQI) value for that air monitor was less than good (>50). Results In a given 12-month period, there were 38,364 asthmatic members mapped to a geographic point within the state boundary of New Mexico. Of the 14 air monitors across the state, 9,965 (26%) asthmatic members mapped to an air monitor. NMED posts air monitor readings on their website daily. During the upcoming 2019 monsoon season, air monitors with a daily AQI reading of >50 will trigger the emailing of a scripted letter to asthmatic members (connected to that specific monitor) informing them of poor air quality in their area and alerting them to limit their outdoor time and to ensure that their medications are up-to-date and easily available. In order to construct this letter in a non-intrusive, succinct manner, collaboration with business partners (who have experience with working with members on a 1:1 basis) within the organization will assist with ensuring a targeted message. After the 2019 monsoon season, this project will be evaluated to determine if the intervention was beneficial in reducing the number of ED visits for the members who were contacted. ED visit rates specific to asthma (inclusion of asthma specific diagnosis code) will be compared for the pre and post intervention monsoon seasons. Conclusions Combining external, state-level data with internal member-level data can have powerful results. Due to protected health information (PHI), state level data sometimes is unavailable at a person-level basis, and thus pointed, individual interventions are not possible. By combining internal and external data sources on different health related topics, it is possible to create a more cohesive, person-level, health-impactful view of a person and their environment. References 1. Fann N, Alman B, Broome RA, et al. The health impacts and economic value of wildland fire episodes in the U.S.: 2008-2012. Sci Total Environ. 2018;610-611:802-809. 2. Delfino RJ, Brummel S, Wu J, et al. The relationship of respiratory and cardiovascular hospital admissions to the southern california wildfires of 2003. Occup Environ Med. 2009;66(3):189-197. 3. Gan RW, Ford B, Lassman W, et al. 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Roles of Health Literacy in Relation to Social Determinants of Health and Recommendations for Informatics-Based Interventions: Systematic Review

Abstract

Objective a) To observe trends and patterns of diseases of public health importance and response b) To predict, prevent, detect, control and minimize the harm caused by public health emergencies c) To develop evidence for managing any future outbreaks, epidemic and pandemic Introduction Disease surveillance is an integral part of public health system. It is an epidemiological method for monitoring disease patterns and trends. International Health Regulation (IHR) 2005 obligates WHO member countries to develop an effective disease surveillance system. Bangladesh is a signatory to IHR 2005. Institute of Epidemiology, Disease Control and Research (IEDCR <www.iedcr.gov.bd>) is the mandated institute for surveillance and outbreak response on behalf of Government of the People's Republic of Bangladesh. The IEDCR has a good surveillance system including event-based surveillance system, which proved effective to manage public health emergencies. Routine disease profile is collected by Management Information System (MIS) of Directorate General of Health Services (DGHS). Expanded Program of Immunization (EPI) of DGHS collect surveillance data on EPI-related diseases. Disease Control unit, DGHS is responsible for implementing operational plan of disease surveillance system of IEDCR. The surveillance system maintain strategic collaboration with icddrr,b. Methods The IEDCR is conducting disease surveillance in several methods and following several systems. Surveillance data of priority communicable disease are collected by web based integrated disease surveillance. It is based on weekly data received from upazilla (sub-district) health complex on communicable disease marked as priority. They are: acute watery diarrhea, bloody dysentery, malaria, kala-azar, tuberculosis, leprosy, encephalitis, any unknown disease. Government health facilities at upazilla (sub-district) send the data using DHIS2. During outbreak, daily, even hourly reporting is sought from the concerned unit. Moreover, IEDCR conducts disease specific specialized surveillance systems. Data from community as well as from health facilities are collected for Influenza, nipah, dengue, HIV, cholera, cutaneous anthrax, non-communicable diseases, food borne illness. Data from health facilities are collected for antimicrobial resistance, rotavirus and intussusception, reproductive health, child health and mortality, post MDA-surveillance for lymphatic filariasis transmission, molecular xenomonitoring for detection of residual Wucheria bancrofti, dengue (virological), emerging zoonotic disease threats in high-risk interfaces, leptospirosis, acute meningo-encephalitis syndrome (AMES) focused on Japanese encephalitis and nipah, unintentional acute pesticide poisoning among young children. Data for event based surveillance are collected from usual surveillance system as well as from dedicated hotlines (24/7) of IEDCR, media monitoring, and any informal reporting. Case detection is done by syndromic surveillance, laboratory diagnosed surveillance, media surveillance, hotline, cell phone-based surveillance. Dissemination of surveillance is done by website of IEDCR, periodic bulletins, seminar, conference etc. Line listing are done by rapid response teams working in the surveillance sites. Demographic information and short address are listed in the list along with clinical and epidemiological information. Initial cases are confirmed by laboratory test, if required from collaborative laboratory at US CDC (Atlanta). When the epidemiological trend is clear, then subsequent cases are detected by symptoms and rapid tests locally available. Results In 2017, 26 incidents of disease outbreak were investigated by National Rapid Response Team (NRRT) of IEDCR. In the same year, 12 cases of outbreak of unknown disease was investigated by NRRT of IEDCR at different health facilities. Joint surveillance with animal health is being planned for detection and managing zoonotic disease outbreaks, following One Health principles. Department of Livestock, Ministry of Environment and icddrb are partners of the joint surveillance based on One Health principles. Disease Control unit of DGHS, district and upazilla health managers utilizes the disease surveillance data for public health management. They analyze also the surveillance data at their respective level to serve their purpose. Conclusions A robust surveillance is necessary for assessing the public health situation and prompt notification of public health emergency. The system was introduced at IEDCR mainly for malaria and diarrhea control during establishment of this institute. Eventually the system was developed for communicable disease, and recently for non-communicable diseases. It is effectively used for managing public health emergencies. Notification and detection of public health emergency is mostly possible due to media surveillance. Data for syndromic surveillance for priority communicable diseases is often not sent timely and data quality is often compromised. Tertiary hospitals are yet to participate in the web based integrated disease surveillance system for priority communicable diseases. But they are part of specialized disease surveillances. Data from specialized surveillance with laboratory support is of high quality. Evaluation of the system by conducting research is recommended to improve the system. Specificity and sensitivity of case detection system should also be tested periodically. References Cash, Richard A, Halder, Shantana R, Husain, Mushtuq, Islam, Md Sirajul, Mallick, Fuad H, May, Maria A, Rahman, Mahmudur, Rahman, M Aminur. Reducing the health effect of natural hazards in Bangladesh. Lancet, The, 2013, Volume 382, Issue 9910 IEDCR. 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Roles of Health Literacy in Relation to Social Determinants of Health and Recommendations for Informatics-Based Interventions: Systematic Review

Abstract

Objective ● To demonstrate the importance of a cross-jurisdictional etiquette workgroup in the Texas Southeast region that leverages on the Syndromic Surveillance Consortium ● To promote data sharing and communicate the findings of disease to assist rapid investigation and data sharing Key words: ESSENCE (Electronic Surveillance System for Early notification of Community-based Epidemics) Introduction Syndromic data is shifting the way surveillance has been done traditionally. Most recently, surveillance has gone beyond city limits and county boundary lines. In southeast Texas, a regional consortium of public health agencies and stakeholders in the 13-County area governs the local ESSENCE system. The Houston Health Department, (HHD) is responsible for deploying ESSENCE to the entire region. To effectively monitor the health of the region's population, a need arose to establish clear guidelines for disease investigation and data sharing triggered by syndromic surveillance across the area. Since Houston's instance of ESSENCE serves all 13 counties, the consortium instituted a cross- jurisdictional etiquette group. The purpose of the group is to determine the standard protocol for responding to ESSENCE alerts and best practices for data sharing and use among consortium members. Methods To achieve these goals, it was determined that a smaller group of stakeholders besides governing officials is needed to provide guidance for regional data sharing and use. The etiquette group was established in the first quarter of 2018 and it included four consortium representatives from the 6/5 south region of Texas. Their first meeting tackled issues relating to data sharing. Results The following products emerged from the activities of the etiquette group within 3 months of its existence: ● Publication/presentation guidance/policy to avoid duplication of efforts and misrepresentation of jurisdiction. ● Procedure for alert responses ●. Instructions for within-systems management of alerts; ●. Instructions for events/times of interest (e.g., political convention, Olympics); ● Instructions of syndromes of interest/syndrome-specific policies; ● Instructions for changing the syndrome definition; ● Notification procedures for identification of a single case of reportable disease/important free text element within data. Conclusions Cross jurisdictional workgroups can influence rapid investigations of disease, protect patient health information and promote privacy and data security and confidentiality by establishing set rules/guidelines for data exchange. All 13-counties in the region rely on these guidelines as a standard for responsibly accessing, using and sharing data in the Texas Southeast ESSENCE system. Lessons Learned: ● As the etiquette group continues to evolve, there is need for more resources to help foster data use and sharing among jurisdictional partners. ● Partner engagement is limited due to ongoing process of configuring the new system ESSENCE. ● Since disease has no boundaries, allocation of jurisdictional responsibilities for responding to alerts should be operationalized ● Continuous training is essential to ensure all system users adhere to the protocols in place for meaningful data use and data sharing

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Abstract

Objective We report the findings of Andhra Pradesh state's mobile medical service programme and how It is currently used to strengthen the disease surveillance mechanisms at the village level. Introduction India has an Integrated Disease Surveillance project that reports key communicable and infectious diseases at the district and sub-district level. However, recent reviews suggest structural and functional deficiencies resulting in poor data quality (1). Hence evidence-based actions are often delayed. Piramal Swasthya in collaboration with Government of Andhra Pradesh launched a mobile medical unit (MMU) programme in 2016. This Mobile medical service delivers primary care services to rural population besides reporting and alerting unusual health events to district and state health authorities for timely and appropriate action. The MMU service in the Indian state of Andhra Pradesh is one of the oldest and largest public-private initiatives in India. Two hundred and ninety-two MMUs provide fixed-day services to nearly 20,000 patients a day across 14,000 villages in rural Andhra Pradesh. Every day an MMU equipped with medical (a doctor) and non-medical (1 nurse, 1 registration officer, 1 driver, 1 pharmacist, 1 lab technician, 1 driver) staff visit 2 service points (villages) as per prefixed route map. Each MMU also has its own mobile tablet operated by registration officer for capturing patient details. The core services delivered through MMUs are the diagnosis, treatment, counseling, and free drug distribution to the beneficiaries suffering from common ailments ranging from seasonal diseases to acute communicable and common chronic non-communicable diseases. The routinely collected patient data is daily synchronized on a centrally managed data servers. Methods For this analysis, we used aggregated and pooled data that were routinely collected from August 2016-March 2018. Patient details such as socio-demographic variables (age, sex etc.) medical history and key vitals (random blood sugar, blood pressure, pulse rate etc.) and disease diagnosis variables were analyzed. Besides, communication and action taken reports shared with Government of Andhra Pradesh were also analyzed. We report the findings of the programme with reference to strengthing the village level communicable disease surveillance. Unusual health events were defined as more than 3 patients reporting the epidemiologically linked and similar conditions clustered in the same village. Results We observed 4,352,859 unique beneficiaries registrations and 9,122,349 patient visits. Of all unique beneficiaries, 79.3% had complete diagnosis details (53% non-communicable disease, 39% communicable and 8% others conditions). A total of 7 unusual health events related to specific and suspected conditions (3 vector-borne diseases related, 4 diarrhea-related) were reported to district health authorities, of which 3 were confirmed outbreaks (1 dengue, 1 malaria, and 1 typhoid) as investigated by local health authorities. Conclusions Mobile medical services are useful to detect unusual health events in areas with limited resources. It increases accountability and response from the Government authorities if the timely information is shared with competent health authorities. Careful evaluation of the mobile health interventions is needed before scaling-up such services in other remote rural areas. References 1. Kumar A, Goel MK, Jain RB, Khanna P. Tracking the Implementation to identify gaps in Integrated Disease Surveillance Program in a Block of District Jhajjar (Haryana). Journal of Family Medicine and Primary Care. 2014;3(3):213-215. 2. Raut D, Bhola A. Integrated disease surveillance in India: Way forward. Global Journal of Medicine and Public Health.2014;3(4):1-10

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Abstract

Objective This panel will focus on the experiences from the Department of Defense (DoD) and Virginia Department of Health (VDH) data sharing project using the National Syndromic Surveillance Program (NSSP) ESSENCE and will discuss lessons learned, challenges, and recommendations within the following areas: 1) data sharing authority, 2) coordination and implementation of data sharing with a focus on personnel, training, and managing access and 3) communication between local, state, and federal agencies. Introduction The DoD and VDH both maintain local ESSENCE installations to monitor the health status of their military and civilian populations, respectively, and submit syndromic surveillance data to the NSSP ESSENCE to foster data sharing and collaborative initiatives among public health entities. Military Treatment Facilities (MTFs), housed on DoD installations, provide healthcare to all service members and their beneficiaries stationed in the area. Service members and their beneficiaries represent a substantial portion of the local community and interact with the civilian population throughout daily activities. Sharing syndromic surveillance data between DoD and public health jurisdictions can provide public health situational awareness among both civilian and military populations to support disease surveillance. DoD and VDH engaged in a pilot project to develop processes and procedures for data sharing, data access, and communication with the aim they can serve as best practices for other jurisdictions seeking to share syndromic surveillance data with DoD. Description The pilot project began in June 2018 with the Centers for Disease Control and Prevention (CDC) NSSP team providing technical support. NSSP ESSENCE users from the VDH state and local health departments across nine Virginia city/counties participated in the project. VDH shared syndromic surveillance data from 34 healthcare facilities (17 urgent cares, 3 emergency care centers, and 14 hospitals) with DoD, which shared syndromic surveillance data from 18 MTFs (16 clinics and 2 hospitals) in Virginia. To standardize the analysis of syndromic surveillance data and use of NSSP ESSENCE across project participants, myESSENCE tabs were created and shared by between VDH and DoD. The goal was to facilitate and enhance communication between local public health departments and their DoD counterparts through the sharing of syndromic surveillance data. How the Moderator Intends to Engage the Audience in Discussions on the TopicThe moderator will solicit feedback from the audience regarding their data sharing experiences with other entities or agencies, data sharing practices, and ideas for use cases when sharing syndromic surveillance data with DoD.

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Abstract

Objective To analyze Los Angeles County's (LAC) extreme heat season in 2018 and evaluate the Council of State and Territorial Epidemiologists' (CSTE) syndrome query for heat-related-illness (HRI) in Los Angeles County (LAC) Introduction LAC experienced several days of record-breaking temperatures during the summer of 2018. Downtown Los Angeles temperatures soared to 108°F in July with an average daily maximum of 92°F. Extreme heat events such as these can pose major risks to human health. Syndromic surveillance can be a useful tool in providing near real-time surveillance of HRI. In 2014, a working group was formed within the CSTE Climate Change Subcommittee to define and analyze HRI. The workgroup's goal was to provide guidance to public health professionals in adapting and implementing an HRI syndrome surveillance query. The Acute Communicable Disease Control Program's (ACDC) Syndromic Surveillance Unit utilized CSTE's HRI query to provide surveillance during the extreme heat season in 2018 in LAC. Additional modifications to the CSTE query were evaluated for potential improvements towards characterizing HRI trends. Methods From May 1 to September 30, 2018, Emergency Department (ED) data were queried for cases using the CSTEs definition for HRI. The queries consisted of key word searches within the chief complaint (CC) data field, and, if available, the diagnosis data fields. The query was derived from the CSTE HRI query published in 20161. In addition, ACDC explored the utility of expanding the CSTE syndrome definition to include additional chief complaints commonly associated with HRI such as dehydration and syncope. Both queries were applied on all participating syndromic EDs in LAC alongside daily high temperature data trends. Local temperature data for downtown Los Angeles weather station KCQT were taken from the Weather Underground website. Spearman correlation coefficients were calculated for each query during the heat season. Similarly, both queries were also applied during colder months from October 1, 2017 to April 30, 2018 for comparison. Lastly, results for dehydration and syncope were independently assessed apart from other HRI query terms during both heat seasons and colder months. Results The CSTE HRI query and the query with the added terms yielded 1,258 and 63,332 ED visits, respectively, during the heat season. On July 6, the maximum daily temperature peaked at 108 °F; the HRI and the query with the added terms yielded 136 and 618 ED visits, respectively. The HRI query and the HRI query with the added terms had a correlation coefficient of 0.714 (p <0.0001) and 0.427 (p <0.0001), respectively. During colder months, the CSTE HRI query and the query with the added terms yielded 377 and 86,008, respectively, with correlation coefficients of 0.342 (p < 0.0001) and 0.133 (p < 0.052). The syncope-only query saw no variation in HRI classified encounters throughout the heat season (mean: 328; min: 228; max: 404) or colder months (mean: 328; min: 261; max: 404) with correlation coefficients of 0.238 (p = 0.003) and 0.155 (p = 0.024), respectively. Similarly, the dehydration-only query saw no variation in HRI classified encounters throughout the heat season (mean: 96; min: 58; max: 258) or colder months (mean: 94; min: 60; max: 160) with correlation coefficients of 0.596 (p < 0.0001) and -0.016 (p = 0.822). Conclusions The CSTE HRI query proved to be a strong indicator for HRI, and the addition of terms associated with dehydration and syncope to the CSTE HRI query weakened the correlation with temperature. Compared to the original CSTE HRI query, the added terms yielded a 4934% increase in HRI classified encounters during the heat season; however, these were likely due to causes other than HRI -- adding the extra terms resulted in a weaker correlation with temperature. Additionally, the comparative analysis showed that, with the added terms, the volume of HRI encounters was larger during colder months than hotter months suggesting misclassification of non-HRI illnesses. Surveillance of HRI has proven to be difficult because many of the HRI symptoms are too commonly associated with non-HRI conditions which would explain the weaker correlations when adding additional chief complaints associated with HRI. In conclusion, the CSTE syndrome definition for HRI proved to be the most robust query for HRI during the heat season. Case counts of HRI are difficult due to symptom overlap with many other medical conditions. However, syndromic surveillance using the CSTE HRI query is useful for trend analysis in near real-time during heat events. References 1. Council of State and Territorial Epidemiologists. Heat-Related Illness Syndrome Query: A Guidance Document for Implementing Heat-Related Illness Syndromic Surveillance in Public Health Practice. Version 1.0. 2016 Sep. 12 p.

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Abstract

Objective The objective of this presentation is to explore emerging technologies and how they will impact the public health field. New technologies such as blockchain, artificial intelligence (AI), and the Internet of Things (IoT) will likely be incorporated into epidemiological methods and processes. This presentation will provide an overview of these technologies and focus on how they may impact public health surveillance in the future. Introduction With the increase in the amount of public health data along with the growth of public health informatics, it is important for epidemiologists to understand the current trends in technology and the impact they may have in the field. Because it is unfeasible for public health professionals to be an expert in every emerging technology, this presentation seeks to provide them with a better understanding of how emerging technologies may impact the field and the level of expertise required to realize benefits from the new technologies. Furthermore, understanding the capabilities provided by emerging technologies may guide future training and continuing education for public health professionals. Methods Analysis of current capabilities and potential advances in emerging technologies such as blockchain, AI, and IoT were performed by reviewing articles and whitepapers. In addition to a literature review, interviews will be performed with public health experts to determine how the emerging technologies align with current practices and the extent to which they may solve existing public health surveillance challenges. Results The literature review revealed many emerging technologies and potential applications in the public health field, including: Blockchain Blockchains can serve as electronic health information exchanges that hold the metadata and access information for patient electronic health records (EHRs).[1] These systems can ensure data privacy protections while also facilitate relevant data sharing from EHRs to disease surveillance systems. Furthermore, blockchain technology can be used in food supply chain management systems. During food contamination events, epidemiologists can trace through the blockchain to identify possible sources of the contamination.[2] AI AI can be used to improve the prediction and detection capabilities of disease surveillance systems. Machine learning algorithms can reveal patterns in the data and enable faster anomaly detection. Furthermore, machine learning models can be trained on data to create predictive models. IoT Urban IoT systems can monitor environmental indices including water and air quality, energy consumption, waste management, and traffic congestion in smart cities.[3] The data collected from such systems can be incorporated into more comprehensive disease surveillance systems and assist epidemiologists in better understanding populations and environmental risk factors. We will analyze and discuss such prospective applications with public health professionals to determine their potential impact on public health processes and practices in the next one, five, and ten years. Conclusions Blockchain, AI, IoT and other emerging technologies have applications in public health surveillance and impact the field to varying degrees. In addition to technological advances, there will be barriers to adoption that must be overcome before the value provided by the technologies can be realized. Many new technologies will require significant collaboration between public health departments, healthcare providers, and other partners to successfully incorporate the technologies into epidemiological processes. These collaborations include forming consortiums to exchange data in a blockchain and working with IoT providers for data access. Some technologies will require public health professionals to obtain additional training before they can take full advantage of the capabilities provided, while other technologies may be implemented by external partners allowing epidemiologists to utilize the new capabilities without the need to completely understand the underlying concepts. As emerging technologies are introduced into the public health field, a strong understanding of their capabilities and suitable applications will allow public health professionals to fully capture the benefits provided by the new technologies. References 1. Ekblaw A, Azaria A, Halamka JD, Lippman A. A Case Study for Blockchain in Healthcare:"MedRec" prototype for electronic health records and medical research data. InProceedings of IEEE open & big data conference 2016 Aug 22 (Vol. 13, p. 13). 2. Yiannas F. A New Era of Food Transparency Powered by Blockchain. Innovations: Technology, Governance, Globalization. 2018 Jul;12(1-2):46-56. 3. Zanella A, Bui N, Castellani A, Vangelista L, Zorzi M. Internet of things for smart cities. IEEE Internet of Things Journal. 2014 Feb 14;1(1):22-32.

Roles of Health Literacy in Relation to Social Determinants of Health and Recommendations for Informatics-Based Interventions: Systematic Review

Abstract

Objective Describe short-term health effects of the Hurricane using the syndromic surveillance system based on emergency departments, general practitioners and dispensaries in Saint-Martin and Saint-Barthélemy islands from September 11, 2017 to October 29, 2017. Introduction In Saint-Martin (31 949 inhabitants) and Saint-Barthélemy (9 625 inhabitants) islands in the French West Indies, the surveillance system is based on several data sources: (1) a syndromic surveillance system based on two emergency departments (ED) of Saint-Barthélemy (HL de Bruyn) and Saint-Martin (CH Fleming) and on mortality (SurSaUD® network [1])); (2) a network of sentinel general practitioners (GP's) based on the voluntary participation of 10 GPs in Saint-Martin and 5 in Saint-Barthélemy; (3) the notifiable diseases surveillance system (31 notifiable diseases to individual case-specific form); (4) the regional surveillance systems of leptospirosis and arboviruses based on the biological cases reported by physicians and laboratories of two islands. On September 6, 2017, Hurricane Irma struck Saint-Martin and Saint-Barthélemy islands. Both islands were massively destroyed. This storm led to major material damages, such as power outages, disturbance of drinking water systems, road closures, destruction of medical structures and evacuation or relocation of residents. In this context, the usual monitoring system did not work and life conditions were difficult. The regional unit of French National Public Health Agency set up an epidemiological surveillance by sending epidemiologists in the field in order to collect data directly from ED physicians, GP's and in dispensaries. Those data allowed to describe short-term health effects and to detect potential disease outbreaks in the aftermath of Hurricane Irma. This paper presents results of the specific syndromic surveillance. Methods Before Irma, ED data were collected daily directly from patients' computerized medical files that were filled in during medical consultations at ED. Among the collected variables, the diagnosis was categorized according to the 10th revision of the International Classification of Diseases (ICD-10). This surveillance system was completed by aggregated data of Emergency Medical Services (EMS), also including medical diagnosis coded using the ICD10. Because of the sudden disruption in hospital departments due to hurricane, electronic transmission was stopped. To replace it, ED data collection turned temporary into paper-forms and several epidemiologists were sent in Saint-Martin and Saint-Barthélemy to collect data directly from the ED physicians. This system remained until the end of October when connections and data transmission were restored. Because of destruction of medical structures, dispensaries were opened in different strategic areas of the island, 3 in Saint-Martin and none in Saint-Barthélemy. General practitioners have progressively reopened their practice (8 GP's in Saint-Martin and 5 in Saint-Barthélemy) and patient"s data were collected and integrated into the surveillance system. Based on a literature review and former experience, the main pathologies identified for the health risk assessment were: (1) somatic pathologies directly or indirectly related to the hurricane (trauma, wounds, cuts, burns, secondary infection); (2) infectious diseases related to the lack of hygiene partly due to damaged water and electricity networks and unavailable health care structures (gastroenteritis, food infections, respiratory diseases, skin infections, tetanus and other pathologies that may occur in the longer term linked to the incubation period especially leptospirosis and hepatitis A); (3) chronic pathologies by discontinuity of care (renal insufficiency, diabetic, cardio-respiratory decompensation, etc.); (4) pathologies related to animal bites and mosquito bites (vector-borne diseases); (5) psychological and / or psychiatry disorders. Then in the French West Indies, from September 11 to October 29,2017, data were routinely analyzed to detect and follow-up various expected or unusual variations of one or more pathology of the above list. Results The following week after Irma (2017-37), the weekly number of ED visits compared to the mean activity observed in normal situation has increased: 1225 ED visits vs. 313 in 2017-35 in Saint-Martin and 227 ED visits vs. 94 ED visits in 2017-35 in Saint-Barthélemy. ED activity has gradually decreased to finally return to a based-activity as observed before the hurricane at the end of October. From September 11 to October 29, 25% of recorded emergency consultations in Saint-Martin island were trauma, wounds, burns and cuts. As in Saint-Martin, 42% of emergency visits in Saint-Barthélemy were pathologies directly or indirectly related to the passage of Irma (trauma, wounds, etc). Others major causes of ED visits were for treatment renewal (diabetes, renal insufficiency, etc.) and gyneco-obstetric activity because general practitioners had stopped their activity. In dispensaries and general practitioners, the most common pathology was gastroenteritis (11% in Saint-Martin) over the entire period of surveillance. At the beginning of the surveillance, skin infections were the most frequently found (20%) in Saint-Martin and psychological disorders (3%) in Saint-Bartélemy, while at the end respiratory infections were the most frequent (6%) in both islands. No increase in visits for chronic diseases, food-borne diseases, acute respiratory or diarrhea illness were detected. No autochthonous confirmed cases of cholera, leptospirosis, vector-bone disease, hepatitis A or typhoid fever had been reported, due to the destruction of the laboratory. Conclusions Syndromic surveillance in the French West Indies allowed the epidemiologists to assess rapidly the health impact of hurricane in Saint-Martin and Saint-Barthélemy. The well-established relations between French National Public Health Agency and local professionals of both affected islands allowed to temporary switch from an electronic into a paper-based data transmission without any interruption of data analysis. Although several cluster suspicions have been investigated (especially of gastroenteritis, scabies, etc), no massive

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outbreak was detected. Then even with a degraded system, syndromic surveillance allowed to reinsure authority of the absence of major health impact due to Irma. References 1-Caserio- Schönemann C, Bousquet V, Fouillet A, Henry V. Le système de surveillance syndromique SurSaUD ®. Bull Epidemiol Hebd 2014 ;3-4 :38-44.

Roles of Health Literacy in Relation to Social Determinants of Health and Recommendations for Informatics-Based Interventions: Systematic Review

Abstract

Objective - To discuss the development of a set of tools for interagency collaborations on health surveillance - To determine the core contents of the tools based on known gaps in health surveillance - To determine collaborators in development and timelines for completion Introduction In 2010, the Council of State and Territorial Epidemiologists (CSTE) identified data collected by poison centers (PCs) as an important tool for all-hazards exposure and illness surveillance. In response to this, the Centers for Disease Control and Prevention (CDC), CSTE, and the American Association of Poison Control Centers (AAPCC) members created the Poison Center Public Health Community of Practice (CoP). The CoP acts as a platform, to facilitate sharing experiences, identify best practices, and develop relationships among federal agencies, state and local health departments (HD), and PCs. Since its inception, the CoP garnered over 250 members, hosted more than 25 webinars regarding PC-HD collaborations, and produced five newsletters highlighting subjects pertinent to PC and HD personnel. Description Findings and lessons learned from activities outlined in the introduction include the need for: 1) standardized inter-agency communication, 2) increased knowledge and utilization of state reporting and monitoring systems, and 3) inter-agency collaborations to prevent the duplication of efforts. In this roundtable, we will: 1) discuss how to develop information and tools for inter-agency public health communication and messaging, 2) identify key stakeholders including potential national, state, and local agencies who can help bolster communication messaging, and 3) develop appropriate points of contact within these agencies. Potential components of the guidance may include: 1) a comprehensive list of state resources available to PC and PH personnel, 2) recommended inter-agency points of contact, 3) lessons learned from collaborative projects, and 4) PC abilities to share and analyze data for public health practice and health surveillance. How the Moderator Intends to Engage the Audience in Discussions on the TopicThis roundtable session will consider the following questions: - Which agencies--local, state, national, or otherwise-- would benefit from inter-agency collaborations health surveillance efforts? - What should the proposed tools include? Who should be involved in developing the proposed materials? Following this roundtable, the CoP hopes to have tangible next steps in creating inter-agency collaborations health surveillance guidance and establish a timeline for completion.

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Abstract

Objective To evaluate Vaccine Derived Polio Virus 2 isolation rate from Environmental Surveillance and its contribution to Polio Eradication Initiative (PEI) Introduction Nigeria is the only country in Africa yet to be certified free of Wild Polio Virus (WPV). The country consists of 36 States and a Federal Capital Territory. Gombe is one of the 19 Polio high risk States in the North-eastern geo-political zone of the country. The last case of WPV isolated in Gombe State was in 2013. One of the strategies for Polio eradication is a sensitive Acute Flaccid Paralysis (AFP) surveillance system in which any AFP is promptly detected and timely investigated. The focus of the investigation is to analyze two faecal samples of the patient, and/or sometimes those from contacts for any possible isolation of Polio Virus1 (PV). AFP surveillance is meant to be applicable to any human population at any time; however, there are situations in which there are good reasons to suspect that negative results of AFP surveillance are not reliable. Supplementary information is required in such situations and one approach for that is Environmental Surveillance (ES), in which a search for PV is made in environmental specimens contaminated by human feaces2 ES in the African region started in Nigeria in July 20113,4. Since the introduction of this strategy, it has achieved its objective of complimenting the AFP surveillance system. There has been a gradual increase in the number of ES sites in Nigeria from 2011 to date4. The increase is largely due to the successes recorded in terms of the PV isolation from the sites, PV epidemiology, the large population size and mobility4,5. The last cases of WPV1 and WPV3 from environmental samples had dates of collection in May 2014 (Kaduna) and July 2012 (Kano) respectively4. ES was initiated in Gombe State in December 2016. Four ES sites were identified and sample collection began soon after training of personnel responsible for collection of the sewage sample. The four identified ES sites are Baba Roba Valley, Unguwauku Railway Bridge, Gadan Bayan Moonshine and Dan Gusau Bridge. Since inception of ES in Gombe State, 2 ambiguous Vaccine Derived Poliovirus type 2 (aVDPV2) were confirmed from sewage samples collected from Baba Roba Valley site on the 30th January 2017 and from Dan Gusau Bridge site on the 6th March 2017. In 2018, a circulating Vaccine Derived Poliovirus type 2 (cVDPV2) was also detected from sewage samples collected on the 9th April 2018 from Baba Roba Valley site. We reviewed the laboratory results from the 2 surveillance methods so as to evaluate the VDPV2 isolation rate. Methods ES involves collection of one litre of environmental sample (sewage water) via grab sampling method in accordance with World Health Organization's (WHO) Guidelines for Environmental Surveillance for Polioviruses2. All ES sewage samples were transported in a 1 litre container appropriately packaged in a Giostyle with 8 frozen icepacks to maintain reverse cold chain to a Polio Laboratory where the samples are analyzed as per WHO ES testing standard operating procedures. Poliovirus type 2 isolates are sent to the reference laboratory at the US Centre for Disease Control for sequencing for PV isolation. We reviewed all the results of the environmental samples (ES) and stool samples from patients with Acute flaccid paralysis (AFP) from January 2017 to June 2018. The environmental samples were from five pre-selected sites that was based on the perceived risks for polio circulation that included poor sanitation, overcrowding, extend of drainage population, availability of sewage system and absence of discharge into the sites. The stool samples were from patients detected with AFP in Gombe local government area. The results from the two methods of surveillance for PV were evaluated and compared based on yields and isolates (Negative results, VDPV2, Non-polio enterovirus (NPENT). Results A total of 309 sewage samples from five (5) sites and 142 AFP stool samples from Gombe LGA were collected from January 2017 to June 2018. Three 3(0.97%) of the sewage samples yielded VDPV2, 102(33.01%) had Non-polio enteroviruses (NPENT) and 41 (13.27%) negative samples. On the other hand, no VDPV was isolated from the AFP stool samples, the NPENT detection rate was 13(9.16%) and 121(85.21%) samples were negative. The Non-polio AFP (NPAFP) and stool adequacy rates for Gombe LGA during the reporting period were calculated to be 17.2 and 100% respectively. Conclusions The polio virus (VDPV) isolation from ES in this review is higher than in AFP surveillance. This has demonstrated amongst others benefit of ES its ability to detect polio virus even in the absence of the virus among AFP cases. ES can thus detect virus that are probably missed by AFP surveillance and hence allow for early response so as to curtail further transmission. The high NPAFP and stool adequacy rates are indication of a sensitive surveillance system nonetheless, the virus isolation from the AFP surveillance was very low. It is important to mention here that other laboratory indicators were not factored into this review. We recommend therefore that both ES and AFP surveillance be done together where facility, resources and personnel are available to implement. References [1] WHO. 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Roles of Health Literacy in Relation to Social Determinants of Health and Recommendations for Informatics-Based Interventions: Systematic Review

Abstract

Objective To perform the spatial distribution of Spotted Fever in the Metropolitan Area of Sao Paulo Municipality (MRSP), coverage area of Epidemiological Surveillance Group VII – of Santo Andre (GVE7), to determine clusters of disease incidence, and through QR Code to be able to access data from any smartphone as an aid to the early treatment of new suspected cases. Introduction The use of new technologies such as Online Maps and the QR Code facilitates the knowledge dissemination in the health science, aiding in diagnostic elucidation and intelligent decisions making, thus offering an improvement in the quality of care provided to patients. Cases with suspected spotted fever should be approached as potentially serious, which may develop with shock within a few hours and, if not addressed can progress to death. In the case of spotted fever, early onset determines the cure of these cases. Methods The spatial distribution of confirmed Spotted Fever cases was performed in the region of the seven municipalities inserted into GVE7, using the Information System of Notifiable Diseases (SINAN) database and Google Maps online tool, and determining clusters of disease incidence. The QR Code was generated through the QR Code Maker online tool to access map and to verify if the displacement of each new suspect case coincides with the incidence clusters of the disease, and to determine early treatment of these patients. Results During the study period, 496 suspected cases of Spotted Fever were reported, of which 64 cases were laboratory test confirmed with a lethality rate of 65%. Most of the probable infection sites are located near the regions close to forest remnants and near the dams. The main concentration of cases is in Recreio da Borda do CampoDistrict in Santo Andre, 27 cases (43% of total). The other priority areas for Spotted Fever occurrence in the MRSP in the period were the districts of Alvarenga, Cooperativa (border of Municipality of Diadema), and Montanhao (in the Municipality of Sao Bernardo do Campo). Figure 1. QR Code and Google Maps Spotted Fever Incidence Clusters, GVE VII Santo Andre. Conclusions In order to validate the use of these technologies as positive, it will be necessary to analyze the closure of the new suspected Spotted Fever cases treated in the region studied. Positive spatial correlation between neighboring areas may result from the disease having an occurrence characteristic in endemic areas and spreading to the nearest areas. We can conclude that the use of new technologies to determine the early onset of treatment for Spotted Fever suspected cases based on the origin of the patients treated in the region of GVE7 can determine the success in the evolution of these cases. References Barros-Silva PM, Pereira SV, Fonseca LX, Maniglia FV, de Oliveira SV, de Caldas EP. Febre maculosa: uma análise epidemiológica dos registros do sistema de vigilância do Brasil. Scientia Plena. 2014 Apr 25;10(4 (A)). Biggs HM. Diagnosis and management of tickborne rickettsial diseases: Rocky Mountain spotted fever and other spotted fever group rickettsioses, ehrlichioses, and anaplasmosis—United States. MMWR. Recommendations and Reports. 2016;65. Czuszynski K, Ruminski J. Interaction with medical data using QR-codes. InHuman System Interactions (HSI), 2014 7th International Conference on 2014 Jun 16 (pp. 182-187). IEEE. Dube S, Ndlovu S, Nyathi T, Sibanda K. QR Code based patient medical health records transmission: Zimbabwean case. InProceedings of informing science & IT education conference (InSITE) 2015 (pp. 521-520). Kanzaki A, Natsuaki M, Matsutani S, Mase K, Nakajima E, Kataoka S, Konya H, Takeda A, Nishiura T, Takada N. Two cases of Japanese spotted fever infected in Rokko mountain near urban area of southern Hyogo Prefecture. The Journal of dermatology. 2018 Jun 1. https://doi.org/10.1111/1346-8138.14208 Nasser JT, Lana RC, Silva CM, Lourenço RW, Silva DC, Donalísio MR. Urbanização da febre maculosa brasileira em município da região Sudeste: epidemiologia e distribuição espacial. Revista Brasileira de Epidemiologia. 2015 Apr; 18:299-312. Parra F. Reflexões sobre as relações entre usuário-interator e tecnologias emergentes a partir do QR Code. Temática. 2018 May 23;14(5). Pinter A ET AL.; A Febre Maculosa Brasileira na Região Metropolitana de São Paulo. Boletim Epidemiológico Paulista 2016;13(151):3-47. Raghavan RK, Goodin DG, Neises D, Anderson GA, Ganta RR. Hierarchical bayesian spatio–temporal analysis of climatic and socio–economic determinants of rocky mountain spotted fever. PloS one. 2016 Mar 4;11(3):e0150180.

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Objective To assess the present status of utility, functionality, usability and user satisfaction of the BioSense Platform. Introduction Since 2015, CDC's Division of Health Informatics and Surveillance staff have conducted evaluations to provide information on the utility, functionality, usability and user satisfaction associated with the National Syndromic Surveillance Program's BioSense Platform tools. The BioSense Platform tools include: 1) Access and Management Center (AMC), a tool that enables site administrators to manage users and data permissions; 2) Electronic Surveillance System for Early Notification of Community-based Epidemics (ESSENCE), a software application that enables syndromic surveillance related data visualization and analysis; 3) Adminer, a tool that allows users to access site data on the datamart; and 4) Rstudio, an application that can be used for data analysis and visualization. The evaluation findings have informed activities that led to improvements in functionality, development or procurement of platform associated tools, and development of resource materials. In May 2018, NSSP conducted an evaluation with eight jurisdictions that participated in the first user acceptance testing (UAT) evaluations in 2015. The purpose of the evaluation was to assess the present status of utility, functionality, usability and user satisfaction of the tools on the BioSense Platform, and delineate progress since 2015. Methods CDC's evaluation framework and utilization-focused evaluation were used to inform and engage stakeholders, develop the evaluation questions, metrics, and methodology. Eight selected jurisdictions participated in an online, Epi-Info survey that captured quantitative and qualitative information. Prior to the survey, participants received a presentation about the evolution of the BioSense Platform since 2015, and were provided an overview of components to evaluate. The participants were asked to assess the following key areas based on use of the BioSense Platform within the past 30 days: 1) the utility, functionality and usability of the AMC, ESSENCE, Adminer and Rstudio; 2) how well the enhanced data flow has enabled them to conduct syndromic surveillance activities; 3) usefulness of the quick start guides. Additionally, participants were asked to provide suggestions for other improvements to the BioSense Platform, and to indicate their overall satisfaction. Descriptive statistics were generated and thematic analysis was conducted to identify themes from qualitative responses. Results Overall, participant's responses remained positive about the utility, functionality, usability and overall satisfaction of the BioSense Platform. Participants indicated using the BioSense Platform regularly (e.g. daily, weekly and/or monthly) within those 30 days. Certain functions have been used more than others across the various tools to conduct syndromic surveillance, with at least 50% of participants reporting use. These included creating data access rules, viewing and verifying raw and processed data, running time series, conducting free-text queries, and assessing data details and total ER visit counts by hospital, county/region, or state. The challenges ranged from tool performance to user interpretation of the function. Participants reported that the enhanced data flow improved their data quality and helped identify issues. Although participants scored ESSENCE to have average usability per the system usability scale (SUS score=63.5 in 2018), the BioSense Platform and its tools were reported as useful by 88% of participants. Further, participants continue to be comfortable using the AMC, however creating data access rules that are outside of simple use cases continue to be a challenge. Participants comfort level with Adminer improved from 2016 to 2018 with all participants reporting comfortable in using the tool. The use of each tool's quick start guides varied. Of those who used the guides, all of the participants agreed that the Adminer and Data Dictionary guides were useful. There was a smaller number of participants agreeing that the other guides were useful. Lastly, participants provided recommendations to improving the BioSense Platform. The most frequent recommendations were improving the data access control architecture, and sharing aggregate data with hospitals in their state. Conclusions The development and operationalization of the BioSense Platform and associated tools has been in an environment of continuing advancements in technology and changing public health needs and priorities. Up-to-date evaluation activities have helped to ensure that BioSense is best suited to address these challenges and meet the syndromic surveillance needs of users. Overall, the findings outlined above indicate that the functionality and utility of BioSense are well suited to meet user needs. References Bangor A, Kortm P, Miller J. Determining What Individual SUS Scores Mean: Adding an Adjective Rating Scale. Journal of Usability Studies. 2009; 4:114-123.

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Objective To assess the type, tone, consistency, and accuracy of communications surrounding a rare polio-like condition called acute flaccid myelitis between 2014-2017 from from CDC, other health agencies, researchers, news media outlets, and the public. Introduction In 2014, CDC started receiving an increase in reports of children in the United States with unexplained limb weakness or paralysis (120 total cases). These children were later confirmed by neurology experts to have a rare condition called acute flaccid myelitis (AFM). The Council of State and Territorial Epidemiologists created a standardized case definition for AFM in 2015, allowing CDC to establish standardized surveillance to monitor AFM, determine possible causes and risk factors, and attempt to estimate the baseline incidence. Through this surveillance, CDC identified another increase in AFM cases in 2016 (149 total cases), and obtained valuable information on the clinical presentation to help characterize this illness and the epidemiology of AFM. However, despite the ongoing investigation, many questions still remain about AFM, including why the increases occurred and what has caused most of the AFM cases. The lack of AFM knowledge has made preventing AFM, finding effective treatments for patients, and developing communication messages challenging. Methods We compiled a timeline of events surrounding AFM and the investigation from 2014 to 2017, and across this timeframe, we analyzed communications from CDC, other health agencies, researchers, news media outlets, and the public. We reviewed scientific articles, press releases, websites, social media, educational materials, and news stories. We assessed the type, tone, consistency, and accuracy of the AFM information based on the principles in CDC's Crisis and Emergency Risk Communication Manual. Results The AFM communications included information about possible causes, symptoms, severity, transmission, risk, prevention, prognosis, and the possibility of future increases. Several materials included stories about patients. Information from the different sources evolved along with the investigation and was overall consistent, but especially differed on whether AFM was associated with enterovirus D68. The amount of information released from the different sources was also variable, with some sources releasing more information than others. Conclusions Emerging diseases, like AFM, pose threats to the public's health, requiring credible and timely risk communication so people can make decisions about their well-being. CDC has played a critical role in relaying the best available scientific information about AFM in a timely manner to healthcare professionals and the public, as the situation has evolved since 2014 and there have been many unknowns. The messages we communicate during these times, using risk communication principles and the valuable data collected from our AFM surveillance and investigation, and their timing affects our level of involvement in the national conversation about AFM. Working closely with health departments, healthcare providers, researchers, and other partners is important for consistent communication messaging and release of information.

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Abstract

Objective To communicate the detection capabilities of syndromic surveillance systems to public health decision makers. Introduction Increasingly public health decision-makers are using syndromic surveillance for real-time reassurance and situational awareness in addition to early warning1. Decision-makers using intelligence, including syndromic data, need to understand what the systems are capable of detecting, what they cannot detect and specifically how much reassurance should be inferred when syndromic systems report 'nothing detected'. In this study we quantify the detection capabilities of syndromic surveillance systems used by Public Health England (PHE). The key measures for detection capabilities are specificity and sensitivity (although timeliness is also very important for surveillance systems)2. However, measuring the specificity and sensitivity of syndromic surveillance systems is not straight forward. Firstly, syndromic systems are usually multi-purpose and may be better at identifying certain types of public health threat than others. Secondly, whilst it is easy to quantify statistical aberration detection algorithms, surveillance systems involve other stages, including data collection and human decision-making, which also affect detection capabilities. Here, we have taken a 'systems thinking' approach to understand potential barriers to detection, and summarize what we know about detection capabilities of syndromic surveillance systems in England. Methods Within the systems thinking approach all stages in surveillance (data collection, automated statistical analysis, expert risk assessment and reporting of any aberrations) were considered. Sensitivity and specificity were then calculated for the system as a whole, and the separate impact of each process stage. To communicate these findings to decision-makers, we created an evidence synthesis. Evidence was synthesised from research involving PHE syndromic surveillance systems and retrospective incidents detected and/or investigated by PHE. We then summarized the evidence for different types of incident. Results We identified the following stages which influence detection: The proportion of people who become symptomatic; The proportion of symptomatic people who present to different types of health care; The coding of symptomatic patients; Coverage of different health care systems by syndromic surveillance; Statistical algorithms used to identify unusual clusters within syndromic data; Risk assessment process used to determine action resulting following automated statistical alarms3. Stages 1 to 3 depend on the type of incident that is affecting peoples' health or healthcare seeking behaviour: stages 3 to 6 depend on the capabilities of the syndromic surveillance system. In general, each stage increases the time until detection, and reduces sensitivity but should improve specificity. Our evidence synthesis identified a wide range of threats to public health including: seasonal outbreaks of respiratory infections; allergic rhinitis; insect bites; gastrointestinal outbreaks; air pollution; and heat waves. We ranked the available evidence, giving more weight to actual events detected and validated against independent evidence, and less to purely descriptive epidemiology or modelled simulations. We created different measures for sensitivity, specificity and timeliness depending on the type of evidence available. Sensitivity ranged from 100% for seasonal influenza to 0% for seasonal adenovirus. Specificity also varied, with high specificity where we had a specific syndromic indicators, e.g. sunstroke, and lower for those associated only with more generic multi-purpose indicators e.g. acute respiratory infections. Timeliness varied from being able to provide early warning of up to seven days prior to traditional surveillance methods for some respiratory illnesses, to being able to detect and report on the health impact of air pollution within four days of a period of poor air quality. Conclusions This study has shown that a syndromic surveillance systems' utility depends on more than just an algorithm's specificity and sensitivity measure. We've identified the impact of the different surveillance stages and separately considered different types of incident. Thus, we can identify the impact of issues such as local population coverage and an individual investigator's risk assessment practices. Furthermore, the evidence synthesis will provide a summary for decision makers, and help identify gaps in our knowledge where more research is required. References 1. Colon-Gonzalez FJ, Lake IR, Morbey RA, Elliot AJ, Pebody R, Smith GE. 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Abstract

Objective The objectives of this project were to rapidly build and deploy a web-based reporting platform in response to a canine influenza H3N2 outbreak in New York City (NYC) and provide aggregate data back to the veterinary community as an interactive dashboard. Introduction Data-driven decision-making is a cornerstone of public health emergency response; therefore, a highly-configurable and rapidly deployable data capture system with built-in quality assurance (QA; e.g., completeness, standardization) is critical.1 Additionally, to keep key stakeholders informed of developments during an emergency, data need to be shared in a timely and effective manner. Dynamic data visualization is a particularly useful means of sharing data with healthcare providers and the public.2 During Spring 2018, detection of canine influenza H3N2 among dogs in NYC caused concern in the veterinary community. Canine influenza is a highly contagious respiratory infection caused by an influenza A virus.3 However, no central database existed in NYC to monitor the outbreak and no single agency was responsible for data capture. Our team at the NYC Department of Health and Mental Hygiene (DOHMH) partnered with the NYC Veterinary Medical Association (VMA) to monitor the canine influenza H3N2 outbreak by building a web-based reporting platform and interactive dashboard. Methods The NYC DOHMH built and deployed a web-based reporting platform to aid veterinarians in reporting cases of canine influenza. We leveraged REDCap Cloud, a cloud-based graphical user interface data capture and management software. REDCap Cloud collected information regarding the provider, owner, dog, residence of dog, illness history, and influenza testing. We leveraged REDCap QA functionality in the form of mandatory questions to ensure data completeness. Several different field types — including dropdown menus, mutually exclusive radio buttons, and multi-select check boxes — were used to ensure data standardization. Skip logic was incorporated to guide users through unique sequences of questions based on the answers they entered. Reporting was voluntary. Results After requirements were gathered, the REDCap web-based reporting platform was rapidly deployed in approximately two business days. Over the course of one week, multiple versions of the dashboard were produced and the final iteration was completed. The entire system was built on server-side software that is available as free or open-source for individual licenses. The dashboard can be found at the following link: http://www.vmanyc.org/canine_influenza_dashboard.html. A total of 28 cases were reported by 6 providers during June–August 2018. All of the 28 cases were reported from 2 of the 5 NYC counties (boroughs); 17/28 (60.7%) were reported from Brooklyn and 11/28 (39.3%) were reported from Manhattan. We were able to collect mostly complete data by leveraging REDCap QA functionality. The reporting facility was listed in all cases, and an owner was listed in all but two cases. All reported cases used a PCR test for the detection of canine influenza H3N2. One reported case indicated polymerase chain reaction (PCR) test results as "not detected" which suggests that one negative case was reported through the system. Conclusions Using REDCap Cloud and R, we were able to rapidly build and deploy a web-based reporting platform and dynamic data visualization during an emergency response to an outbreak of canine influenza H3N2. Our system was used by veterinarians to report 28 cases of canine influenza. Future emergency responses for human disease outbreaks will likely benefit from the experience our team gained during our partnership with the NYC VMA. References 1. Centers for Disease Control and Prevention. Public Health Emergency Response Guide for State, Local, and Tribal Public Health Directors. https://emergency.cdc.gov/planning/pdf/cdcresponseguide.pdf. 2. Meyer M. The Rise of Healthcare Data Visualization. http://journal.ahima.org/2017/12/21/the-rise-of-healthcare-data-visualization/. 3. American Veterinary Medical Association. Canine Influenza FAQ. https://www.avma.org/KB/Resources/FAQs/Pages/Control-of-Canine-Influenza-in-Dogs.aspx. 4. Wickham H. R packages. http://r-pkgs.had.co.nz/.

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Abstract

Objective Through opioid overdose surveillance data briefs, we aim to focus on creating meaningful targeted reports that incorporate mindful "data points" and visualizations for diverse audiences. Data briefs provide information that is actionable to support decision making across the spectrum of partners involved in responding to Tennessee's opioid epidemic. Additionally, visualizations and reporting of opioid overdose surveillance data create pathways and processes for sharing data and opportunities to collaborate with others' expertise that enrich communication among multi agency collaborators and interdepartmental partners. Introduction Tennessee has experienced an increase of fatal and non-fatal drug overdoses which has been almost entirely driven by the opioid epidemic1. Increased awareness by medical professionals, new legislation surrounding prescribing practices, and mandatory use of the state's prescription drug monitoring program has resulted in a decrease of opioid prescriptions and dosages. Paradoxically, emergency department discharges and inpatient hospitalizations due to opioid overdoses have continued to increase. The Tennessee Department of Health, Office of Informatics and Analytics (TDH OIA) has developed visualizations and reports for opioid overdose surveillance data to enhance communication and timely response by health partners. Through opioid overdose surveillance reporting data briefs we aim to focus not on "big data" analytics, but rather meaningfully targeted data briefs that illustrate mindful "data points" and visualizations. These data briefs provide information that is actionable to support decision making across the spectrum of partners involved in responding to Tennessee's opioid epidemic. Methods TDH has partnered with state agencies including the Department of Mental Health and Substance Abuse Services (DMHSAS) and the Tennessee Bureau of Investigation (TBI) as well as internal TDH divisions to foster enhanced opioid response communication. In order to provide a comprehensive yet digestible way to share information we have created two sets of data visualizations that communicate pertinent weekly and monthly opioid overdose trends. A bi-weekly brief contains information from four data sources: Tennessee's Controlled Substance Monitoring Database which is Tennessee's prescription drug monitoring program (PDMP); the Drug Overdose Reporting system which contains non-fatal opioid overdoses captured in hospitals' emergency departments; Vital Records Information System Management which captures fatal drug overdose information; and the Tennessee Incident Based Reporting System which includes opioid and heroin related arrest information. The bi-weekly data brief provides a quick yet inclusive layout of data in an easily consumable manner. A one page front and back layout is divided into four sections, representing each of the four data sources. A nonfatal opioid overdose "counter" displays a year-to-date count of non-fatal opioid overdoses as compared to the previous year. The monthly report follows a slightly different layout, as the report hones in on data pertaining only to non-fatal opioid overdoses reported from hospital emergency departments. A monthly year-to-date count of non-fatal opioid overdoses and counts of non-fatal opioid overdoses by race and age are included in the report, as well as a visualization depicting the number of non-fatal opioid overdoses by month by opioid class. The monthly report also includes a choropleth map that displays non-fatal opioid overdoses by zip code for the reporting month and a heat map of non-fatal opioid overdoses for cumulative 2018. Initial feedback from partners about the visualizations included requests to add footnotes for readers to distinguish the data sources and data limitations, as well as requests to provide enhanced contextual information such as year to date counts, previous year counts, and previous month comparisons. Further visualization discussions included requests to add public health regions as a map overlay, identifying metrics that best illuminate "red flags" or upticks in numbers, and assessing whether to display counts or rates for a given data source. Results Data briefs and reports are disseminated to TDH leadership, the Office of the State Chief Medical Examiner, the Office of General Counsel, TBI, DMHSAS, regional epidemiologists and the newly formed Opioid Overdose Coordinating Office. These data briefs have been proven to be an effective tool for enhanced communication and responding to the opioid crisis. For example, the TDH Commissioner's office requested additional information about a county that was consistently ranking high in non-fatal overdoses as illustrated on a data report. The dissemination of data briefs has also strengthened internal TDH partnerships including linking Viral Hepatitis and HIV programs with OIA to develop visualizations that incorporate HCV and HIV data (Hepatitis C Virus; Human Immunodeficiency Virus) with opioid overdose data to better understand and elucidate the syndemic of opioid overdose, HCV, and HIV in Tennessee. The dissemination of data briefs and reports has also been an effective tool for responding to the opioid crisis with our interagency partner, DMHSAS. A DMHSAS team utilized the data briefs to inform how and where to expand an overdose recovery navigator program within the state—a program that provides individuals who have recently overdosed (and are still in the emergency room) with information for treatment and recovery resources. Current work, also in partnership with DMHSAS, has been the creation of a data brief specifically on the topic of harm reduction. The data brief will include a map that shows areas of naloxone distribution to law enforcement agencies throughout the state, as well as a map that illustrates naloxone administration locations by law enforcement officers in the field. Additionally, information on locations of syringe exchange programs will be included in the brief. Members from DMHSAS have provided feedback that they anticipate using the harm reduction brief to assess which remaining law

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enforcement facilities have not yet on-boarded to receive naloxone, to pin point areas where additional distributions of naloxone might be needed, and identify where supplemental naloxone administration trainings for, either law enforcement or the community, might be targeted. Conclusions Visualizations have illuminated patterns and "red flags" in geographic areas that have helped guide decision makers in making data-driven decisions about opioid response. Visualizations and reporting of opioid overdose surveillance data has also importantly enriched communication among multi agency collaborators and interdepartmental partners that, until now, have been largely siloed. Pathways and processes for sharing data and opportunities to collaborate with others' expertise have been strengthened by the dissemination of targeted mindful "data point" briefs over large scale "big data" analytics. References Office of Informatics and Analytics, Tennessee Department of Health. Prescription drug overdose program 2018 report: understanding and responding to the opioid epidemic in Tennessee using mortality, morbidity, and prescription data [Internet]. Tennessee Department of Health, 2018. Available from: https://www.tn.gov/content/dam/tn/health/documents/pdo/PDO_2018_Report_02.06.18.pdf.

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Roles of Health Literacy in Relation to Social Determinants of Health and Recommendations for Informatics-Based Interventions: Systematic Review

Abstract

Objective This poster presentation shares Indiana's approach of alerting local health departments (LHDs) with near real-time drug overdose data and how this process has been enhanced through mapping and analysis with a geographic information system (GIS). Introduction Since 2008, drug overdose deaths exceeded the number of motor vehicle traffic-related deaths in Indiana, and the gap continues to widen1. While federal funding opportunities are available for states, it often takes years for best practices to be developed, shared, and published. Similarly, local health departments (LHDs) may experience lengthy delays to receive finalized county health statistics. Indiana collects and stores syndromic emergency department data in the Public Health Emergency Surveillance System (PHESS) and uses the Electronic Surveillance System for the Early Notification of Community-based Epidemics version 1.21 (ESSENCE) to monitor public health events and trends. In July 2017, the Indiana Overdose Surveillance Team (IOST) developed a standard process for monitoring and alerting local health partners of increases in drug overdoses captured in ESSENCE at the county level. ISDH is enhancing these alerts by mapping the data in GIS and providing spatiotemporal data to LHDs to inform more targeted intervention and prevention efforts. Methods The IOST monitors drug overdoses statewide by analyzing daily queries from ESSENCE and sending email alerts to LHDs that are experiencing a statistically significant increase in suspected overdose activity at a hospital or county level. The IOST then requests that LHDs complete an overdose response feedback survey describing their actions after receiving an overdose alert. The IOST GIS analyst has enhanced overdose alerts by utilizing daily emergency department data queries from the PHESS database based on chief complaint and diagnosis text. Python™ and ArcGIS™ are used to deduplicate and geocode records, calculate the rate of cases within a hexagonal grid, and calculate the kernel density of case counts to show patterns at the neighborhood level. Comparisons to previous time periods are also calculated. Temporal and spatial scales of analysis are flexible, but 7 days and 30 days are used most often. Results are mapped in an HTML file using an open source Python package for dissemination to LHDs. Results Between July 26, 2017, and Sept. 4, 2018, the IOST sent 89 suspected overdose alerts to LHDs. Alerts were sent to 45 different LHDs, of which 22 received multiple alerts (range: 1-9 repeat alerts). LHDs were requested to complete the survey on their initial alert, and a total of 31 jurisdictions completed this survey (31/45 = 69%). The majority of the LHD respondents (27/31 = 87%) wanted to continue receiving overdose alert emails. Our enhanced spatial analysis project has mapped more than 500 cases per week. Geocoding was successful for approximately 87% of the addresses received through PHESS. Neighborhoods in urban areas with higher counts have been identified, though variability from week to week is high. Areas of high overdose rates that cross county boundaries have also been detected, which would not have been possible using ESSENCE alone. Conclusions Notifying LHDs of near real-time drug overdose trends is a catalyst for drug overdose planning and response efforts in Indiana. GIS mapping of the data provides an easy way for LHDs to view and share spatial trends with their local planning partners and identify community intervention strategies that can reduce drug overdose rates and improve outcomes for overdose survivors. References 1 Overdose Prevention [Internet]. Indianapolis: Indiana State Department of Health; 2017. Indiana Special Emphasis Report: Drug Overdose Deaths 1999-2015; August 2017. [cited 2017 Sept 25]. Available from: http://www.in.gov/isdh/files/2017_SER_Drug_Deaths_Indiana.pdf

Roles of Health Literacy in Relation to Social Determinants of Health and Recommendations for Informatics-Based Interventions: Systematic Review

Abstract

Objective Epidemiologists will be better prepared to serve as a practical resource within their communities and spheres of influence by taking the time to examine data sources behind and implications of news stories and studies that are being widely circulated. Introduction It can be difficult to distinguish between truth, half-truth, fiction, and misinformation as we watch the news, read headlines, and scroll through various social media feeds. Fortunately, epidemiologists have the tools needed to serve as a practical resource for colleagues, partners, and communities. The Scrutinizer Challenge is an opportunity for epidemiologists to tackle at least one news story or study a month that is relevant to public health. The goal is that we would do the research necessary to examine data sources and implications of news stories and studies. This process can help us deliver consistent and reliable messages to share with colleagues, partners, and communities. It also provides an opportunity for epidemiologists that practice in different settings to consolidate resources and develop working relationships that may be needed to more thoroughly examine issues. Methods The Scrutinizer Challenge project was launched in January 2018 and introduced to Texas Public Health Association (TPHA) Epidemiology Section members. Participants were asked to select a headline or study to scrutinize. They were provided a guidance document with 10-25 questions to help identify and determine the credibility of data sources, compare these sources to claims being made, and assess overall implications of the news story or headline. Lastly, participants were asked to submit an actionable summary or end product that could be shared with colleagues, a local partner, or the general public. Scrutinizer Challenge project submissions were shared in the Epidemiology Section Newsletter or distributed to members as an educational resource. Results Three Scrutinizer Challenges were submitted between January 2018 and July 2018. News stories and study topics that were scrutinized addressed maternal mortality and morbidity in the United States, social media and population-level behavior change, and supplemental vitamins and minerals for disease prevention and treatment. The actionable summaries that were submitted were aimed at healthcare providers, researchers, and the general public. Limited but positive feedback was provided for each submission. Sources were found to be mostly credible for each news story or study, however, 2 out of 3 headlines did not support the claims made in the news story or study. Conclusions The Scrutinizer Challenges that have been submitted so far indicate that headlines can make incomplete or inaccurate claims even when credible sources are provided. This preliminary finding supports the need for epidemiologists to serve as a practical resource in their spheres of influence and communities, so that they can help cut through the hype and share reliable messages.

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Abstract

Objective To provide recommendations for future preparedness response efforts based on an assessment of the Post-Hurricane Harvey After-Action Report (AAR). Introduction On August 25, 2017 Hurricane Harvey moved onshore near Port Aransas, Texas, eventually overwhelming areas of Houston with between 41-60 inches of rain (Houston Health Department [HHD], 2017). As a category 4 storm, with wind speeds as high as 130 mph, Harvey broke several rainfall records across the state and ended the prolonged period of twelve years in which no major hurricanes had made landfall in the United States (Mersereau, 2017). Harvey ambled at a leisurely pace through Houston and resulted in devastating flooding that destroyed homes and required the evacuation of approximately 37,000 Houstonians to over 78 shelter facilities across the affected area (HHD, 2017). Through concerted efforts, the American Red Cross and the HHD established the shelter at the George R. Brown Convention Center (GRB) and "delivered or coordinated social services, medical and mental health services, disease surveillance and food/sanitary inspection services" for the duration of the need for the shelter (HHD, 2017). Methods Syndromic surveillance data is essential to understanding the health status of affected communities during and after a disaster. For this abstract, we reviewed data collected from different surveillance systems and programs within the Houston Health Department (HHD), namely Real-Time Outbreak and Surveillance (RODS), Houston Electronic Disease Surveillance System (HEDSS) and other program systems, and reports compiled into the AAR. The AAR contained an assessment of the data collected daily during shelter surveillance and helped identify gaps in the implementation of preparedness plans, current procedures, and best practices. HHD's Informatics team was responsible for data collection, training of staff and maintaining a cloud based repository of information on surveillance data and resources. A review of the AAR indicated a need for resources for the general shelter population to address the need for pharmacy data, enhanced behavioral support for individuals with mental health needs, dialysis treatment plans and pharmaceutical needs for patients with respiratory illness or hypertension. Results From August 30, 2017 to September 8, 2017 approximately 3,500 evacuees residing at the GRB shelter were assessed for a variety of medical conditions and complaints. Patient encounters peaked on September 4, 2017, with 705 patient encounters recorded. Data from the AAR suggested there were four most prevalent conditions of immediate need; affecting almost 25% of the shelter population were hypertension (10.4%), mental and behavioral issues (7.9%), diabetes (5.7%) and dialysis or renal failure (0.3%). There were challenges with supply of medications and synchronization of data collection by HHD and partner agencies. The department's Continuity of Operation Plan (COOP) was voluminous and was not easily accessible during the disaster response. The findings from the After-Action Report indicate that disasters present multidimensional health challenges that can overwhelm advance preparations and more needs to be done to address the problems identified from previous disaster responses to improve on future outcomes. Conclusions Syndromic surveillance can be strengthened in the following recommended areas for better incorporation into disaster response plans; pharmacy and health related data and data collection. The ingestion of pharmacy data by the syndromic surveillance systems could highlight gaps in the supply of needed medications at pharmacies during and post disaster, data from behavioral health clinics could show whether victims of the disaster who suffer mental health issues are able to access care, and whether dialysis treatment plans were continued. Based on the gaps identified, recommendations include integration of pharmacy data into the City's disease surveillance system "ESSENCE" for tracking prescriptions and OTC purchases, to ensure adequate preparation for disaster stock levels and identification of sources for reordering when stocks run short. Additionally, it is recommended to revise and standardize data collection tools used during shelter surveillance to streamline the data collection process and to align the data tools of partner agencies, particularly DMAT and Red Cross, to prevent unnecessary duplication of efforts. Finally, the City's Continuity of Operation Plan (COOP) has been revised since Hurricane Harvey and is periodically assessed and updated. The revised and updated COOP provides a concise and readily accessible document which can be easily reviewed and implemented to support an emergency response. References 1. Houston Health Department. (2017). Hurricane Harvey fast facts. 2. Houston Health Department. (2017). After-Action Report/Improvement Plan. Retrieved from 3. Mersereau, D. (2017). Hurricane Harvey broke multiple weather records. Mental Floss. Retrieved from http://mentalfloss.com/article/556940/pluto-planet-after-all-new-argument-emerges

Roles of Health Literacy in Relation to Social Determinants of Health and Recommendations for Informatics-Based Interventions: Systematic Review

Abstract

Objective Austin Public Health"s Public Health Emergency Preparedness program utilizes a variety of tools and resources to create informative, event-specific, and engaging syndromic surveillance reports to share 1) internally within Austin Public Health; 2) with City of Austin and Travis County partners; 3) local health care coalition members; and 4) the public during events that affect the Austin, Texas metropolitan area. Introduction Austin Public Health creates a variety of syndromic surveillance reports for events throughout the Austin, Texas metropolitan area. These events range from responses to major disasters such as the 2017 Hurricane Harvey sheltering to ongoing special event monitoring such as University of Texas football games and the Austin City Limits music festival. Partnerships within the Austin metropolitan region are crucial to ensuring the information-sharing necessary to create robust reports, as well as during the follow-up process of requesting feedback from partners on the usefulness of the reports. Austin Public Health"s Public Health Emergency Preparedness program utilizes a variety of tools and resources to create informative, event-specific, and engaging reports, fulfilling multiple reporting needs for all partners. Methods The process of generating syndromic surveillance reports begins by keyword surveillance of hospital emergency room chief complaint data. Keywords are keyed into the Austin metropolitan area"s hospital free-text chief complaints via the Capital Area Public Health and Medical Coalition. The searchable keywords are queried to create a baseline picture of an evolving event. Data are also requested and gathered from multiple partners including local news stations, the National Weather Service, the City of Austin's Office of Vital Records (birth and death certificates), social media platforms, Austin 3-1-1, and Austin/Travis County Emergency Medical Services. All data are then analyzed, visualized and displayed in reports that are distributed via multiple platforms including email, social media, governmental websites, Geographic Information System (GIS) storymaps, and WebEOC. Reports are then combined into event end summaries. Accompanying the final summary report are feedback surveys. Results The ability to request keywords in an open communication pathway between hospitals, the Capital Area Public Health and Medical Coalition, and the local health department has bolstered area partnerships. Previous surveillance reports have been reported to be both useful and beneficial to departmental, community and health coalition partners. For example, the 2017 report following Hurricane Harvey was used by local hospitals for planning staffing and surge needs, and the 2018 heat report is being used to determine the placement of future cooling stations at special events. A 2019 surveillance report on dockless scooter injuries will be used to inform risk factors and trauma injury severity. Requested changes from partners have included: the addition of graphs, keyword-specific changes, inclusion of social media and broadcast media data, and the use of information from other partners to create a final event or year-end summary report. Conclusions Keyword surveillance of hospital chief complaint data and of other local real-time data are innovative tools to creating meaningful syndromic surveillance reports that provide situational awareness and are adaptable to the needs of events and situations in the area. The development and evolution of these syndromic surveillance reports has helped to build a rapidly deployable syndromic surveillance system that can provide key data for preparing for and responding to future disaster events. By engaging local and regional partners in an iterative process for developing these reports, APH ensures ongoing improvement, thereby providing more powerful and useful reports to all partners involved.

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Abstract

Objective To describe the lessons learned for public health decision-makers from an analysis of Acute Care Enhanced Surveillance (ACES) data for the heatwaves experienced in Ontario, Canada in the summer of 2018. Introduction The Acute Care Enhanced Surveillance (ACES) system provides syndromic surveillance for Ontario's acute care hospitals. ACES receives over 99% of acute care records for emergency department (ED) visits; mean daily volume is 17,500 visits. ACES uses a maximum entropy classifier and generates more than 80 standard syndromes, fifteen of which are actively monitored for aberrational activity and are considered of higher public health relevance, including RESP (respiratory infection, non-croup), ILI (influenza-like illness), TOX (toxicological, chemical/drug exposure), AST (asthma), OPI (opioid exposure), CELL (cellulitis), GASTRO (gastroenteritis), ENVIRO (environmental, heat/cold exposure), MH (mental health), EOH (alcohol intoxication), DERM (rash), and SEP (bacteremia, sepsis). Syndromic surveillance provides a salient source of public health surveillance during extreme heat events; monitoring real-time ED visits can inform local public health authorities of health impacts, provide situation awareness to initiate and/or inform public health response, and help decision-makers allocate resources according to geographic (or demographic) vulnerability. While the use of syndromic surveillance has been well-characterized to monitor infectious disease outbreaks, its use to monitor the heat-health impacts is relatively novel for ACES users, specifically local public health authorities. This report describes the the data collected during an extended extreme heat event in Ontario, Canada, to highlight the value of syndromic surveillance during extreme heat events and make recommendations regarding incorporating ACES data into routine workflows. Methods Temperature data were retrieved from Environment Canada historical databases for mid-June to mid-July 2018. Aggregate counts per day for total ED visits and and for individual syndromes were retrieved from ACES databases. Descriptive statistics were used to analyze all datasets. Results An extreme heat event occurred in the southern region of Ontario in early summer, 2018. Environment Canada issues heat warnings for regions throughout Canada according to region-specific criteria; for southern Ontario, heat warnings are issued when 2 or more consecutive days of daytime maximum temperatures are expected to reach 31°C or when 2 or more consecutive days of humidex values are expected to reach 40. Extended heat warnings are issued when the event lasts beyond 2 days. An extended heat event occurred June 29 to July 5, 2018. Although the region is large, temperature data from Environment Canada's climate monitoring station at Toronto's Pearson Airport are shown (Figure 1) as an example of the temperatures observed for this time period in the region. Conclusions Lessons learned from an analysis of ACES data during an extreme heat event: 1. The ENVIRO syndrome provides real-time monitoring of the health impacts during a heat event and may provide proxy for estimating the indirect effects of heat (e.g., impacts on chronic conditions). Public health authorities can monitor local health impacts during an extreme heat event. 2. Patients seeking help at the ED do not appear to be skewed in acuity, sex nor age. This does not necessarily reflect the population that experiences the greatest impact from extreme heat, but rather those that are seeking help at the ED for the direct effects of heat. That said, an increase in ENVIRO counts does not indicate whether the increase is due to greater exposure to the heat (or sun), engaging in vigorous outdoor activity during the event (recreational or occupational), or lack of access to air conditioning. 3. ED visits for ENVIRO can be geolocated to determine areas experiencing greater health impacts. This may allow allocation of resources to specifically address vulnerabilities. ACES has built-in mapping capabilities that allows a geovisualization of the home addresses for patients. Furthermore, aggregate counts for relevant syndromes are available for registered users on the Public Health Information Management System (PHIMS), a web-accessible GIS tool for situational awareness that gives public health decision-makers access to real time health impacts in concert with demographics, weather, and other emergency management information.

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Abstract

Objective Identify and document strategies that enhance the value of syndromic surveillance (SyS) data and information for the response, recovery, mitigation and preparedness needs of local and state emergency management professionals in the U.S. Introduction Intense stress can severely degrade one's ability to process and utilize new kinds of information.1 This psychological phenomena may partially explain why epidemiologist are challenged to communicate and establish the value of SyS information with emergency management professionals (EMPs). Despite the timely and useful insights that SyS data and methods can provide, it is very difficult to convey what these data are when EMPs and epidemiologists are working to make intense, highly-scrutinized and high-consequence emergency decisions. If state and local authorities want emergency plans and responses that benefit from the powerful insights that SyS can provide, epidemiologists need to learn how to best report information and establish a strong rapport before emergencies strike. Over the past ten months, ISDS's NSSP's Syndromic Surveillance and Public Health Emergency Preparedness, Response and Recovery (SPHERR) Committee has worked to identify gaps, potential best practices, document use cases, and identify tools for integration of SyS data in EM activities. During SPHERR practice exchange meetings, SyS professionals have consistently cited effective communication between SyS staff and emergency preparedness staff as a top priority in integrating SyS more fully into all phases of emergencies. Methods Participants will engage in an interactive and guided discussion that identifies and documents effective strategies and tools to communicate SyS information in ways that provide EMPs with useful, actionable and valuable insights. As a prompt and further framing device, examples or use cases will be gathered from participants based on health conditions of interest; i.e., Infectious Disease, Environmental Exposures, Injury, Mental Health Conditions, Health Care Utilization, and Exacerbations of Chronic Disease Conditions.4 Examples presented or discussed by SPHERR will also be used as prompts. The authors will use grouping and appreciative inquiry techniques to facilitate this round table discussion, and document the lessons learned. The discussion will inquire and analyze communication methods that participants use, or plan to use for conveying relevant SyS insights to EMPs during each phase of the emergency management cycle. Examples by preparedness phase are included below. During the preparedness phase, establishing SyS/Emergency management relationships can identify ways in which SyS information can address gaps in emergency management capabilities. Ongoing relationships and inclusion of SyS information in exercises helps ensure that this information is incorporated and effectively utilized in emergency management. During the response, SyS data can be used to monitor changes in the number of emergency department (ED) visits, increases in emergency-related syndromes, timing of impacts to EDs, and relative impact by geographical location of EDs. Displacement of populations during mass-care events can also be examined. Conducting surveillance for emergency-related key-words in ED reports can facilitate targeted surveillance for outcomes of interest. SyS data can also be used to screen for potential cases of disease, so that interventions can be targeted effectively. Example use cases of how SyS information has informed event responses will be discussed. During recovery from the emergency, SyS data can be used to track population displacement, as populations return to the area affected by the emergency. It can also be used to track ED visits, to determine when/if they return to pre-event levels. Secondary effects of the emergencies (such as carbon monoxide poisoning, flood-water contaminated food, HazMat events or suicidal ideation/attempts) can also be examined. SyS data can help in mitigation activities to prevent emergencies, reduce the chance of their occurrence, or reduce their damaging effects by monitoring ED data for patterns of syndrome presentations, or clusters of syndromes which could indicate a potential outbreak or event of public health significance. For diseases with typical seasonal patterns, SyS data can be used as an indicator of the beginning of the season, so that public health disease prevention messages and other interventions can be timed more effectively. Historical SyS data can also be examined to identify patterns of presentations that occurred before an outbreak is recognized, to increase the index of suspicion for these patterns in future surveillance. Results At the end of the discussion, roundtable participants will possess a matrix of strategies and tools that they can customize to better utilize SyS in have tools and templates customized to communicate the value of SyS information in addressing hazards, vulnerabilities and threats faced by their communities. Conclusions Integration of SyS data into a highly functioning surveillance system facilitates rapid identification and characterization of potential threats, enhances health and medical situational awareness and increases the evidence base for making emergency management decisions.The importance of integrating surveillance data into emergency management and of effective and timely communication of this data to enhance situational awareness and share surveillance information with emergency managers has been repeatedly cited in both CDC Guidanceand in after-action reports for real-world events.This roundtable will help ensure that participants have the knowledge to effectively communicate SyS to EM personnel and ensure that this potentially life-saving information is integrated into all phases of emergency management. References 1. Bourne, L, Yaroush, R. Stress and Cognition: A Cognitive Psychological Perspective. 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Abstract

Objective A case study on the visual-material components of story map journals as visual, new media interactive health reporting used in population health surveillance. The story map journal is demonstrated an effective tool that visually reports, maps and tracks global support networks and health resources for post-polio (PPS) survivors. Introduction How are interactive story map journals situated within the genre of interactive, health science reporting? How can reporting information to public audiences be theorized through traditional and contemporary understandings of new media genres in technical, health and science communication (1-7). Although the polio vaccine has eradicated the disease in the United States, and 99% worldwide (8), PPS has emerged as a present-day condition that continues to affect many polio survivors years after the initial onset and recovery. Since the symptoms of PPS are oftentimes mis-identified as other illnesses, the diagnosis and management of disease is especially challenging for PPS survivors due to the limited knowledge of and access to PPS resources and support networks (9-11). In 2011, Esri created the ArcGIS story map initiative to meet a need for public audiences who sought how to critically think, better understand, communicate, and interact with world news events. ArcGIS is a geospatially-driven, new media platform that enables audiences to engage with interactive storytelling of news events. Public health and news reporting agencies are now turning to Esri and similar interactive, geospatially driven new media platforms for health and disease surveillance (12-14). Esri's ArcGIS mobile and web technology platform visually reports, maps and tracks population health data information. With the emergence of such new media applications, it is therefore important to recognize multimodal, visualization strategies that investigate how interaction design choices within the story map journal influence and engage public health audiences. In the field of technical and professional communication (15), applied concept of visual-material rhetorics is a useful mode of inquiry in the study of interactive story map journals. Propen's concept presents a new understanding of how researchers in disease and public health surveillance can analyze the effectiveness of text and new media technology in relationship to space, place, and geospatial mapping. More specifically, Propen's concept situates the visual-material as the applied use of text with visual, interactive multimodal components inclusive of images, video, and GPS/GIS mapping technologies. Methods This presentation includes a discussion of genre analysis as applied to visual-material components used to study the genre of new media-driven story map journals for the reporting of public and population health resources. Post-Polio Syndrome (PPS) is presented as a case study of how story map journals in population health can be used to create information about global support networks and resources for PPS survivors. Results The story map journal is an effective genre of new media, interactive reporting in health and disease surveillance. The analysis alongside Propen's mode of inquiry demonstrates the effectiveness of visual-material components of story maps, and how PPS survivors and medical clinicians can use the story map journal to easily access, visualize, and interact with information about diagnosis and disease management, as well as find connections to local and global support networks. Conclusions Story map journals as visual, interactive reporting should be considered when analyzing the accessibility and surveillance of health data for public audiences. The case study of PPS global networks and resources, provides one example of how story map journals can assist public audiences who experience difficulties finding support networks and public health resources References 1. Andersen J. Genre theory in information studies: Emerald Group Publishing; 2015. 2. Caquard S, Cartwright W. Narrative cartography: From mapping stories to the narrative of maps and mapping. Taylor & Francis; 2014. 3. Group iW, Geisler C, Bazerman C, Doheny-Farina S, Gurak L, Haas C, et al. IText: Future directions for research on the relationship between information technology and writing. Journal of Business and Technical Communication. 2001;15(3):269-308. 4. Propen A. Visual communication and the map: How maps as visual objects convey meaning in specific contexts. 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al. Use of mobile technology-based participatory mapping approaches to geolocate health facility attendees for disease surveillance in low resource settings. International journal of health geographics. 2018;17(1):21. 15. Propen AD. Locating visual-material rhetorics: the map, the mill, and the GPS: Parlor Press; 2012.

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Abstract

Objective   The Pocket Atlas of Infectious Diseases (PocketAID) mobile application developed at Pacific Northwest National Laboratory (PNNL) provides infectious disease education and decision support offline for an enhanced personal situational risk assessment anywhere in the world. The app integrates a user's location, demographic information, and infectious disease data to present the user with important information including personalized, calculated risk level. PocketAID features a global disease distribution map and epidemiological curve of country-based case counts by year. Filter options allow users to customize disease lists available to aid in situational awareness. PocketAID, first of its kind, is being developed for offline decision support use by Department of Defense's Defense Threat Reduction Agency (DTRA).   Introduction   There are a wide variety of available web-based apps, such as CDC's Epidemic Information Exchange, that provide infectious disease information and disease distribution [1]. Publicly available, online data can be used to inform a user of general risks based on disease distribution maps and case count data. Unfortunately, each app contains different aspects of the data, which is often represented in different ways and incompatible formats. This heterogeneity can overwhelm a user with confusing information making it difficult to interpret or gain valuable insight into their own situational risk in a specified location. In addition, online resources do not filter information based on the user's current location or situational needs and, therefore, reduces the value of information a user may be interpreting. However, information formatted and represented appropriately in a single app could be used to better understand an individual's situational infectious disease risk. In addition, this information may further educate a user based on a situation or incident to prevent disease spread, especially in higher risk populations. To accomplish these goals, PNNL has developed an offline, Android app that provides the user with simple, easy to understand filterable global infectious disease information integrated with their location to provide personalized situational health risk and decision support in the field.   Methods   This prototype mobile app was a product of PNNL's Biosurveillance Application Competition, sponsored by DTRA. Our implementation of this prototype consisted of two parallel efforts: data collection and Android app development. Data. Infectious disease information was collected from CDC, WHO, Biosurveillance Resource Directory, and Analytics for Investigation of Disease Outbreaks websites [1-4]. Visualization feature data for global disease distribution and the case count curves was collected from CDC, WHO, and ECDC websites [1, 2, 5]. Data used for the disease filter and risk level warning features were associated to the collected infectious disease information and user inputted demographic information.   Application. The prototype app was built using Android operating system. Information about diseases, e.g., transmission mode, symptoms, properties, was stored in SQLite database that was imported into the phone at install time to provide offline information access. We used OSMDroid, an open source project, for map and location services. Downloaded map tiles made zoomable, interactive maps available offline.   Results   PocketAID biosurveillance Android app was targeted for active duty service members, although deemed useful to a much broader audience. Given the various challenges that service members can face during deployment, such as no connectivity in remote areas, the app provides full functionality offline. The general purpose of PocketAID is to provide a user with infectious disease situational awareness and decision support, not be used as an analytic tool to test, treat, or diagnose disease. Upon launch, the user is shown their location on a zoomable, interactive map and a list of diseases that are known to be present in their current country (detected automatically using the device's GPS). The user can change their location by selecting a country from the location dropdown menu, filtering the populated list of diseases. The user can further filter diseases by disease attributes: symptoms, transmission, and properties. Clicking on a disease redirects the user to a page with more details about the disease, an interactive map of global disease distribution, and epidemiological curve displaying case counts by year for selected disease in selected country. The user can input basic demographic information (i.e., age, gender, occupation, and pregnancy status) in the settings page of the app, which then enables an automated assessment of disease risk. Since specific diseases pose an increased risk to certain groups of people, the app can personalize the user's risk level. In other words, if a user's demographic information matches a disease's risk groups, the user is shown a warning alert.   The app was awarded second prize in the competition by judges from across the government for its perceived benefit to biosurveillance, innovation and originality, quality of user experience, and long-term value and sustainability. Conclusions The PocketAID provides global disease distribution on a zoomable map, infectious disease background information, disease case counts, offline capabilities, and diseases filtered by the location. This educational app offers a situational health risk assessment for the user through accessing infectious disease information with a disease attribute filter, personalized risk level warning, and user's GPS or selected location to help improve decision support and reduce situational risk. The app was vetted by domain experts across the US Government, who found it to be useful and valuable. References 1. Centers for Disease Control and Prevention [Internet]. Atlanta (GA): U.S. Department of Health & Human Services; [cited 2018 Aug 17]. Available from: https://www.cdc.gov/. 2. World Health Organization [Internet]. Geneva (Switzerland): World Health Organization; c2018 [cited 2018 Aug 17]. Available from: http://www.who.int/gho/en/. 3. Margevicius KJ, Generous N,

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Roles of Health Literacy in Relation to Social Determinants of Health and Recommendations for Informatics-Based Interventions: Systematic Review

Abstract

Objective I analyze a collection of data visualizations created during the crack and opioid epidemics, respectively, published by mainstream news media using three criteria: genre, subject matter, and language used to describe the graphic. I use precarity as a theoretical framework--that is, "a politically induced condition in which certain populations suffer from failing social and economic networks of support and become differentially exposed to injury, violence, and death" (Butler, 2009, p. 35)--to argue that visualizations created during the crack epidemic positioned addicts as criminals whereas opioid addicts have been positioned as patients in need of treatment. Introduction In late 2015, two economists studying health-related data inadvertently discovered an alarming trend: death rates for middle-aged, white Americans were dramatically increasing from drug overdoses (Kolata, 2015), particularly opioids (CDC, 2015). The opioid epidemic has since been widely publicized in the media. However, as critics have argued, the government"s response to the crack epidemic differs dramatically from an arguably equally devastating "drug epidemic" that hit many inner US cities thirty years ago—the influx of crack cocaine. More specifically, opioid addicts, who tend to be white, have been positioned as patients, whereas in the 1970s and 80s during the war on drugs, heroin and crack addicts, respectively, who tended to be people of color, were criminalized (Hart, 2017; Hutchinson, 2017). Methods I collected data visualzations created during the crack epidemic for 1/1/86-12/31/92 and for the opioid epidemic from 11/3/15 (the date the NYT covered Case and Deaton"s study)-9/30/18 for opioids from the following mainstream news organizations: Newsweek, The Chicago Tribune, The Los Angeles (LA) Times, The New York Times (NYT), The Washington Post (WaPo), Time Magazine, U.S.A Today, and U.S. News and World Report. I then organized each collection by genre (bar or pie chart, line graph, map, etc), subject matter (crime-related, drug use and abuse related, effects on children, effects on health including deaths and treatment, STDs, and trafficking), and also assessed whether the text in the article directly referred to the graphic and discussed the data shown. Results Seventy three images were included of the crack epidemic and 100 were included for the opioid epidemic. The majority of graphics created during the crack epidemic were bar and line graphs whereas there was far more variation in the genre of graphics created during the opioid epidemic. The majority of graphics created during the crack epidemic also showed crime-related information (defined as crime rates, location of crimes, number of crimes committed, specific types of crimes such as homicides as well as information about arrests and sentencing) whereas very few data visualizations created during the opioid epidemic were related to crime. Indeed, the majority of these visuals showed effects on health (more specifically mortality). Finally, data visualizations create during the crack epidemic were rarely directed referred in the text of the article, but were usually discussed albeit, along with other visual information. In contrast, data visualizations created during the opioid epidemic were usually directly referenced and overtly discussed. Conclusions I suggest that these results illustrates precarity (Bulter, 2009) by revealing systemic inequalities that protect some people, but leave others vulnerable through two counter narratives: opioid addiction is a public health issue, but crack addiction is a crime. References Butler, Judith. (2009). Frames of war: When is life grievable? Brooklyn, NY: Verso Books. Case, A. and Deaton, A. (2015). Rising morbidity and mortality in midlife among white non-Hispanic Americans in the 21st century. Proceedings of the National Academy of Sciences of the United States of America. 112(49): 15078-15083. CDC. (2015). Controlled Substance Prescribing Patterns — Prescription Behavior Surveillance System, Eight States, 2013. Morbidity and Mortality Weekly Report. October 16, 2015 / 64(SS09);1-14. Hart, C. L. (2017, August 18). The real opioid emergency. The New York Times. Hutchinson, E. O. (2017, June 21). The opioid crisis in black and white. Huffington Post. Kolata, G. (2015, November 3). Rise in Deaths for U.S. Whites in Middle Age. The New York Times.

Roles of Health Literacy in Relation to Social Determinants of Health and Recommendations for Informatics-Based Interventions: Systematic Review

Abstract

Objective This abstract proposes a poster presentation aimed at explaining rhetorical framing as a technique for articulating and identifying cases in healtchare policy. Introduction Political discourse surrounding matters of public health is exigent because human life is at stake—this is unquestionably the case with respect to widespread opioid addiction. While intravenous drug use itself is described as a health concern, the spread of diseases such as hepatitis C and HIV through the sharing of needles is a disease surveillance emergency. This research centers on municipal-level decision making in the community of greater Lafayette, Indiana. Here, the mayors of sister cities West Lafayette and Lafayette hold different positions regarding a clean needle exchange program operated by the county health department. Methods As scholars of harm reduction note, "harm reduction disputes are the results of participants placing different weight on moral foundations that drive typical public health discourse" (Alderman et al., 2010). The methodology of rhetorical framing includes vocabulary and tactics for navigating the spaces of different weights and competing values. Articulated by George Lakoff as, "mental structures that shape the way we see the world," framing deliberately selects vocabulary built around a platform of values in order establish the parameters of a discourse (2004). In the case of harm reduction and needle exchange, two different frames compete. The rule of law and order is a frame that prioritizes civil stability through a fair and unyielding adherence to civil and criminal law. This frame corresponds closely to what Lakoff calls the "strict father" frame which takes a rigid paternalistic approach to responsibility and a binary approach to morality (2004). For the needle exchange program, this frame asserts that the fundamental issue at hand is criminal drug use and that no conciliatory actions should take place to accommodate lawbreaking of any kind. A different frame can be described as the healthcare and risk reduction frame. This frame seeks to prioritize the healthcare risks associated with drug use and act to abate them. On this view, drug use and addiction is a treatable medical condition. This frame corresponds to what Lakoff calls the "nurturant parent model" (2004). Here nurturance is taken to include responsibility and empathy. In this light, the healthcare frame recognizes the pain and damage caused by drug use for individuals and communities. It holds people responsible by helping them break drug habits rather than simply punish them for being addicted. This project focuses on a series of radio-broadcast interviews in which the mayor of Lafayette expresses his support of the exchange while the mayor of West Lafayette voices his concerns. I argue the reason for the difference in opinion, despite both mayors agreeing on the essential facts, rests on the problem of invoking conflicting frames. On one hand, the healthcare and risk reduction frame sees the needle exchange as a form of harm reduction and something that generally improves public health. At the same time, the frame of rule of law and order interprets the needle exchange as a government complicity in illegal drug use. Results Rhetorical framing in health communication is a strategy for effectively reaching expert and non-expert audiences alike. Rhetorically framing disease communication achieves two key functions: it identifies a specific focus and it usually minimizes situational features that are outside of the focus. In this case study, both mayors previously had careers as police officers in the local police department. One mayor adheres to the rule of law and order frame to maintain ties with his colleagues in law enforcement while the other is willing to split and adopt the healthcare and risk reduction frame. This commonality permits another remarkable discussion—what does it take to persuade someone to adopt a different frame? Beyond shaping policy opinion toward the needle exchange and disease prevention, rhetorical framing establishes the types of surveillance and data that policy makers consider meaningful in terms of measuring success. Whereas the healthcare risk and reduction frame is willing to consider qualitative reports of opioid users who visit the exchange and seek further treatment, the rule of law and order frame is inclined to insist on quantitative data such as the rate of return for needles exchanged or reductions in drug use or the spread of hepatitis C and other diseases transmitted through the use of shared needles. In addition to differences in data types, rhetorical framing also helps to explain differences in methodological approach to data collection and surveillance. Conclusions In this case, political support by the mayors depends on which interpretive frame takes precedence and the rhetorical delivery and framing of available data often determines which frame dominates. Whereas some data (anecdotal evidence) can be modulated and delivered through appropriate framing, other types of data (the rates of return for needles) cannot be so easily reframed. At minimum, rhetorical framing is capable of determining whether public policy concerning needle exchange is communicated primarily as a public health issue or as a matter of criminal law. For disease surveillance more broadly, rhetorical framing provides not only specialized vocabularies for describing observations, but also helps to identify research perspectives including points of overemphasis and potential blindness. References Alderman, Jess, et. al., "Commentary: Understanding the Origins of Anger, Contempt, and Disgust in Public Health Policy Disputes: Applying Moral Psychology to Harm Reduction Debates," Journal of Public Health Policy, vol. 31, no. 1, Apr. 2010, pp. 1-16 Dennis, John "Ask the Mayor: West Lafayette's John Dennis on Leading a Disposable City." Ask the Mayor, by Stan Jastrzebski, 2 November 2017. Dennis, John "Ask the Mayor: West Lafayette's John Dennis on Paths (Walking, Driving and to Recovery)." Ask the Mayor, by Stan Jastrzebski, 13 December 2017. 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Roles of Health Literacy in Relation to Social Determinants of Health and Recommendations for Informatics-Based Interventions: Systematic Review

Abstract

Objective Demonstrate the impact of surveillance and media engagement on Public Health protection during a Vectorborne disease response.Identify surveillance and reporting methods for timely response to positive cases steps.Explore and apply best practices for collaboration with partners and surrounding municipalities in order to reduce disease impact. Introduction The OKC-Co Health Department deployed a phased vectorborne response plan to address multiple diseases, including Zika Virus and West Nile Virus. This plan is scalable and flexible, but must necessarily prepare for the "worst case" scenario. Although not currently a local threat in OKC-Co, Zika virus response planning requires early coordination between state, local and federal agencies in order to mitigate risk to the population. The backbone of the Vectorborne response planning has been proven successful through West Nile Virus response in which Oklahoma has experienced three outbreak seasons: 2003, 2007 and 2012. (OSDH) In 2015, the OKC area experienced a greater than 112% increase in the number of vectors and 18 WNV positive test pools were observed. The heightened number of vectors and positive test pools did not translate to the same escalation in human cases, which demonstrates the strength that Public Health collaboration between surrounding municipalities and community members has on reducing the potential impact of this seasonal epidemic. During the most recent 2017 mosquito season, local code enforcement, city officials and consumer protection deployed a total of 18 CDC Gravid and BG Sentinel traps. The final day of sorting took place during the last week of October, as consistent with the decrease in mosquito numbers. There were 23 trapping and testing weeks with a total of 43,079 mosquitos trapped and 33, 846 mosquitos tested. An average of 66% of all trapped mosquitos were tested each week. The Maximum Likelihood Estimation (MLE) Infection Rate is calculated each week. Methods The OKC-Co Health Department implements a multi-level approach to communication, prevention, surveillance and disease abatement Vectorborne disease. This approach includes: Hazard assessment: Vector activity, disease risk and mitigation strategies are included in the response plan and discussed with partners as needed. -Media outreach -Vector surveillance: OCCHD conducts local vector surveillance by trapping, lab species identification and testing for West Nile Virus. The plans also provide testing capabilities in partnership with State and Federal agencies. Trapping is accomplished using CDC Gravid Traps and BG Sentinel Traps. Trapped mosquitos are brought to the laboratory at OCCHD on a weekly basis and are frozen overnight. The following morning, mosquito genus and species are identified and vector species are tested. -Environmental treatments: Consumer Protection identifies and treats areas with stagnant water following a complaint. -Habitat remediation: OCCHD and its partners have resources and coordination planned for habitat remediation events -Municipality partnerships: OKCSWQ sends OCCHD weekly reports for each of the trap sites that includes information on trap condition, needed repairs, and weekly mosquito count. OCCHD provides larvicide to the municipalities to treat areas of stagnant water. In the case of a positive result, OCCHD coordinates site surveys with the respective municipality. The municipalities conduct windshield surveys around the site and data is collected and graphed along with test result dates, in order to identify trends and identify effectiveness of and plan for mitigation procedures. Roles and responsibilities of each agency are outlined in the phased response plan. -Human disease surveillance: Epidemiologists produce maps using geographic information of cases to identify clusters and possible major sources of mosquitos. This data is sent to Consumer Protection for site surveys and environmental treatments and possible habitat remediation. The Epidemiologist also gathers information on travel history and WNV exposure/risk factors of the patient. Additionally, the OCCHD epidemiologist sends out Vectorborne monitoring reports to partners providing local, state and national surveillance data. Results -Media: During the most recent seasons, OCCHD marketing and communications staff developed prevention messaging and earned more than $600,000 in prevention messaging across the metro, to include outdoor billboard exposure, television, radio and print ads, each season. Further, OCCHD experts engage in an average of 30 media interviews each season(Television, Radio and print). Additionally, OCCD and Tyler Outdoor collaborated to present the 4D's on digital billboards across the OKC Metro area. Vital Outdoor also provides digital locations to present preventive information for 30 days, totaling $60,000 in messaging. Finally, social media (Facebook and Twitter) outreach efforts were utilized to spread awareness to the community, including education videos reaching nearly 2,000 people. -Vector Surveillance: Trapping sites are identified across the metro, four in Edmond and six in Oklahoma City and the mosquito season leading to 43,072 mosquitos captured and identified, of which, 33,846 were tested for WNV, a 131% increase from 2016. -Municipality partnerships: 110 positive test pools were identified and the respective municipality is notified of the site that correlated with the positive test pool to conduct site surveys. -Human disease surveillance: There were 6 confirmed human cases of WNV, 5 classified as Neuroinvasive and 1 classified as WNV Fever. GIS mapping is used in case investigations and habitat remediation. Conclusions As a single agency, this timely Vectorborne disease response would be impossible to achieve without partnerships with surrounding municipalities. Functioning as a cohesive unit, OCCHD and municipality agencies are able to set, maintain, repair and collect traps at each site, disseminate surveillance reporting information, coordinate treatment applications and investigate harborage areas. Additionally, municipalities coordinate with

habitat remediation efforts. Having the resources and coordination planned for these events is critical to a timely response, especially in during an outbreak season. OCCHD is unique in its ability to identify and sort vectors by genus and species. This capability provides detailed surveillance data and aids in preparation and planning, such as designing traps to selectively capture the most common vectors in the area. During seasons with heighted activity, the ability to have team members and partners identify geographic clusters is pivotal to timely preventive measures. Practice based strategies to mitigate the Vectorborne disease risk to humans during an influx of increased mosquito population and positive mosquito test pools include the careful consideration of: Collaboration with outside entities in order to sustain program success; technology and GIS mapping; and strategic planning prior to the start of each season with evidence pulled form geographical analyses, vector and climate surveillance and municipality engagement.

Roles of Health Literacy in Relation to Social Determinants of Health and Recommendations for Informatics-Based Interventions: Systematic Review

Abstract

Objective The Context of Communicating Care Communicating health information across diverse populations is critical to improving public health and sustaining health-related practices within a community. In this context, successful collaborations can provide models for effectively sharing essential information in other communities. This panel examines a case where two entities partnered to create visual and written materials for conveying health information to different underserved populations in a rural and economically disadvantaged region (Lincoln Parish, located in north central Louisiana). Introduction A Case of Effective Community-Based Collaborations For this case, the Visual Integration of Science through Art (VISTA) at Louisiana Tech University (Tech) partnered with the non-profit Lincoln Health Foundation to produce image-intensive communication materials for certain local populations. The specific audience was undereducated, indigent, non-native English speaking communities in the Parish – a population that often cannot readily rely on text-based resources for information. For the project, students enrolled in Advanced Digital Painting, Studio Art Internships, or Usability and User Experience Design classes at Tech collaborated with representatives from the Lincoln Health Foundation to Conduct research on the communication expectations and preferences of the target audience Identify the best methods for sharing information on sensitive health issues with the members of this community Develop image-based brochures, website content, and illustrations to convey health information to these populations These final products students produced included illustrations depicting the health complications associated with diabetes and informational brochures on preventative practices associated with sexually transmitted diseases. In creating this content for the Lincoln Health Foundation, the participants created a model for how community health organizations, educators, and students can collaborate to develop informational products for specific local communities. This proposed panel presentation examines the dynamics of forming such partnerships and collaborating to address the needs of the community population. Description The Dynamics of the Case In this initial pilot, there are two separate but complementary projects where the community partner identified an area of need and Tech students, under supervision of faculty, created either visual images or website and brochure content to improve communication. Specifically, students identified and tested material for dissemination in the community by: Identifying prospective solutions/materials that can address this issue Researching the intended audience to determine the solution(s) that would work best Creating materials for addressing this need (and based on research of audience expectations) Testing these materials with members of the related audience Presenting suggested materials/solutions to community partners Discussing mechanisms the community partner could use to disseminate this information to the intended audience The objective of the model was to provide students with hands-on, real-life experiences in Project planning Project management User research Product development Product planning Illustration as a form of communication Understanding audience Crossing language and cultural barriers The community partner, in turn, received a needed resource developed specifically to meet the needs of a given population within that community. How the Moderator Intends to Engage Audience Discussions The Focus of the Proposed Panel The proposed panel will be comprised of members of each of the groups involved in this project. The members of the panel will discuss how the partnership has worked by explaining project planning and related interactions involved in The projects that students have participated in The usability of the products created The impact of these products on the community The planning of future projects that will continue to impact communities beyond Lincoln Parish In so doing, panel members will overview the ways in which the participating individuals and agencies approached the processes of identifying problems and solutions and fostering and maintaining collaborative relationships during the course of a project in which the dynamics regularly changed. Panel Participants The panel who will lead a discussion on this type of University-Community health partnership includes: Faculty Representative of Studio Art Faculty Representative of Biological Sciences Faculty Representative of Technical Communication/Usability Testing Representative of community partner organization Student participant in the project Each participant will comment on how the related organization approached this overall project, interacted with other collaborators, and engaged in collaborative decision making and problem solving throughout the overall process. Benefits for Attendees Through examining this case of collaboration in this way, the overall presentation will discuss strategies attendees can use to Establish the heath-communication needs to certain local communities Devise solutions for creating effective materials to meet this need Assess the efficacy of such materials with divers communities Identify and collaborate with local partners to address such needs effectively In this way, the presentation will provide attendees with strategies they can apply to address the communication dynamics and community needs of their own local context(s).

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Abstract

Objective To describe surveillance activities and use of existing state (NC DETECT) and national (NSSP) syndromic surveillance systems during the International Federation for Equestrian Sports (FEI) World Equestrian Games (WEG), in Mill Spring, NC from September 11 to September 23, 2018 Methods NC DETECT collects statewide data from hospital emergency department (ED) visits and Carolinas Poison Center (CPC) calls. NC DETECT also collects data from select Urgent Care Centers (UCC) in the Charlotte area. CPC data are updated hourly, while ED data are updated twice a day. NC DETECT data were monitored daily for census (total ED visits), communicable disease syndromes, injury syndromes, and other occurrences of public health significance related to the event. The geographic areas monitored were Polk County (the location of the main event), the counties where the guests were lodging in the Western NC Region (Henderson, Transylvania, Buncombe, Rutherford, McDowell, and Cleveland), the Charlotte Metropolitan area, and statewide. Because of the large number of people from other states and countries who attended, ED surveillance was mainly conducted by hospitals so that visits were captured for all patients and not just NC residents. WEG dashboards containing ED data were created prior to the event using NC DETECT and NSSP ESSENCE systems, and were accessible to epidemiologists at the state level. NSSP syndrome queries were shared with the neighboring state (SC) public health agency. Surveillance began two weeks prior to the event to establish baseline levels for all ED visits for hospitals in Polk County and the Western NC Region. Surveillance occurred daily before the event, during the event, and for two weeks following the event to account for incubation periods of potential diseases. Results The 2018 Equestrian games in Western NC were affected by heavy rain and heat. The weather led to low attendance and cancellation of a few competitions. During the observation period, ED admissions and most of the mass gathering related syndromes in both NC DETECT and NSSP systems were at baseline. ED admissions for motor vehicle collisions and dehydration syndromes were above baseline for 09/19 and 09/21/18 (Figures 3-4). CPC calls and UC admissions for selected UC centers in the Charlotte area were also monitored, and were at baseline. Conclusions NC DETECT and NSSP Dashboards provided effective and timely surveillance for the WEG event to assist local public health in the rural NC area with epidemiologic investigations and appropriate response. NC DETECT's CPC and UC data provided additional valuable information, and complemented ED surveillance during the mass gathering event. Syndromic surveillance became essential during WEG, as NC DPH deployment plans and resource availability changed when Hurricane Florence bore down on the region. References 1. Joseph S. Lombardo, Carol A. Sniegoski, Wayne A. Loschen, Matthew Westercamp, Michael Wade, Shandy Dearth, and Guoyan Zhang Public Health Surveillance for Mass Gatherings Johns Hopkins APL Technical Digest , Volume 27, Number 4 (2008) 2. Kaiser R, Coulombier D. Epidemic intelligence during mass gatherings. Euro Surveill. 2006;11 3. Ising A, Li M, Deyneka L, Vaughan-Batten H, Waller A. Improving syndromic surveillance for nonpower users: NC DETECT dashboards. Emerging Health Threats Journal 2011, 4: 11702 - DOI: 10.3402/ehtj.v4i0.11702

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Roles of Health Literacy in Relation to Social Determinants of Health and Recommendations for Informatics-Based Interventions: Systematic Review

Abstract

Objective To track and visually assess how automated attention structures within the electronic health record (EHR) compete for clinicians attention during computer physician order entry that could potentially lead to transactions hazards in the clinical narrative. Introduction In recent years, studies in health and medicine have shifted toward eHealth communication and the relationships among human interaction, computer literacy, and digital text content in medical discourses (1-6). Clinicians, however, continue to struggle with EHR usability, including how to effectively capture patient data without error (7-9). Usability is especially problematic for clinicians, who must now acquire new skills in electronic documentation (10). Challenges with the EHR occur because of clinicians' struggle with attention to the non-linear format of clinical content and automated technologies (11). It is therefore important to understand how attention structures are visually situated within the EHR's narrative architecture and audience for whom electronic text is written. It is equally important to visualize and track how automated language and design in health information technology (HIT) affect users' attention when documenting clinical narratives (12). In the study of health information technology, researchers of eHealth platforms need to recognize how the construction of human communication lies within the metaphoric expression, design, and delivery of the EHR's information architecture (13). Many studies of electronic health records (EHR) examine the design and usability in the development stages. Some studies focus on the economic value of the EHR Medicare incentive program, which affects providers' return on investment (ROI). Few studies, however, identify the communicative value of how attention structures within the EHR's information architecture compete for users' attention during the clinical documentation process (9, 14). Methods This paper highlights methods from an observed EHR pre-launch testing event that analyzes the visual effects of attention structures within the EHR's information landscape. The observation was completed in two separate stages, each with one IT facilitator and two participant demographics: Stage 1. On-site HIT clinical application staff testing and, Stage 2. Twenty-five participants (RN and non-RN clinical staff). During the second stage of the event, one participant's task performance was screencast-recorded. The length of the testing for the one participant totaled 37 minutes. Because the EHR domain is propelled by both the Internet and Intranet, a contextual-rhetorical analysis of the data collected was performed which incorporated Nielsen"s 10 Usability Heuristics for Interaction Design (15, 16) and Stuart Blythe's methodological approach to analyzing digital writing and technology to defining rhetorical units of analysis in digital Web research (17). Results The UX observation and contextual-rhetorical analysis of EHR design supports a 4-year qualitative study consisting of hospital interviews at two acute-care facilities and an online, national survey of revenue integrity and clinical documentation improvement specialists. The testing event served as an opportunity to observe how a healthcare organization user-experience tests the functionality of the EHR's design build before launching it live. The testing event also provides an understanding of clinicians' organizational needs and challenges during the clinical documentation process. The contextual-rhetorical analysis identified how the structure of narrative in the EHR represents rhetorical units of value that might influence how clinicians make decisions about narrative construction. Conclusions This UX case study analysis of an EHR testing event identifies how scarcity of attention and clinicians' reliance on technology affect clinical documentation best practices leading to potential transaction hazards in the clinical narrative.The study is relevant in eHealth data surveillance because it shows how visual cues within the design of the EHR"s technological landscape affect clinicians' decision-making processes while documenting the EHR-generated clinical narrative

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Roles of Health Literacy in Relation to Social Determinants of Health and Recommendations for Informatics-Based Interventions: Systematic Review

Abstract

Objective To describe how Zika virus (Zika) surveillance data informs and improves testing guidance, clinical evaluation and management of pregnant women and infants with possible Zika infection Introduction Little was known about the maternal and fetal/infant effects of Zika infection before the 2015 outbreak in the Americas, which made it challenging for public health practitioners and clinicians to care for pregnant women and infants exposed to Zika. In 2016, CDC implemented a rapid surveillance system, the US Zika Pregnancy and Infant Registry, to collect information about the impact of Zika infection during pregnancy and inform the CDC response and clinical guidance. In partnership with state, tribal, local, and territorial health departments, CDC disseminated information from this surveillance system, which served as the foundation for educational materials and clinical tools for healthcare providers. Methods Throughout the Zika response, CDC worked closely with health officers, epidemiologists, and clinical partners to seek expert input on the interpretation of emerging data and the evaluation and management of these vulnerable populations. In response to requests from clinical and public health partners, CDC created targeted educational materials and tools to facilitate the implementation of clinical guidance. These materials equipped healthcare providers with the information needed to care for pregnant women and infants with Zika infection. Examples of products developed included: 1) screening tools to identify pregnant women for whom testing is indicated; 2) an interactive web tool to assist with implementation and interpretation of Zika testing guidance (Pregnancy and Zika Testing Widget); 3) patient counseling scripts; and 4) videos to explain critical clinical concepts (e.g., measurement of infant head circumference). These tools were informally pre-tested with the target audiences prior to dissemination, specifically to assess usefulness in clinical settings. CDC disseminated these tools through the CDC website and through comprehensive outreach (e.g., webinars, calls, email alerts) to various audiences. Additionally, several professional organizations incorporated these tools into regular communication with their membership. Results The US Zika Pregnancy and Infant Registry is currently monitoring infants from approximately 7,300 pregnancies in the US states and territories with laboratory evidence of Zika. Surveillance data provided valuable information, including clues toward the pattern of defects and other neurologic disabilities associated with congenital Zika infection, estimates of the risks associated with congenital infection, and timeframes of greatest risk during pregnancy, to help clinicians counsel pregnant patients with potential Zika exposure. CDC used these data to inform their clinical tools, particularly in pretest counseling materials and educational factsheets for healthcare providers to use with pregnant women with potential Zika exposure. After informal testing among healthcare providers, the tools received positive feedback regarding usefulness and applicability in clinical settings. Collectively, CDC's Zika clinical tools were downloaded more than 300,000 times from CDC's website. The Pregnancy and Zika Testing Widget was accessed and followed to an endpoint (e.g., Zika testing recommended) more than 17,000 times, with more than 75% of users self-identifying as clinicians. Conclusions Rapid implementation of Zika surveillance captured evolving data about the impact of Zika on pregnant women and their infants. These data informed the development of clinical tools for healthcare providers caring for and counseling patients with Zika exposure. These tools ensured pregnant women and infants were adequately monitored during the Zika outbreak. Health education materials and clinical tools based on surveillance data should be considered in future emergency responses, particularly when knowledge is rapidly evolving. References CDC Zika Pregnancy Website: https://www.cdc.gov/pregnancy/zika/materials/index.html

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Abstract

Objective Using the epidemic of influenza type A in 2016 in Australia, we demonstrated a simple but statistically sound adaptive method of automatically representing the spatial intensity and evolution of an influenza epidemic that could be applied to a laboratory surveillance count data stream that does not have a denominator. Introduction Surveillance of influenza epidemics is a priority for risk assessment and pandemic preparedness. Mapping epidemics can be challenging because influenza infections are incompletely ascertained, ascertainment can vary spatially, and often a denominator is not available. Rapid, more refined geographic or spatial intelligence could facilitate better preparedness and response. Methods Weekly counts of persons with laboratory confirmed influenza type A infections in Australia in 2016 were analysed by 86 sub-state geographical areas. Weekly standardised epidemic intensity was represented by a z-score calculated using the standard deviation of below-median counts in the previous 52 weeks. A geographic information system was used to present the epidemic progression. Results There were 79,628 notifications of influenza A infections included. Of these, 79,218 (99.5%) were allocated to a geographical area. The maps indicated areas of elevated epidemic intensity across Australia by week and area, that were consistent with the observed start, peak and decline of the epidemic when compared with weekly counts aggregated at the state and territory level. An example is shown in Figure 1. Conclusions The methods could be automated to rapidly generate spatially varying epidemic intensity maps using a surveillance data stream. This could improve local level epidemic intelligence in a variety of settings and for other diseases. It may also increase our understanding of geographic epidemic dynamics.

Roles of Health Literacy in Relation to Social Determinants of Health and Recommendations for Informatics-Based Interventions: Systematic Review

Abstract

Objective To describe the epidemiology of hepatitis A virus (HAV) within the Veterans Health Administration (VHA). Introduction Since hepatitis A vaccination became widely recommended in the US in the mid-1990's, rates of acute hepatitis A virus (HAV) infection have steadily declined, however, since 2011, incidence of new cases of HAV appears to be increasing1, often linked with foodborne outbreaks and socio-economic trends such as homelessness and substance abuse.2 In 2016, the CDC reported vaccination coverage among adults aged > 19 was 9.5%, 19-49 was 13.4%, and > 50 was 5.4%3. CDC issued a Health Alert Network Advisory in June 2018 with additional guidance on identification and prevention of HAV and updates on outbreaks in multiple states4 which prompted our program to conduct a more formal review of HAV infections in VHA. Herein we describe recent trends in HAV infection, vaccination and associated risk factors among Veterans. Methods We queried VA data sources from October 1, 2016 – June 30, 2018 for HAV IgM laboratory tests, HAV-coded outpatient encounters and hospitalizations (ICD-10-CM: B15), and pharmacy data for hepatitis A vaccinations administered in VHA outpatient and inpatient settings. Patients with coded HAV encounter or hospitalization were compared to individuals with HAV IgM positive results to determine Positive Predictive Value (PPV) of HAV outpatient and inpatient diagnostic codes. A total of 30 (20 outpatient and 10 inpatient HAV encounters across both fiscal years) were randomly selected for detailed chart review to determine if patients were properly coded. Additionally, patients with positive HAV IgM results were analyzed for ICD-10-CM coded outpatient and inpatient encounters indicative of homelessness (ICD-10-CM: Z59.0) and/or substance abuse (ICD-10-CM: F1x, excluding nicotine and cannabis). Rates were calculated using total unique users of VHA care for matching fiscal year time frames and geographic area as denominators. We reviewed a sample of 10 electronic medical records (EMR) of patients from Hawaii to determine vaccine indications in the setting of a state-wide outbreak. Results A total of 136,970 HAV IgM tests were performed between October 1, 2016 – June 30, 2018. We identified 247 unique patients with positive HAV IgM. The overall incidence during the study time period was 2.05 per 100,000 population of unique users of VHA care. The state with the highest incidence was West Virginia (9.49 per 100,000) (Figure 1). The overall percent positivity of patients tested for HAV IgM was 0.18% (highest of 1.16% for Kentucky). There were 1,085 HAV-coded outpatient encounters (680 unique patients) but only 58 patients had a positive HAV IgM result (PPV= 8.5%). There were 371 HAV-coded hospitalizations (335 unique patients) but only 39 patients had a positive HAV IgM result (PPV=11.6%). Among these encounters, 270 outpatients had HAV documented as the principal diagnosis for the visit (40 of these were HAV IgM+) and 38 hospitalized patients had HAV as the principal discharge diagnosis code (25 of these were HAV IgM+). Therefore, the PPV when HAV was the principal diagnosis code improved to 14.8% for outpatient encounters and 65.8% for inpatients. Chart review of 30 randomly selected outpatient and inpatient HAV-coded EMR found that only 3 (10%) were correctly coded. Of the remaining 27, 14 (47%) had a positive HAV IgG or HAV Total test result, but negative or no HAV IgM testing, 3 (10%) had a remote history of HAV, 3 (10%) were rule-out HAV but testing was negative, 2 (7%) were miscodes of hepatitis B (HBV) or hepatitis C Virus (HCV) infections, and 5 (17%) were other miscodes. The median vaccination rate during the study time frame was 0.31% [range: 0.11% (Puerto Rico) to 3.48% (Hawaii)]. Additional states with vaccination rates above the median included Kentucky, Michigan, West Virginia, and California (1.05%, 1.02%, 0.93%, 0.67%, respectively). Review of 10 sample EMR of patients from Hawaii, the state with highest vaccination rate, indicated that during their vaccination peak, patients were receiving the 2nd in their 2-dose HAV series, the first having been given in August 2016 at the time of a state-wide outbreak associated with raw scallops. Of 247 patients with positive HAV IgM, 91 (37%) had presence of ICD-10-CM encounter codes for one or more of the following risk factors associated with HAV outbreaks (in order of frequency): substance abuse (63/247; 26%), homelessness (36/247; 15%), HCV (30/247; 12%), and HBV (2/247; 0.8%). Wayne County, MI, Jefferson County, KY, and San Diego County, CA all had clustering of 4 or more cases of acute HAV with risk factors of homelessness, substance abuse, and HCV. Conclusions Acute HAV was identified in the VHA patient population in states associated with recognized outbreaks during the study time frame. Associated risk factors of substance abuse, homelessness, and HCV found in the Veteran population also matched national HAV outbreak data, including clustering in specific counties where outbreaks occurred. Overall, PPV for HAV-coded encounters was low for both inpatients and outpatients due to frequent miscoding. PPV was improved among inpatients with a principal discharge diagnosis of acute HAV. Vaccination rates were likely underestimated as data prior to the study time period was not evaluated and patients may have received vaccine outside of VA, however rates tended to be above the median in states with known outbreaks, possibly indicating ongoing response. In the case of Hawaii, EMR review indicated that a strong public health response demonstrated by a high post-outbreak vaccination rate with Veterans being monitored and brought back for their 2nd of 2 vaccine series occurred following the August 2016 HAV outbreak associated with raw scallops.2 Additional education of VA providers is warranted regarding the timely recognition of, proper testing for, and coding of acute HAV infections and improving vaccination rates, particularly among individuals who are

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Abstract

Objective The purpose of our study was CRISPR-based analysis of Y. pestis isolates from Georgia and neighboring countries. Introduction Particular family of tandem repeats, such as Clustered Regularly Interspaced Short Palindromic Repeats (CRISPR) found in a wide range of prokaryotic genomes. CRISPRs consist of highly conserved repeats interspaced with non-repetitive elements or \"spacers\" usually of viral origin. In the Yersinia pestis genome, three CRISPR elements YPa, YPb and YPc are found. The distribution of spacers and their arrays in Y. pestis strains is region and focus specific and can provide important information for genotyping and evolutionary research of bacteria. Methods Whole-genome sequencing (WGS) of 14 Y. pestis strains from Georgia, Armenia, Azerbaijan, Russian Federation (RF) and Kirgizstan were performed using a combination of different next generation sequencing (NGS) platforms: Illumina, PacBio and 454 technologies. Identification of spacer sequences from CRISPR loci was conducted to evaluate the genetic diversity among the isolates. The spacers arrays were acquired and analyzed. DRs and spacers were identified and extracted. The selected spacer sequences were compared against the microbial genome database in GenBank. Leader sequences were obtained for each CRISPR locus and aligned using MAFFT software. Results In all 14 sequenced genomes, three CRISPR elements were found. All alleles show the same organization, conserved 28 bp repeated sequence is interspaced with spacers, 31 or 34bp in length. A total of 18 spacers were found: seven for the YP1, six for the YP2 and five forYP3. According to the spacer arrays sequence, Biovar Microtus strains from Georgia and Armenia had the same allele sizes with the presence of seven motifs, for YP1 (a1b1c1d1e1m1n1), six motifs for YP2 (a2j2b2k2l2m2) and five for YP3 loci (a3b3c3d3e3) identical to PestoidesG (genotype 1). Spacers/spacer arrays of Biovar Medievalis strains from Georgia, Azerbaijen and Kabardino Balkaria (RF) were the same as KIM (genotype - 59). Conclusions CRISPR analysis of Georgian strains identified two independent phylogenetic groups that is in agreement with previous study data (SNP typing, IS100 fingerprinting). Biovar Microrus strains from Transcaucasian highland placed within one of the most ancient branches of the evolutionary model of Y. pestis. This study enhances our understanding and fulfills the existing data of genetic characteristics of Y. pestis strains circulating in the region.

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Abstract

Objective To assess the level of circulation of DENV, CHIKV, ZIKV, MAYV in French Guiana. Introduction Arboviral infections have become a significant public health problem with the emergence and re-emergence of arboviral diseases worldwide in recent decades [1-6]. Given the increasing number of cases, geographic spread, but also health, social and economic impact of arboviral outbreaks, estimating their true burden represents a crucial issue but remains a difficult task [7-10]. In French Guiana, the epidemiology of arboviral diseases has been marked by the occurrence several major dengue fever (DENV) outbreaks over the past few decades, recent emergences of Chikungunya (CHKV) and Zika virus (ZIKV) and the circulation of Mayaro virus (MAYV) [11-14]. Methods To assess antibody seroprevalence against DENV, CHIKV, ZIKV, MAYV a random 2-stage household cross-sectional survey was conducted among the general population. We enrolled 2,697 individuals aged 1-87 years from June 1 to 12 October 2017. We performed detection of DENV, CHIKV, ZIKV, MAYV IgG antibodies on collected blood samples using a microsphere immunoassay (MIA). Socio-economic data, environmental variables and exposure to mosquitoes, perceptions of the illness and risk of contracting arboviral infections were collected using a standardized questionnaire administered to all individuals included in the survey. Cross-reactivity between same families of viruses was taking into account using seroneutralisation and modeling approaches. Results Overall seroprevalence rates for antibodes against DENV were 69.5% [66.4%-72.5%] and differed significantly according to age and geographical area. Seroprevalence rates of CHIKV, ZIKV and MAYV antibodies were respectively 19.3% [16.5%-22.5%], 23.1% [19.5%-27.2%] and 9.6% [8.1%-11.3%] and did not differed significantly according to gender or age. The distribution of seroprevalence rates for CHIKV, ZIKV antibodies differed from extrapolations obtained from routine surveillance systems and brings valuable information to assess the epidemic risk of future outbreaks. MAYV has been circulating in the southern part of FG, at levels that appear to be substantially higher than those estimated from epidemiological and virological surveillance. Conclusions Serological surveys provide the most direct measurement for defining the immunity landscape for infectious diseases, but the methodology remains difficult to implement particularly in the context of high cross-reactivity between flaviviruses or alphaviruses [15]. The development of reliable, rapid and affordable diagnosis tools and the use of innovative modeling approaches represent a significant issue concerning the ability of seroprevalence surveys to differentiate infections when multiple viruses co-circulate.

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Abstract

Objective To describe a business intelligence system designed to reprocess and utilize an immunization information system's (IIS) data to visualize, and track population trends in immunization coverage in an urban population. Introduction IIS have effectively increased vaccination rates through targeted engagement and outreach, often with clinicians and patients. Little has been published around IIS use for generating meaningful population health measures. To leverage IIS data for sub-county population health measures, new tools are required to make IIS data easily accessed for this distinct use case. Human papillomavirus (HPV), the most common sexually transmitted infection in the United States, has a highly effective (97%) vaccine to prevent infection when administered to individuals 9-26 years old. According to the National Immunization Survey, only 47% of Colorado females 13-17 years had completed the HPV vaccine series in 2011. In 2012, Denver metropolitan health departments were awarded a three year grant to support the Alliance for HPV Free Colorado, where media and clinic coaching were used to improve HPV vaccination coverage among adolescents (11-17 years) in Adams, Arapahoe, Denver, Douglas, and Jefferson counties. Recent HPV vaccination schedule changes from three to two required doses highlighted further challenges in monitoring vaccination UTD rates. Methods We describe a Denver metropolitan area HPV case study where IIS data were used to inform and evaluate the impact of Alliance for HPV Free Colorado activities. IIS data were processed through the Immunization Calculation Engine (ICE)TM, a state-of-the-art open-source web application that provides immunization evaluation and forecasting, typically for patients and providers at the point of care. With the IIS data, the goal of ICE processing was to identify communities of low adolescent HPV coverage (11-17 years) for targeted media placement and track HPV trends over time at the clinic and population level. The Immunization Business Intelligence System (IBIS), processed IIS data from the Colorado Department of Public Health and Environment; using ICE, the validity of each vaccine was evaluated. Each HPV vaccine was evaluated for validity and an assessment made for each individual regarding HPV series initiation and completion (i.e., percent of individuals receiving 1, 2 or 3 valid HPV doses) depending on interval between vaccine and age at first dose. IBIS components and functionality were developed through collaborative design with a goal of developing lessons relevant for future surveillance efforts. Tableau dashboards were constructed to calculate rates of HPV initiation and completion for each participating county and healthcare practice. IBIS contained data on 33 million vaccines administered to 2.5 million adults and children residing in metro counties. In 2017, IBIS received approximately 2 million vaccines administered to 959,000 adults and children, representing roughly 35% of the 2.7 million metro residents estimated by the American Community Survey (2016). Specific to HPV vaccines, IBIS received over 900,000 HPV vaccines administered to roughly 400,000 individuals by over 1100 clinics; 2017 data included 91,951 HPV vaccines administered to 81,795 patients. Between 2015 and 2017, 186,489 HPV vaccines were administered to 116,901 adolescents 11 to 17 years residing in the Denver metro area. Using ICE, 85% of HPV vaccines were valid, 10% were accepted as extra doses not needed to complete the HPV series, 4% were invalid because the dose was given too soon after the previous dose, and less than 1% as invalid because the dose was administered too early (under nine years). As of 12/31/2017, 65,447 or 56% of adolescents 11 to 17 years had completed the HPV vaccine series, among those receiving any HPV vaccines. County specific completion rates varied from 53% to 60%, among adolescents receiving any HPV vaccines. Completion increased with age from 7% at 11 years, 34% at 12 years, 70% at 14 years, 76% at 15 years and then declined to 68% at 17 years of age. Among adolescents receiving any vaccines in the past decade, HPV completion rates were lower but increased with age from 2% at 11 years to 39% at 14 years and down to 22% at 17 years. Tableau reports displayed monthly age and county specific HPV completion rates, tracking trends over time. As ICE implemented modifications aligned with 2016 HPV schedule changes (from 3 doses to 2), IBIS was updated and trend data were reprocessed to accurately reflect current ACIP rules. IBIS was indexed to optimize direct query using Tableau for stratified dashboard reporting by demographic and/or geographic populations. IIS-based vaccination surveillance and reporting provided important guidance for public health program direction. IBIS repurposed a knowledge management system for a population-focused HPV surveillance use case applies across the metro area of Colorado. IBIS was built on a scalable platform, allowing for expansion of data capture and reporting across broader geographies and demographic groups, as well as different vaccines, vaccine groups and vaccine schedules. Collaboration across public health entities was important to construct appropriate infrastructure to build and maintain IBIS for broader public health use. Future development of IBIS includes expanding reporting to 10 additional Colorado counties and vaccines in 2018. How the Moderator Intends to Engage the Audience in Discussions on the Topic The moderator will engage audience members in a discussion about the lessons learned from developing the IBIS tool at an LPHA including challenges to understand and interpret up to date rates and opportunities for translation in other jurisdictions.

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Abstract

Objective Automated syndromic surveillance using mobile devices is an emerging public health focus that has a high potential for enhanced disease tracking and prevention in areas with poor infrastructure. Pacific Northwest National Laboratory sought to develop an Android mobile application for syndromic biosurveillance that would i) use the phone camera to take images of human faces to detect individuals that are sick through a machine learning (ML) model and ii) collect image data to increase training data available for ML models. The initial prototype use case is for screening and tracking the health of soldiers for use by the Department of Defense's Disease Threat Reduction Agency. Introduction Infectious diseases present with multifarious factors requiring several efforts to detect, prevent, and break the chain of transmission. Recently, machine learning has shown to be promising for automated surveillance leading to rapid and early interventions, and extraction of phenotypic features of human faces [3, 5]. In addition, mobile devices have become a promising tool to provide on-the-ground surveillance, especially in remote areas and geolocation mapping [4]. Pacific Northwest National Laboratory (PNNL) combines machine learning with mobile technology to provide a groundbreaking prototype of disease surveillance without the need for internet, just a camera. In this android application, VisionDx, a machine learning algorithm analyses human face images and within milliseconds notifies the user with confidence level whether or not the person is sick. VisionDx comes with two modes, photo and video, and additional features of history, map, and statistics. This application is the first of its kind and provides a new way to think about the future of syndromic surveillance. Methods Data. Human healthy (n = 1096) and non-healthy (n = 1269) facial images met the criteria for training the Machine Learning model after preprocessing them. The healthy images were obtained from the Chicago face database [6] and California Institute of Technology [2]. There are no known collections of disease facial images. Using open source image collection/curation services, images were identified by a variety of keywords, including specific infectious diseases. The criteria for image inclusion was 1. a frontal face was identified using OpenCV library [1], and 2. the image contained signs of disease through visual inspection (e.g., abnormal color, texture, swelling). Model. To identify a sick face from a healthy one, we used transfer machine learning and experimented with various pretrained Convolutional Neural Networks (CNN) from Google for mobile and embedded vision applications. Using MobileNet, we trained the final model with our data and deployed it to our prototype mobile app. Google Mobile Vision API and TensorFlow mobile were used to detect human faces and run predictions in the mobile app. Mobile Application. The Android app was built using Android Studio to provide an easily navigable interface that connects every action between tabbed features. The app features (i.e., Map, Camera, History, and Statistics) are in tab view format. The custom-made camera is the main feature of the app, and it contains face detection capability. A real-time health status detection function gives a level of confidence based the algorithm results found on detected faces in the camera image. Results PNNL"s prototype Android application, VisionDx, was built with user-friendly tab views and functions to take camera images of human faces and classify them as sick or healthy through an inbuilt ML model. The major functions of the app are the camera, map, history, and statistics pages. The camera tab has a custom-made camera with face detection algorithm and classification model of sick or healthy. The camera has image or video mode and results of the algorithm are updated in milliseconds. The Statistics view provides a simple pie chart on sick/healthy images based on user selected time and location. The Map shows pins representing all labeled images stored, and the History displays all the labeled images. Clicking on an image in either view shows the image with metadata, i.e., model confidence levels, geolocation, and datetime. The CNN model prediction accuracy has ~98% validation accuracy and ~96% test accuracy. High model performance shows the possibility that deep learning could be a powerful tool to detect sickness. However, given the limited dataset, this high accuracy also means the model is most likely overfit to the data. The training set is limited: a. the number of training images is small compared to the variability in facial expressions and skin coloring, and b. the sick images only contained overt clinical signs. If trained on a larger, diverse set of data, this prototype app could prove extremely useful in surveillance efforts of individual to large groups of people in remote areas, e.g., to identify individuals in need of medical attention or get an overview of population health. In effort to improve the model, VisionDx was developed as a data collection tool to build a more comprehensive dataset. Within the tool, users can override the model prediction, i.e., false positive or false negative, with a simple toggle button. Lastly, the app was built to protect privacy so that other phone aps can"t access the images unless shared by a user. Conclusions Developed at PNNL for the Defense Threat Reduction Agency, VisionDx is a novel, camera-based mobile application for real-time biosurveillance and early warning in the field without internet dependency. The prototype mobile app takes pictures of faces and analyzes them using a state-of-the-art machine learning model to give two confidence levels of likelihood of being sick and healthy. With further development of a labeled dataset, such as by using the app as a data collection too, the results of the algorithm will quickly improve leading to a ground-breaking approach to public health surveillance. References 1. Bradski G. (n.d.) The OpenCV Library. Retrieved Sept 30, 2018 at http://www.drdobbs.com/open-source/the-opencv-library/184404319 2. Computational Vision: Archive. (1999). Retrieved Sept

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Roles of Health Literacy in Relation to Social Determinants of Health and Recommendations for Informatics-Based Interventions: Systematic Review

Abstract

Objective To find out the prevalence of Entamoeba species in rural community of Nepal. The purpose of the study is to evaluate Nested PCR, microscopic examination and Elisa assay for detection and differentiation of Entamoeba species. Introduction Nepal being a developing country has many health problems, which escalate in intensity at different times of the year or in epidemic form. Amebiasis is one of the infectious diseases that is highly seen in rural area of Nepal caused by Entamoeba species ((1, 2). Recent reports show that open defecation, drinking untreated water, unsanitary habits and lack of basic health knowledge cause higher mortality and morbidity in our country. E. histolytica is an anaerobic pathogenic parasitic. However, E. dispar and E.moshkovskii exits as non-pathogenic. Likewise, E. histolytica, E. dispar and E. moshkovskii are morphologically identical but genetically distinct species (3). Methods A total of 270 faecal sample were collected from south eastern terai region of Nepal after the informed consent form. The samples were processed by direct wet smear and formalin ethyl acetate concentration technique (4). Eventually, microscopic examination were performed for the detection of Entamoeba species along with other intestinal parasites. Furthermore, enzyme immunoassay were executed to detect antigens of E. histolytica through ELISA. Additionally, microscopically positive samples for Entamoeba species cysts were further characterized using a Nested- PCR targeting 16S-like ribosomal RNA gene (5). The PCR generate amplicons which was subjected to 2% agarose gels electrophoresis and visualized under UV transilluminator. Results 8.52% of the total collected samples were microscopically positive for Entamoeba cysts either singly or in combination with other intestinal parasites. Likewise, among 270 stool sample, viral diarrheal was most significant form of diarrhoea found in 76.67% of patients. Among different organisms, As. Lumbricoids and E. histolytica, G. lambia and H. nana were identified in most of the patients accounting for 11.11%, 8.52%, 2.59% and 1.11% respectively. However, Lumbricoids, G. lambia, Tenia solium and E. histolytica were present in an individual patient while two patient was found with both As. Lumbricoids and G. lambia. Among several symptoms, diarrhoea seems to be the common symptoms infecting all of the patients which is followed by fever and vomiting which accounts for 55.1 % and 46.2% correspondingly. Whereas, nausea appears to be the least common symptoms infecting only 14.4% of patients. Subsequently, 56 cases were PCR positive, 51 cases were ELISA positive whereas 47 were found to be positive by microscopy. Conclusions Molecular techniques are indeed promising tools for epidemiological studies, particularly in discriminating the pathogenic from the non-pathogenic species of the Entamoeba species. This study reports a new nested multiplex PCR strategy for detection and differentiation of E. histolytica, E. dispar and E. moshkovskii which is highly rapid, specific and sensitive which is useful for proper diagnosis, immunological assay and drug testing. References 1. Chaudhary M, Maharjan M. (2014). Association of Anaemia with Parasitic Infection in Pregnant Women Attending Antenatal Clinic at Koshi Zonal Hospital. Neplalese Journal of Zoology, 2(1):1-7. 2. Tandukar S, Ansari S, Adhikari N, Shrestha A, Gautam J, Sharma B, et al (2013). Intestinal parasitosis in school children of Lalitpur district of Nepal. BMC research notes, 6(1):449. 3. Clark C, Espinosa Cantellano M, Bhattacharya A. Entamoeba histolytica: an overview of the biology of the organism (2013). Amebiasis: World Scientific, 1-45. 4. Dhanabal J, Selvadoss PP, Muthuswamy K(2014). Comparative study of the prevalence of intestinal parasites in low socioeconomic areas from South Chennai, India. Journal of parasitology research. 5. Van den Bossche, D., Cnops, L., Verschueren, J., & Van Esbroeck, M. (2015). Comparison of four rapid diagnostic tests, ELISA, microscopy and PCR for the detection of Giardia lamblia, Cryptosporidium spp. and Entamoeba histolytica in feces. Journal of microbiological methods, 110, 78-84.

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Roles of Health Literacy in Relation to Social Determinants of Health and Recommendations for Informatics-Based Interventions: Systematic Review

Abstract

Objective To identify risk factors among contacts of Lassa fever cases which can predispose to disease spread and institute control measures. Introduction Contact tracing is an important strategy employed in surveillance to aid prompt detection of infectious disease and control outbreaks. It involves the identification of those who have come in contact with an infectious person and following them up for the duration of the incubation period of the disease to promptly detect symptoms and signs and institute treatment thus reducing chances of disease spread to other susceptible individuals. It is a primary means of disease prevention. The importance of cooperation from contacts being traced cannot be overemphasized as they are required to promptly report symptoms, avoid gatherings and travelling until they are cleared by the surveillance team. The follow-up should also link contacts who become symptomatic to designated care centers. In 2014, during the Ebola outbreak in Nigeria, the disease spread from Lagos to another State in the country by a contact who travelled out of Lagos to Rivers state. To identify risk factors among contacts of Lassa fever cases which can predispose to disease spread and institute control measures, we interviewed primary contacts of Lassa fever cases during an outbreak response in Kogi State Nigeria, 2016 Methods We Identified contacts of Lassa fever cases (confirmed/suspected/probable) among family, friends, community members, co-workers and health care workers, followed up for 21 days during a Lassa fever outbreak which started in February 2016 at Kogi State Nigeria. Contacts were interviewed using a structured interviewer administered questionnaire with sections on demography, risk factors for infection and spread of Lassa fever, symptoms developed during the follow-up period and adherence to prorocol. Control measures were instituted to address identified gaps. We defined a contact as anyone irrespective of age, occupation or sex who came in contact with any of the cases of Lassa fever classified as either confirmed/suspected/probable and used standard IDSR case definitions for Suspected, Confirmed and Probable cases of Lassa fever. Data was analysed with Epi Info version 7 Results Overall 149 contacts were interviewed, 79 (53.0%) were female, the mean age of respondents was 33.2 +-10.1 and many were health care workers 61(40.9%). Of the respondents, 18 (12.0%) live or work in areas infested with rodents, 21 (14.1%) ate bush meat, 2 (2.5%) of the females were pregnant and 20 (13.4%) of respondents travelled out of station with 1 (5%) contact crossing international borders. During the follow-up period, 14 (9.4%) developed symptoms suggestive of Lassa fever. Of these 12 (85.7%) sought treatment and the options were self-medication 3 (25.0%) and presenting at a health facility 9 (77.8%). The health facilities visited were mainly privately owned 7(77.9%) and only 1 (11.1) was a tertiary health care facility. We instituted the following interventions; Health education of contacts and linkage of symptomatic contacts to the designated treatment center where treatment commenced and samples were collected and sent to reference lab for diagnosis. All samples 14(100%) came back negative for Lassa fever. Conclusions Contact tracing is an important strategy in controlling outbreaks of infectious diseases. However, risk factors identified among contacts can hinder the effectiveness of this strategy and facilitate spread of the disease. We recommend training on health education and Lassa fever transmission for contacts of cases and the need to adhere to protocol so that the ultimate aim of interrupting transmission can be achieved. References Nigeria Center for Disease Control.Viral Haemorrhagic Fevers,Preparedness and Response Plan.2017

Roles of Health Literacy in Relation to Social Determinants of Health and Recommendations for Informatics-Based Interventions: Systematic Review

Abstract

Objective Describe how the Georgia Department of Public Health (DPH) used data from its State Electronic Notifiable Disease Surveillance System (SendSS) Syndromic Surveillance (SS) module for early detection of an outbreak of salmonellosis in Camden County, Georgia. Introduction Evidence about the value of syndromic surveillance data for outbreak detection is limited (1). In July 2018, a salmonellosis outbreak occurred following a family reunion of 300 persons held in Camden County, Georgia, where one meal was served on 7/27/2018 and on 7/28/2018. Methods SendSS-SS and SAS were used for cluster detection of Emergency Department (ED) patients with similar Chief Complaint (CC), Triage Notes (TN), or Discharge Diagnoses (DDx) by facility, time of ED visit, and zip code / county of residence. A SAS-based free-text query related to food poisoning in the CC and DDx fields was also performed on a daily basis. County- and hospital-specific charting of the Diarrhea syndrome was also conducted in SendSS-SS, whereas county- and zip code-specific charting of the same syndrome were done in both SendSS-SS and SAS (2). Results On Sunday July 29th, 2018, three children and three adults were seen within 18 hours at the ED of Hospital A in Camden County, Georgia. All patients complained of diarrhea, vomiting, and food poisoning, after a large family reunion that had been held the day before. This early cluster was detected by the SAS-based free-text query of 'food poisoning' and the SAS-based cluster detection tool for patients with Diarrhea syndrome. The District Epidemiologists (DE) in the Coastal Health District were notified on Monday, July 30th, 2018. One-year high daily spikes of the Diarrhea syndrome occurred from July 29th to July 31st, 2018 in a local hospital ED (Fig 1), Camden County, and zip code 31548. Two HIPAA-compliant line lists with a total of 27 patients seen at EDs were emailed to the DEs to support active case finding. No further spikes of the Diarrhea syndrome were detected in Camden County during the 2-week period after the 3-day spike. Conclusions Syndromic surveillance was a useful surveillance tool for early detection of a salmonellosis outbreak, helping with the active search for outbreak cases, tracking the peak of the outbreak, and assuring that no further spikes were occurring. References 1.R Hopkins, C Tong, H Burkom, et al. A Practitioner-Driven Research Agenda for Syndromic Surveillance. Public Health Reports 2017; 132(Supplement1): 116S-126S. 2. G Zhang, A Llau, J Suarez, E O''Connell, E Rico, R Borroto, F Leguen. Using ESSENCE to Track a Gastrointestinal Outbreak in a Homeless Shelter in Miami-Dade County, 2008. Advances in Disease Surveillance. 2008; 5:139.

Roles of Health Literacy in Relation to Social Determinants of Health and Recommendations for Informatics-Based Interventions: Systematic Review

Abstract

Objective We aim to develop a prediction model for the number of imported cases of infectious disease by using the recurrent neural network (RNN) with the Elman algorithm1, a type of artificial neural network (ANN) algorithm. We have targeted to predict the number of imported dengue cases in South Korea as the number of dengue cases is greater than other mosquito-borne diseases2. Introduction In recent years, mosquito-borne diseases such as Zika, chikungunya, and dengue have become particularly problematic due to global climate change. Rising temperatures and changes in precipitation are considered to be associated with habitat suitability of mosquito vectors3 and viruses 4. To address such cross-border infectious diseases, countries have come up with various strategies to control and manage mosquito-borne diseases. In line with this, international efforts have been made to minimize the burden of global infectious diseases. In 2014, Global Health Security Agenda (GHSA)5 has been launched in collaboration with the international organizations, member countries of GHSA, and non-governmental organizations in order to improve national and global capacities against global public health threat. In addition, various quarantine programs have been operated in and between countries borderlines and airports with cutting edge ICT technologies. These efforts could be made more effective when the authorities have reliable predicted future trends or events6, utilize their capacities more efficiently and provide timely alerts to the public. However, very few studies have been conducted to deal with imported disease, while much attention has been paid to the endemic diseases. In this study, we aim to develop a prediction model for imported infectious disease by using the approach of ANN. We have chosen to model the imported cases of dengue in Korea, as the number of imported dengue cases is larger than other mosquito-borne diseases. Additionally, Japan, one of South Korea's neighboring countries, has recently experienced autochthonous dengue virus transmission, which has raised concerns about localization in Korea as well as in Japan7. Methods As our prediction target was the monthly number of imported dengue cases, among the alternative types of ANN, our study used recurrent neural network (RNN) models, which has been developed to model the temporal sequenced data. Specifically, Elman algorithm1 was used to develop an RNN and the model was implemented by an R package "RSNNS". A conventional autoregressive integrated moving average (ARIMA) model was also developed to compare and verify the predictabilities between the RNN and conventional ARIMA modeling approach. The ARIMA model predicted the number of dengue cases that are likely to be imported from Indonesia in 2016, based on the reported number of imported dengue cases from the country between the year 2011-2015. The analysis was conducted by an R package "forecast." To develop an RNN, the number of hidden layers and the number of nodes for each hidden layer need to be determined. The grid searching method was employed for the determination based on rooted mean squared error (RMSE), a measurement of the model performance under which a lower value indicates a better model fit. For the grid search, we chose a range of 1-3 for the number of hidden layers, and a range of 10-40 for the number of nodes for each hidden layer (29,791 combinations in total for the RNN model). To this end, we have divided the dengue importation data into two sets, i.e., the training set versus validation set. The training data set included data which had a time period of 48 months from 2012 to 2015, and the validation set had data for over 12 months in 2016, which was the latest data set available during the time of our study. As the sequential external validation approach was adopted, we used 12 RNNs for each data point in the validation set. In other words, we predicted the number of imported dengue cases from the given target country at the point in time in January 2016, using the RNN developed based on the data from January 2012 to December 2015. We then subsequently predicted the cases in February 2016 by using the data from 2012 to January 2016 and iterated the process similarly for predictions at other time points in 2016. Through the process, we have obtained the predicted number of imported dengue cases in 2016, and computed an RMSE by comparing the value to those in the observed data. Via the grid searching method used, a total of 29,791 RMSE values were calculated for models of each target country, and a model with the least RMSE was selected as the best-fitting model. Results The RMSE for the best-fitting RNN model was 14.152. In comparison to the ARIMA model, of which RMSE was 16.466, the RNN model showed improved predictability. The RNN-based prediction model can be utilized to improve the effectiveness of both national and individual level interventions for preventing the imported cases of dengue and its subsequent localization in Korea. Conclusions Since Dengue's enlistment in 2000 as nationally notifiable infectious disease, it has been reported to be one of the most common infectious disease imported into South Korea8. Concerning the rapid change in climate and disease patterns, the South Korean government should be prepared to be more responsive towards any potential imported cases of infectious disease (especially Dengue) by developing an active surveillance system and specific countermeasures. In this context, our prediction model can be utilized to enhance the response system which is designed to reduce the number of imported cases in the future and prevent any possible localization of the disease. Our analysis also suggests areas for future research to further advance the prediction models for infectious disease importation in general. Since the current RNN-based prediction model still has its limitations, it would be crucial to put in more efforts in improving the model performance and applicability. The ANN algorithms need further development in order for it to effectively

manage the availability of relevant big data in the near future. References 1. Elman JL. Finding structure in time. Cognitive science. 1990;14(2):179-211. 2. Choe YJ, Choe SA, Cho SI. Importation of travel-related infectious diseases is increasing in South Korea: An analysis of salmonellosis, shigellosis, malaria, and dengue surveillance data. Travel Med Infect Dis. 2017;19:22-7. 3. Kraemer MU, Sinka ME, Duda KA, Mylne AQ, Shearer FM, Barker CM, et al. The global distribution of the arbovirus vectors Aedes aegypti and Ae. albopictus. Elife. 2015. 4. Alto BW, Bettinardi D. Temperature and dengue virus infection in mosquitoes: independent effects on the immature and adult stages. The American journal of tropical medicine and hygiene. 2013;88(3):497-505. 5. Arthur GF, Michael M, Leah FM, Maureen B, Mitsuaki H, Wenshu L, et al. Contributions of the US Centers for Disease Control and Prevention in Implementing the Global Health Security Agenda in 17 Partner Countries. Emerging Infectious Disease journal. 2017;23(13). 6. Eisen L, Eisen RJ. Using geographic information systems and decision support systems for the prediction, prevention, and control of vector-borne diseases. Annual review of entomology. 2011;56:41-61. 7. Yoshimura Y, Sakamoto Y, Amano Y, Nakaharai K, Yaita K, Hoshina T, et al. Four Cases of Autochthonous Dengue Infection in Japan and 46 Imported Cases: Characteristics of Japanese Dengue. Internal medicine (Tokyo, Japan). 2015;54(23):3005-8. 8. Yeom J-S. Current status and outlook of mosquito-borne diseases in Korea. Journal of the Korean Medical Association. 2017;60(6):468-74.

Roles of Health Literacy in Relation to Social Determinants of Health and Recommendations for Informatics-Based Interventions: Systematic Review

Abstract

Objective This study is an attempt to explore the relationship of EF incidence with climate variables and ENSO events in the seventh most populous city in India. Introduction Enteric fever (EF) is a grave systemic infection, which has been controlled quite effectively in developed countries, but continues to be a grave public health concern for India. Environmental drivers such as rainfall, temperature, relative humidity and El Niño-Southern Oscillations (ENSO) are known to influence the transmission of Salmonella typhi and paratyphi. India possesses the largest population burden of EF, yet very few studies have explored its climatic associations. Methods We analyzed address-confirmed widal positive, monthly EF cases reported by Ahmedabad Municipal Corporation and local climate data recorded by the Meteorology Office from 1986-2017. EF incidence trend in the city was cross validated using EF monthly reports from one large public hospital and from private reports. We also collected data for Temperature, Humidity and Rainfall from Meteorological Centre of Ahmedabad, population data from Census department, and identified IOD and ENSO events from National Oceanic and Atmospheric Administration (NOAA) for the same period. Results Our study recorded 29,808 Widal positive cases for 32 years. EF incidence trend over last 32 years showed a decadal pattern. Initial study period (1986-1995) showed higher and erratic case rates, while cases were more restrained during the last decade (1995-2005), although a steady rise is persisting. We also observed a consistent rise in EF cases in the last 8 years (Fig 1). Analysis of annual pattern of monthly-normalized EF cases revealed a bimodal distribution of peaks, in the month of June and September. Peaks of EF cases showed a lag and lead of one month with Tmax and Tmin. The first EF peak in June lagged the Tmax peak in May by a month and the second EF peak in September led the Tmax peak in October by a month. The second peak of EF cases in September coincided with the peak humidity in the same month. The dip between the two EF peaks coincided with maximum rainfall peak in July (Fig 2 a,b,c). Spearman's rank correlation showed a small positive but significant correlation between monthly EF case rates and climate variables (Tab 1). A Poisson model showed significant but weak association between EF incidence and all climate variables - Tmin, RH and Rainfall. In our study T max had the strongest association with EF cases, wherein an increase of one case was accompanied by a 0.1°C increase of the Tmax (Tab 2). Over the 32 years, there were 4 strong and 4 moderate El Nino years, 5 strong and 2 moderate La Nina years and 17 neutral years. Figure 3 shows that except for the two El Nino years which coincided with positive IOD events, the remaining six El Nino years experienced a subdued rainfall. Six out of seven La Nina years experienced high rainfall. The early El Nino events of 1986, 1987, 1991 and the most recent one of 2015 exhibit a trend of low rainfall and high cases. This trend is diluted in the middle El Nino years, 1994, 1997, 2002 and 2009 showing high and low rainfall and relatively lesser annual case rates. Although the highest case rate was recorded in a La Nina year - 59/100,000 in 1988, average case rates were highest for El Nino years (25.5), lower for La Nina (20.5) and lowest for Neutral years (17.6). However, we were unable to establish any statistical significance between average EF case rates during each of these periods. A spearman correlation between EF cases and rainfall was small but significant for El Nino (r_s= 0.35, p=0.001) and for neutral years (r_s= 0.20, p= 0.004), but not for La Nina years. A repeated measures ANOVA analysis showed no significant difference in average EF cases during the three ENSO categories, however visual profile plot (Fig 4) of estimated marginal monthly means over the year showed distinct differences – early rise and peaking of cases in the El Nino and La Nina years, and a much more restrained rise without conspicuous peaks in Neutral years. The 2 positive IOD events that occurred along with the strong El Nino events in 1994 and 1997 may have led to lowering of case rates during El Nino years, and thus the lack of a significant increase in EF incidence rates. But this could also be due to the fact that our analysis, unlike a time series analysis, has used an El Nino year as a variable, which does not accommodate the fact that El Nino does not run by a calendar year. We were unable to conduct a geospatial analysis which may have better correlated our data with temperature and rainfall intensity during the three ENSO phases in our region. Uneven development of urban infrastructure would also influence rates of illness. Furthermore, the cases reported to the epidemic cell were based on Slide and/or Tube Widal positive tests which is considered a poor diagnostic test. Despite these numerous and at times opposing factors influencing trends of EF, the upswing in case incidence rate early in the El Nino and La Nina years, when the weather is still balmy and water shortages haven't yet begun in the city, merits deeper investigation. Conclusions Future control strategies for EF need to consider the influence of local environment, geographical climate variation and seasonal patterns. This relationship between ENSO events and EF cases needs to be investigated with larger and longer data sets from different cities and towns in the sub-continent. One of the limitation of our study is we need longer and larger, spatially distributed dataset of EF incidences to associate it better with climate phenomena.

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Roles of Health Literacy in Relation to Social Determinants of Health and Recommendations for Informatics-Based Interventions: Systematic Review

Abstract

Objective To demonstrate an overview of the epidemiological and clinical distribution of reportable West Nile cases in Houston, Texas, from 2015-2017. Introduction West Nile virus (WNV) is considered the leading cause of domestically acquired arboviral disease and is spread through mosquitoes. In general, the majority of the cases are asymptomatic. One in five people infected will display mild symptoms like fever, headache, body ache, nausea, and vomiting. Only about 1 in 150 people infected will develop serious neurologic complications such as encephalitis and meningitis. According to CDC, in 2017, there were 133 confirmed cases including 5 deaths and 14 presumptive blood donors reported in the State of Texas. Out of the confirmed cases, there were 85 neuroinvasive and 48 non-neuroinvasive disease cases. Methods Data were extracted from Houston's Electronic Disease Surveillance System (HEDSS) from January 1, 2014, to December 31, 2017. A total of 45 confirmed cases are included in this analysis to examine the epidemiologic characteristics of the WNV cases. A confirmed case is an illness with onset of acute focal limb weakness and an MRI showing a spinal cord lesion largely restricted to gray matter and spanning one or more spinal segments. Results Among the confirmed cases, 67% of were males. Age group 60 and above (47%) had the highest proportion of WNV cases. Whites (26%) represented the highest number of confirmed cases followed by Hispanics (24%). Seventy six percent of the cases were hospitalized. Non-neuroinvasive clinical presentations found among confirmed WNV cases were fever (94%), headache (76%) followed by chills and rigors (68%). Among the neuroinvasive presentations, altered mental status had the highest proportion (24%), followed by stiff necks (18%), Ataxia (12%), and seizure (9%). Conclusions WNV is mostly prevalent in White male adults over 60 years of age, with majority of cases have common neuroinvasive symptoms like altered mental status, stiff necks, and Ataxia. For non-neuroinvasive cases clinical symptoms were fever, headache, chills and rigors. WNV infection is a markedly underreported disease as most of the infected people do not seek medical care due to mild or no symptoms. Currently there are no specific treatments available. Thus, continued monitoring and surveillance activities are warranted for prevention and control of WNV complications as well as decreasing the risk of infection. References CDC: West Nile Virus [Internet]. Atlanta: Center for Disease Control and Prevention (CDC), National Center for Emerging and Zoonotic Infectious Diseases (NCEZID), and Division of Vector-Borne Diseases (DVBD); Last reviewed: September 19, 2018. Available from: https://www.cdc.gov/westnile/index.html

Roles of Health Literacy in Relation to Social Determinants of Health and Recommendations for Informatics-Based Interventions: Systematic Review

Abstract

Onjective To study trends and patterns in legionnaires' disease cases in Houston, Texas, from 2014-2017. Introduction Legionellosis is a respiratory illness that is mostly (80-90%) caused by the bacterium Legionella pneumophila. It is associated with a mild febrile illness, Pontiac fever, or Legionnaires' disease (1), a source of severe, community-acquired pneumonia. Legionella bacteria mostly affect elderly persons specifically those with underlying debilitating illnesses and with lowered immune systems. Water is the major natural reservoir for Legionella, and the pathogen is found in many different natural and artificial aquatic environments such as cooling towers or water systems in buildings, including hospitals. An abrupt increase in the incidence of Legionnaires' has been noted since 2003 throughout the nation. According to CDC, about 6,000 cases of Legionnaires' disease were reported in the United State in 2015 (1). Incidence rates of Legionnaires for the year 2015 were 1.06 and 1.90 (ref) for Texas and the United States respectively (2). Increased number of reported cases might be due to the fact of an older population, more at risk individuals, aging plumbing infrastructure, and increased testing for Legionnaires' disease by various hospitals and laboratories. Methods Data were extracted from Houston's Electronic Disease Surveillance System (HEDSS) from January 1, 2014, to December 07, 2018. Confirmed cases were analyzed to examine the epidemiologic trends across years 2014 to 2018. Demographic characteristics such as age, race, and gender were also analyzed. Incidence rates, case fatality and time lapse from date of diagnosis to date of reporting to the health department were also studied. Data were analyzed using SAS statistical software, version 9.4. Only Houston residents were included in the analysis. To be considered confirmed, a case must be clinically compatible and fulfill at least one of the confirmatory laboratory criteria. Results There were 218 cases of LD reported to the City of Huston from 2014 to 2018. Only 116 cases (53%) were classified as confirmed. Reported cases may have been not confirmed due to the lack of fulfilling the case criteria for the case. Providers may have ordered a non-confirmative test, or the case may not have satisfied the clinical compatibility due to loss to follow-up or for other reasons. Most of the confirmed cases were reported from larger for-profit hospitals (500+beds) in the area. The majority of cases were diagnosed by urinary antigen test (95, 82%). There were four deaths due to legionnaires disease during this period giving a case fatality rate of 3.4%. Death rates were inaccurate, though, and could be higher than reported since cases were not followed up after being reported to the state. From 2014 to 2018, legionnaires' disease incidence rates increased from 0.71 to 1.36 per 100,000, an average annual increase of 17%. In 2014–2018, the incidence of LD was higher among men compared with women. 67 cases (58%) were male, and 49 (42%) were female. Female cases remained stable throughout the years while male cases increased from 6 to 23, an increase of approximately four folds. The median age was 60 years with a range of 21 to 96 years. LD incidence increased with age; it was highest among residents 65 years and older (42,36%). African Americans had the highest incidence of LD (40, 35%) followed by Hispanics (29, 25%). African Americans cases had more than doubled through years 2014-2018 from 6 to 13. Cases were higher in warmer months specifically in July (14) an August (13). Conclusions Cases were higher in the warmer months and the highest among the elderly, men, and those of African American race. ELR was the prime source of initial case reporting to the health department. The number of legionnaire's cases observed were increasing with each passing year. The ratio of confirmed cases to those reported were only 53% thus raising awareness and appropriate education to the investigators and providers are highly advised. It is critical to the control of LD that enhanced surveillance is maintained at a high level. Consequently, more consideration should be given for the more widespread use of Legionnaires confirming test when a patient presents with pneumonia. Hospitals and other healthcare facilities often have large, complex water systems, making them potentially high-risk settings for transmission of legionellosis to vulnerable patients or residents. We recommend all healthcare facilities have a water management program to control Legionella. References 1. Centers for Disease Control and Prevention. (2018). Infection Control Assessment Tools. Retrieved October 5, 2018, from https://www.cdc.gov/legionella/ 2. Texas Health and Human Services. (2018). Legionellosis. Retrieved October,5, 2018, from https://www.dshs.texas.gov/idcu/disease/legionnaires/

Roles of Health Literacy in Relation to Social Determinants of Health and Recommendations for Informatics-Based Interventions: Systematic Review

Abstract

Objective To survey the distribution of Ixodid tick and infection of severe fever with thrombocytopenia syndrome virus (SFTSV) in natural environments from Deogyusan national parks in Korea. Introduction Severe fever with thrombocytopenia syndrome (SFTS) is an emerging viral disease in East-Asian countries, including China, Japan, and the Republic of Korea (ROK). The causative agent of SFTS is the SFTS virus (SFTSV) transmitted by hematophagous ticks. Methods To investigate the prevalence of SFTSV in the ROK, a total of 4,223 ticks were collected by flagging from Deogyusan National Park from 2015 to 2018. One-step reverse transcription-polymerase chain reaction (RT-PCR) and nested PCR were used to detect SFTSV-specific gene fragment from each ticks. The sequence data were analyzed using Chromas and aligned using CLUSTAL X. The phylogenetic analysis was constructed using the neighbor-joining method in MEGA7. Results Of the collected adult and nymph ticks, Haemaphysalis longicornis (3611, 85.5%) were the most abundant, followed by H. flava (502, 11.88%), Ixodes nipponensis (109, 2.5%), and Ixodes ovatus (1, 0.02%). The infection rate of SFTSV in total ticks was 5.8% (245/4,223), and the infection rate by year was 3.69% in 2015, 7.97% in 2016, 5.08% in 2017 and 4.68% in 2018. The infection rates of SFTSV were getting decreased each year in Deogyusan National Park. In addition, infection rate was higher in spring and summer of each season. Phylogenetic analysis was performed and SFTSV sequences obtained in this study were included in Korean/Japanese SFTSV clade. Conclusions In conclusion, we confirmed the sequence of two clades, and it is thought that the epidemiological investigation of SFTSV is necessary through further studies.

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Roles of Health Literacy in Relation to Social Determinants of Health and Recommendations for Informatics-Based Interventions: Systematic Review

Abstract

Objective The purpose of this study is to describe and evaluate the results of the GAFINET(Gyeonggi Acute Febrile Illness Surveillance Network) operated for one year. Introduction After MERS outbreak in 2015, the provincial government and infectious disease control center (GIDCC) initiated an emergency department (ED) based Gyeonggi-do provincial acute febrile illness (AFI) surveillance network (GAFINet) to monitor for a subsequent outbreak of emerging or imported infectious diseases since September 2016. Following pilot operation from September to December 2016, the operation was run for one year from June 2017 to May 2018. GAFINet Initiative involves ten hospitals, consisted of four university-affiliated hospitals and six provincial medical centers in Gyeonggi-do province. These hospitals participated in this network voluntarily. Methods Periodic surveillance for finding AFI patients in ED of participating hospitals was performed prospectively (Figure 2). AFI was defined as 1) fever: body temperature ≥38 °C at admission, or 2) chief complaint of febrile or chilling sensation. Demography of patients and chief complaints were investigated in this first step. Cases were classified into six categories based on their clinical diagnoses: 1) respiratory AFI [AFRI], 2) gastroenteric AFI [AFGI], 3) exanthematic AFI [AFEI], 4) other infectious AFI, 5) non-infectious AFI, and 6) unclassified AFI. Participating infectious diseases specialists regularly reviewed and reformed this classification via web based system. Nosocomial AFI cases or the patients transferred from another hospital were excluded. When a patient had a history of international travel or he/she were undiagnosed in three days after ED admission, more comprehensive information including history and final diagnosis were obtained. For a baseline data, age- and sex-stratified ED visits were also gathered weekly. The proportion of AFI cases per 1000 visits was determined for one week period and analyzed by febrile diseases categories with age-stratification. Characteristics of cases with international travel histories or undiagnosed cases were also described separately. The results were presented to participating researchers as visualized dashboards in Web-based systems. Also we compared the trend and peak time of GAFINET data with the surveillance data of KCDC for influenza, hand foot and mouth disease, and Tsutsugamushi disease. Results The total number of patients in the emergency room in 10 hospitals was 366,695 for one year. Among them, 40,897 patients were diagnosed with acute febrile illness (11.2%). 47.8% were under 10 years of age, and 508 - 1,769 patients were fever - related patients per weak. The number of patients with foreign travel was 0 - 11 in each week, and the number of patients with unknown fever in the week was 0 - 6. 1 to 9 years of age accounted for the largest proportion (27.6% - 48.3%) of acute febrile patients. The most common infectious diseases were acute febrile respiratory disease, and other acute febrile infections and acute febrile gastrointestinal disease are followed. In acute febrile respiratory disease and acute febrile illness, seasonal pattern was seen. A total of 157 patients with acute febrile illnesses with overseas travel ability, 0 - 11 persons per week, consistently occurred. Acute gastroenteritis (AGE) was the most frequent diagnosis in 28 patients (17.8%), fever of unkonwn origin(FUO) was 25(15.9%), Acute pharyngotonsilitis 17(10.8%), viral infection 17 (10.8%), Influenza 7 (4.5%) and colitis 5 (3.2%). The cause of fever was not found in 30 of the acute febrile patients with overseas travel ability. A total of 77 patients with acute febrile disease were admitted to the hospital. In comparison with national surveillance data, the trend of occurrence of influenza in GAFINet and national data was similar. Both data peaked in the first week of 2018. Also trend of hand-foot and mouth disease(HFMD) was similar in two data. But peak weak was little different in both data(CDC at 30 weeks, GAFINett at 29 weeks in 2017). In GAFINet, the final diagnosis was confirmed as Tsutsugamushi disease in total 43 cases. The number of reported cases was small, and the epidemic peaked at the same time as the CDC surveillance data, but the outbreak occurred in the same period (October to November). Conclusions GAFINet has both the characteristics of indicator based surveillance and event based surveillance. Data were collected over a period of one year to examine the feasibility and applicability of the indicator based surveillance. In comparison with national surveillance data, some feasibility was verified by similar trends, but the necessity of operating regional surveillance data still needs to be discussed. It should also be noted that some diseases have different peak times of one week. The role of event based surveillance is mainly aimed at surveillance of fever patients with international travel history. The advantage of the GAFINet"s classification system in the emergency room of participating hospitals is that the patient"s cases of fever were constantly monitored. However, there is still a limit to the lack of budget and manpower in the samping and labaratory test. Real time visual feedback of surveillance data helped to increase participation and discuss the results.

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Roles of Health Literacy in Relation to Social Determinants of Health and Recommendations for Informatics-Based Interventions: Systematic Review

Abstract

Objective The objective of this study is to evaluate the use of a supplementary data management application to meet surveillance demands for foodborne disease in Tennessee and to highlight successes, challenges, and opportunities identified through this process. Introduction The Tennessee Department of Health (TDH) Foodborne Disease Program conducts routine surveillance for foodborne illnesses and enteric disease outbreaks and participates in statewide enhanced surveillance as part of the Foodborne Disease Center for Outbreak Response Enhancement (FoodCORE) and the Foodborne Diseases Active Surveillance Network (FoodNet) supported by the Centers for Disease Control and Prevention (CDC). TDH uses the CDC NEDSS Base System (NBS) application for routine disease surveillance. However, NBS serves multiple disease programs within TDH and modifications to the system for the rapidly changing data demands, grant requirements, and outbreak needs of the foodborne program, may not be a priority for the system as a whole. In 2014, the TDH Foodborne Disease Program began using the Research Electronic Data Capture (REDCap) application as a solution to changing surveillance needs. FoodCORE, FoodNet, and routine surveillance data elements are entered into REDCap to supplement NBS, depending on program specific needs and system capability. Methods REDCap was queried for FoodCORE, FoodNet, and routine surveillance projects. Projects were categorized by surveillance activity type. Epidemiologists provided qualitative feedback on successes and challenges in using REDCap to supplement NBS, which were then categorized into attributes according to existing frameworks for evaluating public health surveillance systems.1, 2 Results As of August 2018, the TDH Foodborne program housed 45 individual REDCap databases dedicated to surveillance. Four primary database categories were identified: routine case-based surveillance (8), enhanced/active surveillance (6), aggregate outbreak/cluster surveillance tracking (6), and outbreak-specific databases (25). The REDCap application programming interface (API) and an open database connection to NBS within SAS 9.4 (Cary, NC) were used to create unilateral data flow from NBS to REDCap, where possible. Successes and challenges in using REDCap fell into six main surveillance system attributes: Flexibility, Ease of Data Management, Stability, Simplicity, Efficiency, and Acceptability. Successes included the high level of control over data and databases offered by REDCap, the flexibility to rapidly implement program-specific changes, and the accessibility and reliability of REDCap as a de facto back-up of NBS data. Challenges included lack of interoperability between REDCap databases and with NBS, leading to dual data entry, overuse of REDCap resulting in unnecessarily complex and decentralized data storage (Figure 1), and increased personnel time on data management and extraction for metrics and reports. Conclusions Using REDCap in Tennessee to supplement an existing disease surveillance application increased flexibility and functionality of the foodborne disease surveillance system, but also added complexity and time involved in data management. The Nationally Notifiable Diseases Surveillance System Modernization Initiative (NMI) is developing a standardized message mapping guide (MMG) in collaboration with states and CDC, which incorporates FoodNet data elements and would transition data collection tools in NBS for foodborne diseases to a more portable and flexible format. Implementation of this MMG could minimize case-based data entry into REDCap. Tools that offer increased interoperability between NBS and REDCap and between REDCap databases could also improve the efficiency of using complementary applications for rapidly changing foodborne disease surveillance needs. References 1. German RR, Lee LM, Horan JM, Milstein RL, Pertowski CA, Waller MN. Updated guidelines for evaluating public health surveillance systems: recommendations from the guidelines working group. MMWR Recomm Rep. 2001;50(Rr-13):1–35. 2. Calba C, Goutard FL, Hoinville L, et al. Surveillance systems evaluation: a systematic review of the existing approaches. BMC Public Health. 2015;15:448. doi:10.1186/s12889-015-1791-5.

Roles of Health Literacy in Relation to Social Determinants of Health and Recommendations for Informatics-Based Interventions: Systematic Review

Abstract

Objective To povide knowledge on the factors that predict retention in care and health outmomes among HIV patients and be able to understand viral load and its relation to retention in care. Introduction The prevalence of persons living and diagnosed with HIV infection in the United States in 2010 to 2014 increased in number and rate (Center for Disease Control & Prevention (CDC), 2016). In 2015, persons aged 25–29 years had the highest rate (33.4), followed by persons aged 20–24 years (31.2) (CDC, 2016). Consistent reduced viral load is associated with reduced morbidity and mortality and a lower likelihood of transmitting HIV to sex partners (CDC, 2011). Retention into HIV care promotes life and decreases the risk for HIV transmission (Yehia et. al. 2015). Preventing HIV transmission, prevention intervention strategy is critical and should be ongoing to all HIV patients consistently. New cases of HIV in the United States are increasing by approximately 30, 000 per year and with this increase, more providers are needed (Weiser et al.2016). Methods Quantitative cross sectional study: 2017 Palm Beach County Needs Assessment Survey was used, The data used was secondary-deidentified data. The sample size consisted of 357 survey participants.The surveys were collected from September 2016 to January 2017. The Florida Department of Health (FDOH) Institutional Review Board (IRB) approval was granted before data Collection.. The participants were not at risk due to de-indentifieddata. The demographic and clinical data was reviewed. Ethical practices were followed by securing data and only the data needed to conduct study were utilized. The Independent Variables were: Age, Educational Level, Race, Gender, Condom Use, Unprotected sex, Sexual Orientation, Blood Tests-Viral Load, Medical care type facility. The Dependent Variables were: Medical Care/In Care, Miss HIV Meds and Hospitalization. Four Research Questions are posed in this study, the results section list the research questions. Statistical Test were computed with the use of SPSS with ANOVA and Linear Regression Results RQ:Is there a statistical significant association between age of HIV patients, retention in care and health outcomes, in Palm Beach County? Analysis of variance (ANOVA) was conducted to investigate if there was a statistical significant association between age of HIV patients and retention in care . Analysis Result: ANOVA, F (9, 0.393.) =2.181, p<0.05 (p=0.023). There was statistically significant association between age and retention in care between groups. Post Hoc (Dunnett test revealed differences between the 50-54 p =0.006, between 55-59, p=0.009 and 60 ≥ p=0.010 RQ2: Is there a statistically significant association between HIV patients at risk for sexually transmitted diseases and retention in care as evidenced by unprotected sex? Analysis of variance (ANOVA) was conducted to investigate if there was a statistical significant association between at risk for STD of HIV patients and retention in care as evidenced by unprotected sex. Analysis Result: ANOVA , F (3, 4.531) =15.975, p<0.001 (p=0.000). There was statistically significant association between at risk for STD and retention in care as evidenced by unprotected sex . Post Hoc (Dunnett) test revealed differences between retention in care and risk for sexually transmitted diseases as evidenced by unprotected sex, p=0 RQ3: Are MSM HIV patients who attend health department clinics and or other health care facilities, more likely to retain in care than other groups of HIV patients? Analysis of variance (ANOVA) was conducted to investigate if MSN patients who attend health department clinics and other health care facilities, more likely to retain in care than other groups of HIV patients? ANOVA , F (4, 0.280) = 1.516, p > 0.05 (p= 0.197). There was no statistically significant association between MSN HIV patients who attend health department clinics and other health care facilities than other groups of HIV patients more likely to remain in care? RQ4: Do patients knowledge of viral load test predict retention in care? Logistic Regression was conducted to investigate knowledge of viral load and retention in care. Retention in care and viral load tests regression model was statistically significant The regression model showed P < 0.01, p=0.000 Viral Load test significantly predicted retention in care.Coefficients of Viral Load greater than 1000 and Less than 200 were statistically significant:Viral Load >1000 p = 0.010;Viral Load < 200 p = 0.004 Conclusions Limitations to the study included the time frame to complete the study and the use of secondary data which was available to conduct the study. Low viral load is indicative of better health outcomes. Many studies have attempted to address barriers to retain in care and more work is needed to address the factors that impact retention in care. Findings are consistent with other research that retention in care are due to social, behavioral and system factors. Some of the reasons the patients gave for their not in care are treatment of staff in clinic and or doctors office, long wait times, transportation, language barrier, child care and the clinic hours. The three most frequent answers were treatment of staff in clinic, long wait times and transportation. The burden o fnew HIV infection transmitting HIV if patients do not remain in care. Findings are consistent with other research that retention in care are due to social, behavioral and system factors. Three most frequent answers were treatment by staff, long wait times and transportation. References Center for Disease Control & Prevention. Diagnoses of HIV infectionin the United States and dependent areas, 2015 HIV Surveillance Report, 2016; 27. Drachler, M.D., Drachler, C. W., Teixeira, L.B., & Leite, J. C. D. The Scale of Self-Efficacy Expectations of Adherence to Antiretroviral Treatment: A Tool for dentifying Risk for Non-Adherence to Treatment for HIV. 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Roles of Health Literacy in Relation to Social Determinants of Health and Recommendations for Informatics-Based Interventions: Systematic Review

Abstract

Objective Session objectives: Review strategies and policies employed to get independent C/MEs from a state with a de-centralized C/ME system to start reporting overdose death data to the Department of Health. Summarize flexibility needed to collect overdose death data from C/MEs with a variety of case management systems/methods. Preview how overdose death data is displayed on the Prescription Drug Monitoring Programs' Interactive Data Report. Introduction The severity of the nationwide opioid epidemic necessitates a fully-informed and evidenced-based response on the part of public health organizations. To support that aim, Pennsylvania applied for and received the Center for Disease Control and Prevention"s Enhanced State Opioid Overdose Surveillance (ESOOS) grant. Methods Today's poster presentation will outline issues with recruiting coroners/medical examiners (C/MEs) for participation who are unique to jurisdictions that utilize a decentralized C/ME system, and how those issues were addressed. Those issues include tension between state and county governments, time and staff concerns on the part of C/MEs, and the variety of case management systems that the C/MEs use. Results At the beginning of this project, two out of 67 counties were submitting comprehensive toxicology and risk factor data to the Pennsylvania Department of Health. As of September 2018, thirty-eight out of 67 counties are submitting death data. The presentation will also discuss what data is collected and how it is reported. Conclusions The outreach strategy successfully increased the number of coroners and medical examiners that submit death data.

Roles of Health Literacy in Relation to Social Determinants of Health and Recommendations for Informatics-Based Interventions: Systematic Review

Abstract

Objective To describe the characteristics of ED vitis related to dengue fever and to show how the syndromic surveillance system can be flexible for the monitoring of this outbreak. Introduction In Reunion Island, a French overseas territory located in the southwestern of Indian Ocean, the dengue virus circulation is sporadic. Since 2004, between 10 and 221 probable and confirmed autochthonous dengue fever cases have been reported annually. Since January 2018, the island has experienced a large epidemic of DENV serotype 2. As of 4 September 2018, 6,538 confirmed and probable autochthonous cases have been notified1. From the beginning of the epidemic, the regional office of National Public Health Agency (ANSP) in Indian Ocean enhanced the syndromic surveillance system in order to monitor the outbreak and to provide hospital morbidity data to public health authorities. Methods In Reunion Island, the syndromic surveillance system called OSCOUR® network (Organisation de la Surveillance Coordonnée des Urgences) is based on all emergency departments (ED)2. Anonymous data are collected daily directly from the patients' computerized medical files completed during medical consultations. Every day, data files are sent to the ANSP via a regional server over the internet using a file transfer protocol. Each file transmitted to ANSP includes all patient visits to the ED logged during the previous 24 hours (midnight to midnight). Finally, data are integrated in a national database (including control of data quality regarding authorized thesauri) and are made available to the regional office through an online application3. Following the start of dengue outbreak in week 4 of 2018, the regional office organized meetings with physicians in each ED to present the dengue epidemiological update and to recommend the coding of ED visit related to dengue for any suspect case (acute fever disease and two or more of the following signs or symptoms: nausea, vomiting, rash, headache, retro-orbital pain, myalgia). During these meetings, it was found that the version of ICD-10 (International Classification of Diseases) was different from one ED to another. Indeed, some ED used A90, A91 (ICD-10 version: 2015) for visit related to dengue and others used A97 and subdivisions (ICD-10 version: 2016). As the ICD-10 version: 2015 was implemented at the national server, some passages could be excluded. In this context, the thesaurus of medical diagnosis implemented in the national database has been updated so that all codes can be accepted. ED visits related to dengue fever has been then described according to age group, gender and hospitalization. Results From week 9 of 2018, the syndromic surveillance system was operational to monitor dengue outbreak. The regional office has provided each week, an epidemic curve of ED visits for dengue and a dashboard on descriptive characteristic of these visits. In total, 441 ED visits for dengue were identified from week 9 to week 34 of 2018 (Figure 1). On this period, the weekly number of ED visits for dengue was correlated with the weekly number of probable and confirmed autochthonous cases (rho=0.86, p<0.001). Among these visits, the male/female ratio was 0.92 and median (min-max) age was 44 (2-98) years. The distribution by age group showed that 15-64 year-old (72.1%, n=127) were most affected. Age groups 65 years and more and 0-14 year-old represented respectively 21.8% (n=96) and 6.1% (n=27) of dengue visits. About 30% of dengue visits were hospitalized. Conclusions According Buehler et al., "the flexibility of a surveillance system refers to the system"s ability to change as needs change. The adaptation to changing detection needs or operating conditions should occur with minimal additional time, personnel, or other resources. Flexibility generally improves the more data processing is handled centrally rather than distributed to individual data-providing facilities because fewer system and operator behavior changes are needed..." 4. During this dengue outbreak, the syndromic surveillance system seems to have met this purpose. In four weeks (from week 5 to week 9 of 2018), the system was able to adapt to the epidemiological situation with minimal additional resources and personnel. Indeed, updates were not made in the IT systems of each EDs' but at the level of the national ANSP server (by one person). This surveillance system was also flexible thank to the reactivity of ED physicians who timely implemented coding of visits related to dengue fever. In conclusion, ED surveillance system constitutes an added-value for the dengue outbreak monitoring in Reunion Island. The automated collection and analysis data allowed to provide hospital morbidity (severe dengue) data to public health authorities. Although the epidemic has decreased, this system also allows to continue a routine active surveillance in order to quickly identify a new increase. References 1Santé publique France. Surveillance de la dengue à la Réunion. Point épidémiologique au 4 septembre 2018. http://invs.santepubliquefrance.fr/fr/Publications-et-outils/Points-epidemiologiques/Tous-les-numeros/Ocean-Indien/2018/Surveillance-de-la-dengue-a-la-Reunion-Point-epidemiologique-au-4-septembre-2018 [Accessed September 8, 2018]. 2Vilain P, Filleul F. La surveillance syndromique à la Réunion : un système de surveillance intégré. 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Roles of Health Literacy in Relation to Social Determinants of Health and Recommendations for Informatics-Based Interventions: Systematic Review

Abstract

Objective Intensive Care Unit (ICU) data are registered for quality monitoring in the Netherlands with near 100% coverage. They are a 'big data' type source that may be useful for infectious disease surveillance. We explored their potential to enhance the surveillance of influenza which is currently based on the milder end of the disease spectrum. We ultimately aim to set up a real-surveillance system of severe acute respiratory infections. Introduction While influenza-like-illness (ILI) surveillance is well-organized at primary care level in Europe, little data is available on more severe cases. With retrospective data from ICU's we aim to fill this current knowledge gap and to explore its worth for prospective surveillance. Using multiple parameters proposed by the World Health Organization we estimated the burden of severe acute respiratory infections (SARI) to ICU and how this varies between influenza epidemics. Methods We analyzed weekly ICU admissions of adults in the Netherlands (2007-2016) from the national intensive care evaluation (NICE) quality registry (100% coverage of adult ICU in 2016; population size 14 million adults. A SARI syndrome was defined as admission diagnosis being any of 6 pneumonia or pulmonary sepsis codes in the Acute Physiology and Chronic Health Evaluation IV (APACHE IV) prognostic model. Influenza epidemic periods were retrieved from primary care sentinel influenza surveillance data. In recent years NICE has explored and promoted increased timeliness and automation of data transfer. Results Annually, 11-14% of medical admissions to adult ICUs were for a SARI (5-25% weekly). Admissions for bacterial pneumonia (59%) and pulmonary sepsis (25%) contributed most to ICU-SARI. Between influenza epidemics, severity indicators varied: ICU-SARI incidence (between 558-2,400 cumulated admissions nation-wide, rate: 0.40-1.71/10,000 inhabitants), average APACHE score (between 71-78), ICU-SARI mortality (between 13-20%), ICU-SARI/ILI ratio (between 8-17 SARI ICU cases per 1,000 expected medically attended influenza-like-illness in primary care), peak incidence (between 101-188 ICU-SARI admissions nationally in the highest week, rate: between 0.07-0.13/10,000 population). ICUs use different types of electronic health records (EHRs). Data submitted to the NICE registry is mainly based on routinely collected data extracted from these EHRs. The timeliness of data submission varies between a few weeks and three months. Together with ICUs, the NICE registry has recently undertaken actions to increase timeliness of ICU data submission. Conclusions In ICU data, great variation can be seen between the yearly influenza epidemic periods in terms of different influenza severity parameters. The parameters also complement each other by reflecting different aspects of severity. Prospective syndromic ICU-SARI surveillance, as proposed by the World Health Organization would provide insight into severity of ongoing influenza epidemics which differ from season to season. Currently a subset of hospitals provide data with a 6-week delay. This can be a worthwhile addition to current influenza surveillance, which, while timelier, is based on milder cases seen by general practitioners (primary care). Future increases in data timeliness will remain an aim.

Roles of Health Literacy in Relation to Social Determinants of Health and Recommendations for Informatics-Based Interventions: Systematic Review

Abstract

Objective To identify and assess the characteristics of individuals with repeated emergency department (ED) visits for unintentional opioid overdose, including heroin, and how they differ from individuals with a single overdose ED visit. Introduction The Virginia Department of Health (VDH) utilizes syndromic surveillance ED data to measure morbidity associated with opioid and heroin overdoses among Virginia residents. Understanding which individuals within a population use ED services for repeated drug overdose events may help guide the use of limited resources towards the most effective treatment and prevention efforts. Methods VDH classified syndromic surveillance visits received from 98 EDs (82 hospitals and 16 emergency care centers) between January 2015 and July 2018. An unintentional opioid overdose, which included heroin, was classified based on the chief complaint and/or discharge diagnosis (ICD-9 and ICD-10) using Microsoft SQL Server Management Studio. ED visits were categorized as either a single or a repeat visit, where a repeat visit was defined as two or more separate ED visit records from the same individual. ED visit records were matched to individuals using medical record number. Each match represented a repeat visit for one person. RStudio was used to conduct Pearson's chi-square tests for sex, race, and 10-year age groups among both visit groups and to assess visit frequency among the repeat visit group. Results Between January 2015 and July 2018, 9,869 ED visits for opioid overdose were identified, of which 734 (7.4%) were repeat visits among 597 individuals occurring among 57 EDs. The proportion of individuals with repeated opioid overdose visits was significantly different compared to the proportion of individuals with a single opioid overdose visit by sex (male 66% vs. 61%) and age group (20-29 years 34% vs 30%) (p < 0.05). No significant difference was found by race. EDs had an average of 10 individuals who had repeated opioid overdose visits, with a range from 1 to 62 individuals. Individuals with repeated opioid overdose visits made on average 2.2 visits to EDs, with a range of 2 to 6 visits. The overdose visit rate among EDs ranged from 0.6 to 51.3 opioid overdoses per 100,000 ED visits, with four EDs having a rate greater than 40 opioid overdose visits per 100,000 ED visits. Conclusions Approximately 7% of ED visits during the study period for opioid overdose were identified as repeat visits using the medical record number. Individuals with repeated opioid overdose visits differed from those with a single opioid overdose visit with respect to sex and age. Repeated opioid overdose visits were disproportionately higher for males and individuals aged 20-29. Hospital utilization by individuals with repeated opioid overdose visits can provide information on which EDs or communities that may require further attention. Some limitations of this study are that the method utilized to identify individuals may result in an underestimation of repeat visits because limited personally identifying information was used to match visit records, and repeat visits that occurred before and after the study period would not be captured.

Roles of Health Literacy in Relation to Social Determinants of Health and Recommendations for Informatics-Based Interventions: Systematic Review

Abstract

Objective This abstract aims to: 1) describe human WNV infections in Harris County excluding the City of Houston, Texas, 2003 to 2018; 2) explore geographical distributions of WNV positive mosquito pools in relation to human cases; 3) provide a brief overview of the county's rigorous multidisciplinary WNV surveillance and control in mosquitoes and humans. Introduction West Nile virus (WNV) is the leading cause of autochthonous arboviral disease in the United States[1]. The virus is primarily spread to people through the bite of infected Culex species of mosquitos. WNV was first identified in Harris County, Texas, in 2002[2]. Since then, the mosquito-borne virus has become endemic in the region, with surges in 2012 and 2014. Although majority of individuals infected are asymptomatic, WNV induced neuroinvasive infections often result in hospitalizations and adverse outcomes[3-7], thus may pose a significant concern in public health and healthcare. The Harris County Public Health (HCPH) Surveillance and Epidemiology Unit (SEU) conducts surveillance of WNV in humans, in collaboration with Mosquito and Vector Control Division (MVCD) that monitors the virus in mosquito populations and birds. Mosquito abatement activities are implemented in areas where positive mosquitoes and human cases are identified. In this integrated model, clusters of WNV positive mosquito pools in relation with human cases provide comprehensive surveillance data to guide targeted efforts of mosquito control, disease prevention, and community education. Methods Surveillance data of human WNV cases and WNV tested mosquito pools 2003 to 2018 in Harris County excluding the City of Houston were used for the analysis. Human cases included were confirmed and probable cases. Frequencies, percentages, age-adjusted annual average rates were used to describe the data. Geographical locations of WNV positive mosquito pools and human cases were mapped and analyzed using ESRI ArcGIS to determine the spatial relationship between the positive mosquito pools and human cases. Space-Time analysis was performed on 16 years of human disease data using Scan statistics in SatScan™ to test the effect of time and identify significant geographical clusters of WNV cases over time, which revealed a statistically significant cluster in 2012 to 2014 in northwest of Harris County. Subsequently, human cases and WNV positive mosquito pools of 2012 to 2014 were selected for hotspot analysis to verify the results from Satscan analysis and visualize the geographical cluster. Human cases were aggregated into census tracts and analyzed by optimized hotspot method; the positive mosquito pools were geocoded using their intersection locations and analyzed by ESRI Getis-Ord Gi hotspot method. Results From 2003 to 2018, a total of 295 confirmed and probable human WNV cases were identified, including 217 neuroinvasive and 78 fever cases. The median age of patients was 58 years old; 64.8% were male. The onset of majority of the cases (80.7%) concentrated in July to September. Among case-patients, 72.9% were hospitalized, and 3.4% died. The annual average age-adjusted incidence rate of WNV was 0.7 per 100,000 during 2003 to 2018. However, the rate was 1.8 and 2.7 per 100,000 in 2012 and 2014, respectively. Over 68% of the cases clustered in west and northwest of the county. The annual WNV positive mosquito pools ranged from 0.2% to 10.2% amongst the years. The number of WNV positive mosquito pools in 2014 was more than 4 times higher than the average number during those years, the highest record in the County. Hot spots of human cases and the positive mosquito pools were both identified in northwest Harris County. There was a significant geographical overlap between human cases and the positive mosquito pools. The space-time analysis for the 16 years detected a significant high-risk cluster in 2012 to 2014 in northwest Harris County. Findings from optimized hotspot analysis on human cases are consistent with the results from SatScan analysis. Statistically significant hot spots of positive mosquito pools identified by Getis-Ord Gi hotspot analysis displayed highly overlay with the statistically significant cluster of human cases detected by Satscan space-time analysis. Conclusions WNV infection is underestimated. Studies suggest that every one case identified represent five infections [8-9]. Therefore, the actual number of cases is likely substantially higher. Clinicians should be alerted in WNV season and consider testing and reporting as early as possible, especially in neuroinvasive patients. The public should be encouraged to utilize personal protection, particularly during peak seasons. This analysis shows that GIS mapping and optimized hotspot analysis of WNV human cases in relation to positive mosquito pools can provide statistical evidences of areas most affected, thus inform targeted mosquito control, prevention and education strategies in people living in areas with high virus activitie References 1. Reimann CA, Hayes EB, DiGuiseppi C, et al. Epidemiology of neuroinvasive arbovrial disease in the United States, 1999-2007, Am J Trop Med Hyg, 2008:79:974-9. 2. Kristy M. Lillibridge, Ray Parsons, Yvonne Randle, et al. The 2002 introduction of West Nile virus into Harris county, Texas, an area historically endemic for St. Louis encephalitis 3. Mostashari F, Bunning ML, Kitsutani PT, et al. Epidemic West Nile encephalitis, New York, 1999: results of a household-based seroepidemiological survey. Lancet 2001;358:261-4. 4. Busch MP, Wright DJ, Custer B, et al. West Nile virus infections projected from blood donor screening data, United States, 2003. 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Roles of Health Literacy in Relation to Social Determinants of Health and Recommendations for Informatics-Based Interventions: Systematic Review

Abstract

Objecive This study was aimed at assessing the knowledge of malaria as well as perception and dispensing practices of antimalarials among vendors in Buea community Introduction Lack of knowledge of rational use of antimalarial drugs among dispensers is a serious problem, especially in areas of intense transmission thus increasing the risk of resistance and adverse drug reactions. Methods A community-based cross-sectional survey of a random sample of 140 drug vendors living within the Buea community was conducted between March and June 2017. Questionnaire was designed to obtain information from drug vendors on the general knowledge of malaria as well as dispensing practices. Data were analyzed using SPSS Statistics 20.0 and were considered significant at P ≤ 0.05 Results Knowledge of malaria symptoms, transmission, and prevention was reasonable among 55.8% (77) of the respondents. Only 33.6% (47) of the respondents could attribute the cause of malaria to protozoan of genus Plasmodium species. Of the 140 vendors, 115(82.7%) prescribe antimalarial drugs. The knowledge of the national protocol was malaria case management among dispensers was 35.0%. Vendors in hospital/community pharmacies were 2.4 times (OR = 3.14, 95% CI: 4.14 - 8.74, P < 0.001). more knowledgeable about malaria treatment protocol than those of in drugstores. The prevalence of self-prescription of antimalarials was 39.3%. Self-prescription was significantly higher in drugstores than hospital/community pharmacies (P=0.004). In all, 56(40.6%) of vendors showed good practices regarding antimalarial drug dispensing with majority (51.7%) from community pharmacies (OR=2.27,95% CI: 1.13-4.56). Conclusions Findings reveal moderate knowledge of malaria but poor prescription and dispensing practices of antimalarial drugs among vendors, thus indicating a need for routine monitoring and evaluation to prevent emergence of resistant strains to current efficacious antimalarials

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Roles of Health Literacy in Relation to Social Determinants of Health and Recommendations for Informatics-Based Interventions: Systematic Review

Abstract

Objective During this session, participants will be able to understand how Harris County Public Health utilized data to make informed decisions on how to combat the influenza season. Introduction The 2017 – 2018 influenza season was classified by the Centers for Disease Control and Prevention (CDC) as 'high severity' across all age groups. Furthermore, CDC noted that this was the first year to be categorized as such, with the highest peak percentage of influenza-like-illnesses (ILI), since 2009. In Harris County alone, there were 2,665 positive flu tests reported in comparison to the previous season at 1,395 positive tests. In response to the severity of this year's flu season, Harris County Public Health (HCPH) collaborated across the department to deploy five pop up influenza vaccination events utilizing our Mobile Fleets open to the general public. HCPH epidemiologists are able to collect influenza data from multiple systems and compile it into useful reports/tools. These data include latitudinal and longitudinal data, allowing us to create highly localized maps of where influenza has had impacted communities the hardest. This granular data allowed HCPH to target 5 areas with our Mobile Fleet that had a) high levels of influenza and b) generally limited healthcare/public health infrastructure. Our Mobile Fleet is made up of 8 different Recreational Vehicles that have been retrofitted to offer various public health services including: immunizations, medical visits, dental visits, pet adoptions, mosquito and vector control education, and a fresh food market. The Fleet allows HCPH to offer a full menu of public health services anywhere within the County. While our efforts for this abstract were focused on controlling the influenza outbreak, we leveraged the opportunity to engage with the public on multiple issues such as environmental, veterinary, mosquito control, dental health, and accessible healthy food options. Methods As positive flu reports mounted, our epidemiology program provided surveillance data of influenza and ILI in Harris County. Data was obtained through multiple sources including: National Electronic Disease Surveillance System (NEDSS), which includes electronic laboratory reporting; National Respiratory Enteric Virus Surveillance System (NREVSS), which includes all flu tests done in laboratories in Houston; and last, the Flu Portal, which school nurses in Harris County upload school absenteeism rates due to ILI. Once collected and compiled, our Geographic Information System (GIS) team used the data to generate spatial maps of Harris County illustrating the disproportionly high rates. Specifically, our GIS team was able to utilize ArcGIS, and cross layer them with the flu data provided from the epidemiologists. Utilizing these maps, HCPH leadership mobilized the preparedness team to lead a data driven response in five different zip codes throughout the county to hold the influenza vaccination events. Results The Mobile Fleet was operational on five separate dates in five separate zip codes during February and March of 2018. Overall, 477 individuals were provided the influenza vaccine. Of those 477, 304 were 18 years or older, with 173 being under 18 years of age. Conclusions Having timely and actionable data is an essential first step to understand and stop an outbreak of any size. However, surveillance data alone won"t prevent an outbreak from spreading. That data must be married to effective public health action. Our Mobile Fleet is able to deliver precision public health services by targeting communities most affected and vulnerable to the spread of disease. As surveillance geospatial data becomes more granular so too must our public health service delivery modes become more precise and targeted.

Roles of Health Literacy in Relation to Social Determinants of Health and Recommendations for Informatics-Based Interventions: Systematic Review

Abstract

Objective In order to track progress towards TB goals, we investigated the legal framework for disease surveillance, specifically policy changes for TB surveillance in Mongolia during the MDGs and the SDGs era. Introduction Mongolia is one of countries in the WHO Western Pacific Region with a high TB burden. The National Stop TB Strategy 2010-2015 implemented and developed strong surveillance and response system in the country. However, new TB incidence and deaths have not decreased significantly.Political commitment is critical for effective TB surveillance and that commitment can be demonstrated by a country's legal framework, which governs the practice of prevention and control. Therefore, this study is aimed at investigating the legal underpinnings for disease surveillance to help identify what policy changes have occurred in Tuberculosis surveillance. Methods We conducted a literature review that included government strategy, programme guidelines and procedures, to examine the overall disease surveillance system in Mongolia, and used a framework analysis to investigate operation of the TB surveillance system (CDC 2001 guideline). First, nine of core functions and six of support functions for the TB surveillance system were placed on the Y axis, and the national TB strategies, programme, guidelines and procedures were placed on the X axis. Next, the strategies, programme, guidelines and procedures were unpacked and allocated to cells based on whether they were consistent with the essential functions of the surveillance system. These data points were then used to develop a matrix to enable understanding of correspondence and changes between the legal documents during MDGs to SDGs. Results Result 1. Mongolia has an Emerging Disease Surveillance and Response unit and A National Centre for Communicable Disease responsible for implementing the International Health Regulations in the country. The legal framework for the surveillance system was updated regularly and overall, 11 legal instruments were identified. Result 2. However, currently there is no specific national TB strategy since 2015. Recently, National Programme of Prevention and Control on Communicable disease 2017-2020 and Guidelines for TB Care 2017 were approved. The result of framework analysis shows that during MDGs era, the legal documents had weaknesses that were related to "feedback" from the core and "training and resources" from the support functions. On other hand, the weaknesses of the legal documents for SDGs were related to "outbreak preparedness and response" from the core and "training and supervision" from the support functions. Conclusions There is an urgency to update the legal framework to enable a comprehensive strategy specifically for TB surveillance nationwide. Also, additional studies should be done continuously and should incorporate other parts of the assessment, including co-ordination, laboratories,to help determine the factors that influence the overall structure of Tuberculosis surveillance in the country.

Roles of Health Literacy in Relation to Social Determinants of Health and Recommendations for Informatics-Based Interventions: Systematic Review

Abstract

Objective To quantify the effects of climate variability, selected remotely-sensed environmental factors on human leptospirosis in the high-risk counties in China. Introduction Leptospirosis is a zoonotic disease caused by the pathogenic Leptospira bacteria and is ubiquitously distributed in tropical and subtropical regions. Leptospirosis transmission driven by complex factors include climatic, environmental and local social conditions 1. Each year, there are about 1 million cases of human leptospirosis reported globally and it causes approximately 60,000 people lost their lives due to infection 2. Yunnan Province and Sichuan Province are two of highly endemic areas in the southwest China that had contributed for 47% of the total national reported cases during 2005-2015 3. Factors underlying local leptospirosis transmission in these two areas is far from clear and thus hinder the efficacy of control strategies. Hence, it is essential to assess and identify local key drivers associated with persistent leptospirosis transmission in that areas to lay foundation for the development of early-warning systems. Currently, remote sensing technology provides broad range of physical environment data at various spatial and temporal scales 4, which can be used to understand the leptospirosis epidemiology. Utilizing satellite-based environmental data combined with locally-acquired weather data may potentially enhance existing surveillance programs in China so that the burden of leptospirosis could be reduced. Methods This study was carried out in two counties situated in different climatic zone in the southwestern China, Mengla and Yilong County (Fig 1). Total of 543 confirmed leptospirosis cases reported during 2006-2016 from both counties were used in this analysis. Time series decomposition was used to explore the long-term seasonality of leptospirosis incidence in two counties during the period studied. Monthly remotely-sensed environmental data such as normalized difference vegetation index (NDVI), modified normalized water difference index (MNDWI) and land surface temperature (LST) were collected from satellite databases. Climate data include monthly precipitation and relative humidity (RH) data were obtained from local weather stations. Lagged effects of rainfall, humidity, normalized difference vegetation index (NDVI), modified normalized difference water index (MNDWI) and land surface temperature (LST) on leptospirosis was examined. Generalized linear model with negative binomial link was used to assess the relationships of climatic and physical environment factors with leptospirosis. Best-fitted model was determined based on the lowest information criterion and deviance. Results Leptospirosis incidence in both counties showed strong and unique annual seasonality. Bi-modal temporal pattern was exhibited in Mengla County while single epidemic curve was persistently demonstrated in Yilong County (Fig 2). Total of 10 and 20 models were generated for Mengla and Yilong County, respectively. After adjusting for seasonality, final best-fitted models indicated that rainfall at lag of 6-month (incidence rate ratio (IRR)= 0.989; 95% confidence interval (CI) 0.985-0.993, p<0.001) and current LST (IRR=0.857, 95%CI:0.729-0.929, p<0.001) significantly associated with leptospirosis in Mengla County (Table 1). While in Yilong, rainfall at 1-month lag, MNDWI (5-months lag) and LST (3-months lag) were associated with an increased incidence of leptospirosis with a risk ratio of 1.013 (95%CI: 1.003-1.023), 7.960 (95%CI: 1.241-47.66) and 1.193 (95%CI:1.095-1.301), respectively. Conclusions Our study identified lagged effect and relationships of weather and remotely-sensed environmental factors with leptospirosis in two endemic counties in China. Rainfall in combination with satellite derived physical environment factors such as flood/water indicator (MNDWI) and temperature (LST) could help explain the local epidemiology as well as good predictors for leptospirosis outbreak in both counties. This would also be an avenue for the development of leptospirosis early warning system in to support leptospirosis control in China. References 1. Haake, D. A. , Levett, P. N. Leptospirosis in humans. Current Topics in Microbiology and Immunology 2015, 387, 65-97. 2. Costa, F. et al. Global Morbidity and Mortality of Leptospirosis: A Systematic Review. PLOS Neglected Tropical Diseases 2015, 9, e0003898. 3. Dhewantara, P. W. et al. Epidemiological shift and geographical heterogeneity in the burden of leptospirosis in China. Infectious Diseases of Poverty 2018, 7, 57. 4. Herbreteau, V., Salem, G., Souris, M., Hugot, J. P. & Gonzalez, J. P. Thirty years of use and improvement of remote sensing, applied to epidemiology: from early promises to lasting frustration. Health & Place 2007, 13, 400-403.

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Roles of Health Literacy in Relation to Social Determinants of Health and Recommendations for Informatics-Based Interventions: Systematic Review

Abstract

Objective To evaluate the relationship between test positivity rate and test-confirmed malaria case rate both in time and space, to provide better understanding of the utility and representativeness of HMIS data for changing malaria burden in endemic settings. Introduction Routine surveillance is an important global strategy for malaria control. However, there have been few studies comparing routine indicators of burden, including test positivity rate (TPR) and test-confirmed malaria case rates (CMCR), over spatial and temporal scales. Methods We studied the relationship between these indicators in children under 11 years, presenting with suspected malaria at outpatient department clinics in three health facilities in locations of varying transmission across Uganda. We evaluated trends in each indicator over time (month) and space (by village) and explored the relationship between them using multivariable regression models. Results Overall, 65,710 participants visited the three clinics during the study period. Pairwise relationships between TPR and CMCR showed good agreement over time, particularly for TPR's below 50% and during low transmission seasons, but the relationship was complex at the village level. Village mean annual TPR remained constant while CMCR was drastically reduced with increased distance from health facility, highlighting health care access' importance. The forth quartile of distance from the health facility, relative to the first, was associated with reduction in CMCR with IRR of 0.40 (95% CI: 0.23-0.63; p=0.001), 0.55 (0.40-0.75; p<0.001), and 0.25 (0.12-0.51; p<0.001) for Nagongera, Kihihi, and Walukuba respectively. Regression analysis results emphasized a non-linear (cubic) relationship between TPR and CMCR, after accounting for month, village, season and demographic factors. Conclusions Altogether, these results suggested a strong non-linear relationship between the two indicators regardless of transmission setting. However, the current malaria surveillance system in Uganda may under-represent burden from patients living furthest from sentinel health facilities.

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Roles of Health Literacy in Relation to Social Determinants of Health and Recommendations for Informatics-Based Interventions: Systematic Review

Abstract

Objective To describe the methodology of the National Institute for Occupational Safety and Health (NIOSH) system for national surveillance of health-related workplace absenteeism among full-time workers in the United States and to present initial findings from October through July of the 2017–2018 influenza season. Introduction During an influenza pandemic, when hospitals and doctors' offices are—or are perceived to be—overwhelmed, many ill people may not seek medical care. People may also avoid medical facilities due to fear of contracting influenza or transmitting it to others. Therefore, syndromic methods for monitoring illness outside of health care settings are important adjuncts to traditional disease reporting. Monitoring absenteeism trends in schools and workplaces provide the archetypal examples for such approaches. NIOSH's early experience with workplace absenteeism surveillance during the 2009–2010 H1N1 pandemic established that workplace absenteeism correlates well with the occurrence of influenza-like illness (ILI) and significant increases in absenteeism can signal concomitant peaks in disease activity. It also demonstrated that, while population-based absenteeism surveillance using nationally representative survey data is not as timely, it is more valid and reliable than surveillance based on data from sentinel worksites.1 In 2017, NIOSH implemented population-based, monthly surveillance of health-related workplace absenteeism among full-time workers. Methods Each month, NIOSH updates an influenza season-based time series of health-related workplace absenteeism prevalence among full-time workers with the previous month's estimate (i.e., with a 1-month lag). Data for this surveillance system come from the Current Population Survey (CPS), a monthly national survey of approximately 60,000 households administered by the Bureau of Labor Statistics. The CPS collects information on employment, demographics and other characteristics of the noninstitutionalized population aged 16 years or older. A full-time worker is defined as an employed person who reports that they usually work at least 35 hours per week. Health-related workplace absenteeism is defined as working fewer than 35 hours during the reference week due to the worker's own illness, injury, or other medical issue. Because the CPS questions refer to one week of each month, absenteeism during the other weeks is not measured. These one-week measures are intended to be representative of all weeks of the month in which they occur. Monthly absenteeism prevalence estimates for the current influenza season are compared to an epidemic threshold defined as the 95% upper confidence limit of a baseline established using data from the previous five seasons aggregated by month. Point estimates that exceed the epidemic threshold signal surveillance warnings; estimates whose lower 95% confidence limits exceed the epidemic threshold generate surveillance alerts. Estimates of total absenteeism are calculated as are estimates stratified by sex, age group, geographic region (HHS service regions), and occupation. All analyses are weighted using the CPS composite weight and estimates of all standard errors are adjusted to account for the complex design of the CPS sample. Results During the period October 2017 through July 2018, the prevalence of health-related workplace absenteeism among full-time workers began at 1.7% (95% CI 1.6–1.8%) in October, increased sharply beginning in November, peaked in January at 3.0% (95% CI 2.8–3.2%), and declined steadily thereafter to end at a low of 1.4% (95% CI 1.3–1.5%) in July. The January absenteeism peak significantly exceeded the epidemic threshold, signaling a surveillance alert. Absenteeism remained elevated in February, but not significantly, signaling a surveillance warning. (Figure 1) Peak absenteeism in the 2017-2018 influenza season exceeded that of all of the five previous seasons except the 2012-2013 season. (Figure 2) Analyses stratified by sex generated surveillance alerts for male workers in January and February. Surveillance alerts were also signaled for the following strata: workers aged 45–64 years in January and February; workers in HHS Region 6 in January and February and Region 9 in December and March; and workers in management, business, and financial occupations and installation, maintenance, and repair occupations in January and in production and related occupations in February. Unlike surveillance alerts, the numerous surveillance warnings generated in stratified analyses are not reported due to small sample sizes in several strata. Conclusions Results of initial analyses for the 2017–2018 influenza season indicate that, among full-time workers in the United States, the prevalence of health-related workplace absenteeism began to increase in November, peaked in January and was significantly higher than the average of the previous five seasons. These findings are consistent with official characterizations of 2017–2018, based on traditional ILI, hospitalization, and virologic surveillance data, as a high severity season that accelerated in November and peaked in January and February.2,3 Analyses further suggest that male workers; workers aged 45–64 years; workers living in HHS Regions 6 and 9; and those working in management, business, and financial; installation, maintenance, and repair; and production and related occupations may have been especially impacted. While not timely enough to serve as an early warning system, population-based workplace absenteeism is, nevertheless, a useful syndromic measure of a pandemic's impact on the working population. It also provides information that can be used to maintain health situational awareness during the inter-pandemic period, to evaluate the impact of pandemic control measures, and to inform future pandemic preparedness and response planning. Absenteeism surveillance can provide an important supplementary measure of a pandemic's overall impact because morbidity and mortality statistics may not fully reflect the disruption caused to the social and economic life of the community. This is

especially true when disease makes people too sick to work but not sick enough to seek medical care. References 1. Groenewold MR, Konicki DL, Luckhaupt SE, Gomaa A, Koonin LM. Exploring national surveillance for health-related workplace absenteeism: Lessons learned from the 2009 Influenza Pandemic. Disaster Med Public Health Preparedness. 2013;7:160–166. 2. Garten R, Blanton L, Elal AI, et al. Update: Influenza Activity in the United States During the 2017–18 Season and Composition of the 2018–19 Influenza Vaccine. MMWR Morb Mortal Wkly Rep 2018;67:634–642. 3. World Health Organization. Review of the 2017–2018 influenza season in the northern hemisphere. Wkly Epidemiol Rec. 2018;34(93):429–444.

Roles of Health Literacy in Relation to Social Determinants of Health and Recommendations for Informatics-Based Interventions: Systematic Review

Abstract

Objective To assess the performance of neonatal tetanus surveillance in Bayelsa state of Nigeria. Introduction Neonatal tetanus (NT) though a preventable disease, remains a disturbing cause of neonatal morbidity and mortality particularly in low income countries where maternal and child care are substandard and antitetanus immunization coverage is still poor. The disease, which is mostly fatal, is particularly common in hard to reach and rural areas where deliveries take place at home or with untrained attendants without adequate sterile procedures and in unclean environment. Since eliminating NT became a global target, significant reductions in NT deaths have been reported. The most recent estimates by WHO (2015) put death of newborns due to NT at 34,019, a 96% reduction from the situation in the late 1980s. All countries are committed to "elimination" of maternal and neonatal tetanus (MNT), i.e., a reduction of NT incidence to below one case per 1000 live births per year in every district. A strong neonatal tetanus surveillance (NTS) is however required to achieve this. As of March 2018, only 14 countries were yet to eliminate MNT and this includes Nigeria. The different types of NTS recommended are conducted to varying degrees of efficiency and effectiveness in Nigeria under the major surveillance strategy – the Integrated Disease Surveillance and Response (IDSR). These include routine monthly surveillance, zero reporting, active surveillance and retrospective record review. Nigeria comprises six geopolitical zones, 36 states and a Federal Capital territory (FCT), and is made up of 774 Local Government areas (LGA) (districts) – an LGA being the lowest administrative level. This study was conducted in Bayelsa state – one of the six states in the south zone. It is made up of eight LGAs, more than half of which are riverine and consists of many hard-to-reach communities, where formal functional health facilities are few and far between. Health workers are in short supply and funding of health care delivery is poor in the state. Methods This was a retrospective review of all confirmed cases of neonatal tetanus that were managed at the two tertiary hospitals in the state - Niger Delta University Teaching Hospital Okolobiri (NDUTH), and Federal Medical Centre Yenagoa (FMC) - between January 2009 and December 2013. These were the only two public facilities that had the capacity to manage NT cases in the state. Relevant data including sociodemographics, pregnancy and birth history of patients, cord care and tetanus toxoid immunization of mothers were abstracted from the case files. The cases were traced to the office of the State Epidemiologist, where all cases were expected to be documented and investigated in line with the existing neonatal tetanus surveillance. Ethical approval was obtained from the Research and Ethics Committee of NDUTH for the research and permission was given to access case files. Results A total of 48 cases were managed in both facilities (36/75.0% in NDUTH and 12/25.0% in FMC) in the period under review but only 13 cases (27.1%) were reported to the office of the State Epidemiologist. Figure 1 shows the number of cases per year of review. The cases were resident in seven out of the eight LGAs. The mean age of cases was 8.98 (SD = 5.14) days and 29 (60.4%) were male while 19 (39.6%) were female. Available evidence showed that only 2.1% of the cases were protected at birth (mothers had TT2+); 91.7% of mothers did not have antenatal care and all the mothers were delivered by traditional birth attendants; 70.8% had their umbilical cord cut with new (?sterile) blade; and 43.8% had their cord treated with methylated spirit, others were treated with just water or some herbal preparation. Educational attainment of mothers of cases was primary (54.2%) and secondary (45.8%). Conclusions There were gaps in Neonatal Tetanus Surveillance in Bayelsa State as only 27.1% of cases were captured at the state level. Many mothers and their newborns were still not protected against tetanus, and delivery and cord care were done in unhygienic conditions. There is an urgent need to strengthen NT surveillance, improve vaccination against tetanus, and encourage skilled birth attendance in the state. References 1. WHO. Immunization, Vaccines and Biologicals: Tetanus. http://www.who.int/immunization/diseases/tetanus/en/. Accessed on 23 Jul 2018 2. WHO. Immunization, Vaccines and Biologicals: Maternal and Neonatal Tetanus Elimination (MNTE): The initiative and challenges.http://www.who.int/immunization/diseases/MNTE_initiative/en/ Accessed on 23 Jul 2018. 3. WHO. WHO-recommended standards for surveillance of selected vaccine-preventable disease. WHO. 2003 4. Bayelsa State Ministry of Health. Health facilities and their distribution across the Local Government Areas of Bayelsa State. 2010.

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Roles of Health Literacy in Relation to Social Determinants of Health and Recommendations for Informatics-Based Interventions: Systematic Review

Abstract

Objective The purpose is to propose a serial of approach for estimation for disease risk for ILI in \"small area\" and present the risk values by spatio-temporal disease mapping or an interactive visualization with HTML format. Introduction Disease mapping is a method used to descript the geographical variation in risk (heterogeneity of risk) and to provide the potential reason (factors or confounders) to explain the distribution. Possibly the most famous uses of disease mapping in epidemiology were the studies by John Snow of the cholera epidemics in London. Accurate estimation relative risk of small areas such as mortality and morbidity, by different age, ethnic group, interval and regions, is important for government agencies to identify hazards and mitigate disease burden. Recently, as the innovative algorithms and the available software, more and more disease risk index has been pouring out. This abstract will provide several estimation risk index, from raw incidence to model-based relative risks, and use visual approach to display them. Methods All the data are from a syndromic surveillance and real-time early warning system in the Yunnan province in the China. For brief introduction aim, we are using the ILI (Influenza-like illness) data in December 2017 in one county. The relative risks of disease in small area are including: raw incidence, a standardized morbidity ratio (SMR), Empirical Bayes smoothing estimation relative risk (EB-RR) and the Besag-York-Mollio model (BYM). The incidence in each small area is common used for descriptive the risk but fail to comparable directly since the different population at risk in each area. SMR is a good way to deal with this incomparability. But SMR can give rise to imprecisely estimate in areas with small populations. Empirical Bayes estimation approach has been used for smoothing purpose and can be seen as a compromise between relative risks and P-values. However, all above approaches are inept to have spatial or spatio-temporal structure in mind. BYM based the Bayesian inference can handle both the area-specific spatial structured component (such as intrinsic conditional autoregressive component) and the exchangeable random effect (unstructured component). All the analyses are implemented in the R software with INLA package (http://www.r-inla.org). The outcome of relative risk estimation with visual way and interactive maps showing are using ggplot2 and leaflet packages. Results 1, the spatio-temporal raw cases of ILI from 2017/12/01 to 2017/12/31 is Fig.1 2. the SMR and EB-RR estimation RR of ILI are in Fig.2 and Fig.3 3. the most excited is the interactive visualization with HTML format for all the risk indexes is visited http://rpubs.com/ynsxx/424814 in detail. And the screenshot is Fig.4 Conclusions Small area disease risk estimation is important for disease prevention and control. The faster function of computer with power R software can lead to advance in disease mapping, allowing for complex spatio-temporal models and communicate the results with visualization way.

Roles of Health Literacy in Relation to Social Determinants of Health and Recommendations for Informatics-Based Interventions: Systematic Review

Abstract

Objective The objectives were to understand the functioning of the local network of actors involved in the French bovine infectious diseases surveillance system and the influence of their organisation on data reporting from the field. Introduction Disease surveillance systems can be based on two components of surveillance: active surveillance in which the diseases are looked for on a regular basis in a defined population, and passive surveillance where the diseases are looked for whenever specific sanitary events are notified. The first type of surveillance is fundamental to detect clinically unexpressed infections and to estimate the prevalence of the disease in the global population. The second type of surveillance is essential to detect new disease cases as early as possible after their appearance, and necessitates a clinical expression of infections. Active surveillance is more complete but also takes more resources to be implemented. As for passive surveillance, although it has the advantage of sparing resources, it is subject to variability in data reporting according to the reporters. A recent study was conducted in France on a specific data reporting in veterinary public health: the declaration of bovine abortions1. It is the main clinical sign for some diseases that can have a serious economic impact on the production and that can be transmittable to humans. This study has highlighted individual obstacles to abortion declaration by farmers and veterinarians, but it has also shown that in different departments of France with the same bovine farming characteristics (similar types of production, mean sizes of the farms, density of farms, etc.), large differences could be observed regarding their abortion declaration rate (a department is a French administrative and territorial division covering a mean surface area of 5,800 km2). This result suggests that there is another level of factors influencing data reporting, different from the individual factors related to the characteristics of the farms. We formulated the hypothesis that these other factors were related to the local governance of animal health surveillance data collection. Our study was thus developed in the continuity of this previous research to explore the variation of data reporting in relation with the organisation of animal health surveillance actors of bovine production at the local level. In France, an official organisation chart sets how actors should act and interact with one another at the national, regional and departmental scales, and yet some differences can be observed at the departmental level, mostly regarding the relations between actors, due to a difference in the resources available for each actor according to the local context. Methods We used the methodology and tools of Sociology of Organisations 2. A series of 34 semi-structured interviews were conducted in spring and summer 2018 with the animal health surveillance actors of two French departments (respectively, 16 and 18 interviews). The two departments were chosen with similar bovine farming characteristics (both mixed production types, similar mean size and number of herds) in order to reduce the influence of this factor on data reporting. We also looked for different levels of data reporting, through their respective abortion declaration rates, based on the data available in a national database. In both departments, the interviewees were bovine farmers, rural veterinarians, representatives of farmers' and veterinarians' organisations and of departmental veterinary laboratories, departmental veterinary services and departmental councils (Figure 1). The material collected was analyzed by creating sociograms that characterized roles and interdependences between actors. Then, the underlying mechanisms were identified and related to the level of data reporting. Results Our results showed evidence of the central position of veterinarians in the network of actors, as all major surveillance actors needed either their expertise of veterinary medicine or their proximity to farmers as an important resource for their action. There was complementarity and good collaboration between veterinarians and the farmer health-support association in both departments. Nevertheless, veterinarians wanted to remain the reference actor in all farms regarding sanitary issues and they had an advantage over the farmer health-support association in one of the two departments studied, where the membership rate to the health-support association was less high. Veterinarians also had to face another form of competition, which was more obvious, from some farmer organisations and cooperatives that have an official delegation for the sale of veterinary medicine. In the two departments of the study, the place taken by these organisations on the medicine market was very different and so was the pressure exerted by this competition on veterinarians' activities. In one of the two departments studied, there was a specific form of organisation between veterinary clinics and farmers that materialised by an association between them. In this setting, they agreed on an annual package that covered the most frequent veterinary acts for a fixed price. The veterinarians of these associations also organised regular trainings for farmers, to enable them to dispense primary care to their animals. In these specific forms of organisation, there were a lot of exchanges and trust between farmers and their veterinarians, which diminished their asymmetry of competence (as typically observed in a patient-to-doctor relation), to approach a more collaborative relation. Conclusions These first results show interesting discrepancies at the local level between the forms of organisation and the nature and force of the relations between veterinary public health actors. In the following of the analysis, we will concentrate on the impact of these identified differences on the quality of data reporting. We aim to identify conditions that foster a fluent and sustainable communication of surveillance information between actors. These conditions would thus facilitate data reporting from the field, which is a key component of the surveillance systems, enabling a precocious detection of new disease infections. In public health

as well as veterinary public health, a better understanding of the local forms of organisation and the way they influence data circulation between actors helps creating and improving surveillance systems in a way that is more adapted to the field situations, sometimes different from what theory foresees. This is made possible by an interdisciplinary approach between sociology and epidemiology in disease surveillance. References 1. Bronner A, Hénaux V, Fortané N, Hendrikx P, Calavas D. Why farmers and veterinarians do not report all bovine abortions, as requested by the clinical brucellosis surveillance system in France? BMC Vet Res. 2014;10:93-104. 2. Friedberg E. Le pouvoir et la règle. Dynamiques de l'action organisée. ed. Paris: Le Seuil; 1993. French.

Roles of Health Literacy in Relation to Social Determinants of Health and Recommendations for Informatics-Based Interventions: Systematic Review

Abstract

Objective Discuss the power of utilizing DOD clinical ancillary services data for infectious disease surveillance, the steps used to mitigate pitfalls which may occur during the surveillance process, and the potential of adapting this data for surveillance of emerging infectious diseases. Introduction Military service members and their families work and live around the world where both endemic and emerging infectious diseases are common. Timely infectious disease surveillance helps to inform medical and policy decisions which ensure mission readiness and beneficiary health. The EpiData Center (EDC) at the Navy and Marine Corps Public Health Center has performed public health surveillance, including routine infectious disease monitoring among service members, their families, and others eligible for military medical benefits for the Department of the Navy (DON) and Department of Defense (DOD) since 2005. The EDC stores and maintains 15 databases totaling over 20 terabytes of health and administrative data. These include administrative data from outpatient encounters and inpatient admissions, Health Level-7 (HL7) formatted ancillary services data, and medical event reports. These data provide the potential for robust surveillance methodologies to monitor diseases of interest and identify trends and outbreaks. The primary intent and design of these data sources is not for disease surveillance, but rather for administrative and billing purposes. However, due to the availability of this data, it is routinely used by academic organizations, private industry, health systems, and government organizations to conduct health surveillance and research. Ancillary services data in particular can be very powerful for near-real time infectious disease surveillance in the DOD as the aggregated data is available within 1 to 2 days after processing. The EDC has demonstrated the value of using laboratory data for surveillance through outbreak detection and longitudinal health trends for specific diseases among select populations. The fact that this data is not designed for surveillance does present several pitfalls in regards to analysis, from issues ranging from free text interpretation to changing testing practices. These pitfalls can be mitigated through standardized processes and detailed quality assurance testing. The EDC has harnessed the power of available administrative health data to improve health outcomes and influence policy among military beneficiaries. Methods The EDC has established and validated methods for using and interpreting ancillary services data. Key steps involved in the process for infectious disease surveillance include: ● Reviewing diagnostic criteria; ● Defining relevant search terms and test types;- ● Consulting clinicians for technical input when needed; ● Developing algorithms using retrospective data; ● Developing quality checks; ● Automating the process to reduce daily workload; ● Documenting processes and methods. ● Variables essential to interpretation within ancillary services records are not standardized across the DOD. Several pitfalls can occur during the surveillance process due to complexities related to free text, layout of the full results, and differences between laboratory practices. Typically, these pitfalls can be grouped into one of the following categories: ● Data irregularities that include unexpected abbreviations and numerous misspellings; this may result in misclassification or missed cases. ● Data changes resulting from shifts in testing practices due to new or discontinued laboratory tests, or differing data entry methods. ● Classification challenges for diseases that require sequential testing or clinical compatibility information, which limits the ability to positively identify cases. However, records can be identified as 'suspect cases' (i.e., syphilis, Lyme disease, varicella, yellow fever and others). ● Technical issues, at the medical facility, server, or EDC level, often causes lapses in data, which results in a delay in case reporting. Despite these pitfalls, their impact can be mitigated by routinely reviewing algorithms, employing data analytic techniques that account for likely misspellings and abbreviations, and incorporating data quality checks that flag unexpected or unclassifiable results. Outside of automated processes, human interaction is important; EDC analysts must remain astute and vigilant to investigate unusual or unexpected occurrences, shifts in the volume of cases or data. Results Due to the pitfalls outlined, the EDC has developed powerful and robust methods to circumvent the issues of using administrative health data for near real-time clinical ancillary services based disease surveillance. The methods developed to address the pitfalls of working with administrative health data have been used in the daily active surveillance of over fifty reportable infectious diseases, weekly surveillance of influenza, and monthly surveillance of malaria and tuberculosis. In addition to using these methods for routine surveillance, the EDC adapts this methodology for new reports for specific concerns. Further, the EDC continues to develop and adapt these methodologies to quickly address emerging infectious threats and the pitfalls associated with the data. Pharmacy transactions and administrative data from outpatient encounters and inpatient discharges supplement and enhance laboratory-based surveillance, particularly when only a diagnosis or presumptive treatment occurs (such as with influenza). While this method provides timely information, built in quality assurance checks and routine reviews of algorithms must occur to address changes in testing practices, the use of new tests, variation in laboratory technician entry of results, and to ensure data integrity. Conclusions The EDCs comprehensive surveillance provides the DON and DOD leadership and preventive medicine community with the ability to monitor and respond to ongoing and emerging infectious disease threats. While the primary purpose of administrative health data is not for health surveillance, the EDC has recognized the rich source of health information which may be extracted from this data. Processes have been developed to mitigate

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the pitfalls that may occur when administrative data is adapted for health surveillance. This data provides a real-time snapshot of the health of military beneficiaries and provides awareness of possible outbreaks, health trends, and geographic hotspots. Beyond routine surveillance this data has the potential to be used to rapidly create new methodologies to detect emerging infections which can be combined with other data sources, such as pharmacy transactions and medical encounters, to provide a more robust picture of cases by accounting for variance in clinical practice. This data often guides military health policy and procedures and is essential for a medically ready force.

Roles of Health Literacy in Relation to Social Determinants of Health and Recommendations for Informatics-Based Interventions: Systematic Review

Abstract

Objective ● To describe findings from the joint collaborative between the Houston Health Department and Houston-based hospitals ● To promote cross sectional partnerships and collaborations across health agencies Introduction Asymptomatic Bacteriuria (ASB) is defined as the presence of bacteria in the urine of a patient without signs or symptoms of a urinary tract infection (UTI). It is one of the most common reasons for inappropriate antibiotic use in hospitalized patients. Without efforts to check inappropriate use, our communities could see increased numbers of highly resistant bacterial pathogens contributing to the public health threat of antimicrobial resistance. Treatment itself may be associated with subsequent antimicrobial resistance, adverse drug effects, and cost.The Houston Health Department (HHD) has made it a priority to address antibiotic resistance and stewardship by working collaboratively with members of the healthcare community to address this patient safety issue. As such HHD, in conjunction with infectious diseases experts from the HHD Antimicrobial Stewardship Executive Committee formed a joint learning collaborative to work on an asymptomatic bacteriuria stewardship project. The goal of the project was to engage with healthcare professionals across facilities within the Houston area to work collaboratively to help reduce unnecessary testing and treatment of ASB. Methods The project is a joint learning collaborative between HHD and selected acute care facilities within the City of Houston. Space was limited to no more than 8 hospitals and enrollment occurred on a first come, first serve basis. Activities conducted as part of the project included a Project Launch meeting held at HHD that was attended by participants, education by project subject matter experts (SMEs), monthly calls with SMEs to provide case-based feedback and intervention tools. The project launch meeting included a brief overview of the project, review of an asymptomatic bacteruria algorithm (referred to as "Kicking UTI" algorithm), instructions on how to classify cases, project timeline and plan implementation. The project timeline was 8 months (this included the Kick off Meeting in month 1, data collection in months 2-4, intervention period during months 5-7, preliminary report in month 4 and final report at month 8. Participants were encouraged to do the interventions in one area (e.g. Emergency Room or a single ward) vs. institution wide. Intervention tools provided included a case classification form with instructions, an electronic form that was pre-formatted for local data collection (using Microsoft Access), and project launch worksheet. The project launch worksheet asked participants about their goals for the project, areas of desired improvements, units/wards to be targeted and key members of the project (e.g. executive champion, project champion, and active participants) at their facility. The agenda for the monthly calls included discussing data collection (i.e. number of cases classified), SME review of challenging cases, and utilization of education and project tools. Finally, onsite visits by the SMEs and HHD representatives were offered to participants to increase local site engagement. Results Seven acute care hospitals and 1 rehabilitation facility were enrolled in the collaborative. Participants from the institutions included 11 clinical pharmacists and one nurse. Half of the participants originally targeted emergency departments (ED). The remaining participants conducted interventions on the medical/surgical wards and one facility conducted interventions on the brain injury floor. Additional activities were adapted and added throughout the program period. These included: 1) choice of ward versus ED 2) targeted providers (working with mid-level providers to discourage standard urine testing in the emergency department) and 3) strategies for education. Strategies for education included utilizing nurse practitioners to educate nurses, designing project marketing tools (flyers, posters, and pocket cards), pharmacy rounds, resident orientation and one-to-one education. Site visits were conducted at 3 facilities and included a range of interventions from 1:1 peer to peer discussions to large presentations to medical staff. Outcomes for 3 sites included Pre-project ASB treatment rates of 61% and Post project ASB treatment rates of 24%, representing a 37% decrease in ASB treatment for these sites. In addition, two health systems that participated in the study utilized the information obtained from the project to work with their laboratory departments to change testing practices by increasing the threshold of urine white blood cells required in the sample before reflex to testing for the presence of bacteria. Conclusions This project showed that collaboration between a city Health Department and local institutions can be successful in reducing the overtreatment of ASB. HHD facilitated collaboration, assisted with eliminating barriers to knowledge sharing and served as a partner in setting transparent goals. A cross disciplinary approach to promoting patient safety indirectly lead to gains in public health. In person interaction between the Health Department, SMEs, and representatives from local facilities helped to increase engagement throughout the project. The results of this project will be shared on the Health Department website as a way of forging community practices and stretching the role of the health department to serve as an advocate for public health and patient safety. Future projects would benefit from having increased participation from facillity stakeholders to promote institutional sustainability.

Roles of Health Literacy in Relation to Social Determinants of Health and Recommendations for Informatics-Based Interventions: Systematic Review

Abstract

Objective Sentinel physician surveillance in the communities has played an important role in detecting early aberrations in epidemics. The traditional approach is to ask primary care physicians to actively report some diseases such as influenza-like illness (ILI), and hand, foot, and mouth disease (HFMD) to health authorities on a weekly basis. However, this is labor-intensive and time-consuming work. In this study, we try to set up an automatic sentinel surveillance system to detect 23 syndromic groups in the communites. Introduction In December 2009, Taiwan's CDC stopped its sentinel physician surveillance system. Currently, infectious disease surveillance systems in Taiwan rely on not only the national notifiable disease surveillance system but also real-time outbreak and disease surveillance (RODS) from emergency rooms, and the outpatient and hospitalization surveillance system from National Health Insurance data. However, the timeliness of data exchange and the number of monitored syndromic groups are limited. The spatial resolution of monitoring units is also too coarse, at the city level. Those systems can capture the epidemic situation at the nationwide level, but have difficulty reflecting the real epidemic situation in communities in a timely manner. Based on past epidemic experience, daily and small area surveillance can detect early aberrations. In addition, emerging infectious diseases do not have typical symptoms at the early stage of an epidemic. Traditional disease-based reporting systems cannot capture this kind of signal. Therefore, we have set up a clinic-based surveillance system to monitor 23 kinds of syndromic groups. Through longitudinal surveillance and sensitive statistical models, the system can automatically remind medical practitioners of the epidemic situation of different syndromic groups, and will help them remain vigilant to susceptible patients. Local health departments can take action based on aberrations to prevent an epidemic from getting worse and to reduce the severity of the infected cases. Methods We collected data on 23 syndromic groups from participating clinics in Taipei City (in northern Taiwan) and Kaohsiung City (in southern Taiwan). The definitions of 21 of those syndromic groups with ICD-10 diagnoses were adopted from the International Society for Disease Surveillance (https://www.surveillancerepository.org/icd-10-cm-master-mapping-reference-table). The definitions of the other two syndromic groups, including dengue-like illness and enterovirus-like illness, were suggested by infectious disease and emergency medicine specialists. An enhanced sentinel surveillance system named "Sentinel plus" was designed for sentinel clinics and community hospitals. The system was designed with an interactive interface and statistical models for aberration detection. The data will be computed for different combinations of syndromic groups, age groups and gender groups. Every day, each participating clinic will automatically upload the data to the provider of the health information system (HIS) and then the data will be transferred to the research team. This study was approved by the committee of the Institutional Review Board (IRB) at Academia Sinica (AS-IRB02-106262, and AS-IRB02-107139). The databases we used were all stripped of identifying information and thus informed consent of participants was not required. Results This system started to recruit the clinics in May 2018. As of August 2018, there are 89 clinics in Kaohsiung City and 33 clinics and seven community hospitals in Taipei City participating in Sentinel plus. The recruiting process is still ongoing. On average, the monitored volumes of outpatient visits in Kaohsiung City and Taipei City are 5,000 and 14,000 per day. Each clinic is provided one list informing them of the relative importance of syndromic groups, the age distribution of each syndromic group and a time-series chart of outpatient rates at their own clinic. In addition, they can also view the village-level risk map, with different alert colors. In this way, medical practitioners can know what's going on, not only in their own clinics and communities but also in the surrounding communities. The Department of Health (Figure 1) can know the current increasing and decreasing trends of 23 syndromic groups by red and blue color, respectively. The spatial resolution has four levels including city, township, village and clinic. The map and bar chart represent the difference in outpatient rate between yesterday and the average for the past week. The line chart represents the daily outpatient rates for one selected syndromic group in the past seven days. The age distribution of each syndromic group and age-specific outpatient rates in different syndromic groups can be examined. Conclusions Sentinel plus is still at the early stage of development. The timeliness and the accuracy of the system will be evaluated by comparing with some syndromic groups in emergency rooms and the national notifiable disease surveillance system. The system is designed to assist with surveillance of not only infectious diseases but also some chronic diseases such as asthma. Integrating with external environmental data, Sentinel plus can alert public health workers to implement better intervention for the right population.
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Roles of Health Literacy in Relation to Social Determinants of Health and Recommendations for Informatics-Based Interventions: Systematic Review

Abstract

Objective We assesed the feasibility of a zoonotic disease surveillance system through the current EHR (ROVR) for all POAs and GOAs. Additionally, we conducted a retrospective observational study querying and collecting reported zoonoses of interest, for 2017. Introduction Dogs, cats and other companion animals have played an integral role in many aspects of human life. Human and companion animal (CAs) interactions have a wide range of benefits to human health1–3. The threat of zoonotic transmission between CAs and humans is exacerbated by proximity (56% of dog owners and 62% of cat owners sleep with their animal next to them4) and the number of diseases CAs share with humans. Many of these highlighted zoonoses are spread by direct contact, and others are vector-transmitted (e.g., fleas, ticks, flies, and mosquitos). Within the realm of the One-Health concept, CAs can serve multiple roles in zoonotic transmission chains between humans and animals. They can serve as intermediate hosts between wildlife reservoirs and humans, or as possible sentinel or proxy species for emerging diseases5. Given the large number of CAs within the United States (estimated 72 million pet dogs, 81 million pet cats), understanding and preventing the diseases prevalent in CA populations is of utmost importance. Biosurveillance is a critical component of One Health initiatives including zoonotic disease mitigation and control. As Lead Service for Veterinary Animal and Public Health Services, the Army has a responsibility to champion biosurveillance efforts to support One Health initiatives, improving Servicemember, family, and retiree health across the Joint Force. Additionally, with military personnel experiencing apparent increased rates of job-reducing ailments such as diarrheal, bacterial and viral disease6–8, it is essential that the Army focus on maximizing their operational potential by minimizing the amount of time personnel are sick from these transmissible diseases and observing potential sources of infection. By observing the zoonotic disease burden in privately owned (POAs) and government-owned (GOAs) animals, public health investigators can increase focus on what transmittable diseases are at greatest risk of being spread from companion animals to military personnel. To address this potential source of infection, the Department of Defense (DoD) sought and continues to seek to establish a centralized and integrated veterinary zoonotic surveillance system to provide Commanders with a clear picture of disease burden9. With this assigned responsibility, the Army Veterinary Service (VS) seeks to centralize and enhance surveillance efforts through the Remote Online Veterinary Record (ROVR) Electronic Health Record (EHR), an enterprise web-based application to support the Army VS, accurately establishing a zoonotic epidemiological baseline and sustaining consistent future reporting. Methods Through a requested effort and proof of concept, the Army Public Health Center's (APHC) One Health Division tested the feasibility of a zoonotic disease surveillance system through the current EHR (ROVR) for all POAs and GOAs. We obtained one year (2017) worth of zoonotic encounters of interest through ROVR, querying a population of roughly 202,000 animals (n=202,217). We conducted a retrospective observational study comparing reported zoonoses of interest between CA populations. Maximum Likelihood Estimations of frequency detailed comparisons of frequency and prevalence between GOAs and POAs, within the ROVR EHR. Additionally, we evaluated the accuracy of surveillance data queried, proposed potential metrics and dashboards for commanders and stakeholders to easily observe zoonotic burden of companion animals and developed potential courses of action for future tools, collaborations, and educational interventions. Results Of the 512 collected zoonotic encounters, Giardia and Hookworm were the two most prevalent zoonoses overall, with 4.23 and 5.43 cases per 10,000 outpatient visits (OPVs), respectively. We observed a significant differential frequency of Giardia and Hookworm between GOAs and POAs (63% (CI: 54.6-71.4) vs 12.7% (CI: 9.7-16.1) and 2.5% (CI: 0.1-5.9) vs 41.9% (CI: 37.1-46.8) of all queried zoonotic diseases of interest, respectively). In addition to back-end database and querying improvements, we suggested the development of an educational intervention based at Army First-Year Graduate Veterinary Education program (FYGVE) locations to emphasize the important benefits of capturing zoonotic diseases of interest correctly, early stages in the clinical experience. The intervention would focus on increasing accurate data capture with the ultimate goal of a phased regional rollout through education and colloabortive buy-in. Conclusions From these results and recent CDC guidance of data-driven surveillance, we've proposed a phased surveillance development plan focused on systematic data collection, collaboration, and evaluation. Our idenftied overexpressed zoonoses will focus our efforts on tracking Giardia and Hookworm through multi-year trends. This assessment and proof of concept allows for illumination of gaps and limitations within the Army VS to effectively track the zoonotic burden of GOA and POA populations. Our current and future work will look to close surveillance gaps and help identify potential routes of transmission from companion animals to humans. References 1. Edney AT. Companion animals and human health: an overview. J R Soc Med. 1995 Dec;88(12):704p-708p. 2. Wells DL. The Effects of Animals on Human Health and Well-Being. Journal of Social Issues. 2009 Sep 1;65(3):523–43. 3. O'Haire M. Companion animals and human health: Benefits, challenges, and the road ahead. Journal of Veterinary Behavior: Clinical Applications and Research. 2010 Sep 1;5(5):226–34. 4. Krahn LE, Tovar MD, Miller B. Are Pets in the Bedroom a Problem? Mayo Clinic Proceedings. 2015 Dec 1;90(12):1663–5. 5. Day MJ, Breitschwerdt E, Cleaveland S, Karkare U, Khanna C, Kirpensteijn J, et al. Surveillance of Zoonotic Infectious Disease Transmitted

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Roles of Health Literacy in Relation to Social Determinants of Health and Recommendations for Informatics-Based Interventions: Systematic Review

Abstract

Objective 1. To quantify the burden of perinatal hepatitis C (HCV) exposure and examine the geographic variation in Tennessee (TN). 2. Develop new surveillance strategies for retrospective tracking of perinatal HCV exposures. Introduction Hepatitis C virus (HCV) infections are increasing nationwide and are of particular concern in Tennessee, especially among individuals of reproductive age.1,2 Maternal HCV status reported on the birth certificate reveals that the rate of HCV among women giving birth in TN increased 163% from 2009-2014.3 Further, a 2017 TN Department of Health (TDH) study found that 30% of reproductive aged women with newly reported chronic HCV in TN were determined to be pregnant. While current treatment options are not recommended for children under 12, it is critical to identify an infant's HCV status in order for him/her to receive proper care. Given the high rates of pregnancy reported among women with newly diagnosed HCV, we sought to expand viral hepatitis surveillance efforts to quantify the extent of the burden of HCV among women giving birth in TN, utilizing surveillance data in lieu of standalone birth certificate data. Methods Birth certificate data, denoting all live births in TN from 2013 to 2017, were obtained from the TDH Birth Statistical File (n=404,694). Maternal HCV infection laboratory data were obtained from the TDH National Electronic Surveillance System (NEDSS) Based System (NBS). Maternal birth certificate and maternal HCV data were matched using a step-wise matching algorithm; records were required to match on one of the following criteria: (1) first name, last name, and date of birth (DOB); (2) first name, maiden name, and DOB; (3) phonetic first name, phonetic last name, DOB; (4) phonetic first name, phonetic maiden name, and DOB; or (5) social security number. For geographical variations, maternal county of residence was extracted from birth certificate data. As there is currently no case definition pertaining to HCV-positive pregnant women, laboratory data was used to determine perinatal exposure case status for each live birth as follows: (1) confirmed exposure, if a mother had at least 1 HCV RNA-positive lab during pregnancy, or in the absence of a pregnancy lab, at least one HCV RNA was conducted prior to pregnancy and the last HCV RNA prior to pregnancy was positive; (2) probable exposure, if a mother did not have an HCV RNA test, but had an HCV Ab-positive lab preceding or during pregnancy; or (3) no exposure, if a mother had a history of HCV, but only HCV RNA-negative labs during pregnancy, or in the absence of a pregnancy lab, at least one HCV RNA was conducted prior to pregnancy and the last RNA prior to pregnancy was negative. HCV infant exposure rates were calculated using the number of probable or confirmed HCV perinatal exposures divided by the total number of live births*1,000. Results From 2013 to 2017, there were 4,909 perinatal HCV exposures, with an average exposure rate of 12.1 per 1,000 live births. The exposure rate increased by 93.7%, from 7.9 in 2013 to 15.3 in 2017 (Table 1). Using an estimated 5.8% transmission rate, 285 infants acquired HCV infection perinatally over the past 5 years in TN.4 Figure 1 depicts the rates of perinatal exposure per 1,000 live births in 2017, by county, and illustrates the large geographical variability of the perinatal HCV exposure rates. While the statewide average was 1.5%, this varied from 0% to 14.1% across TN. Eastern TN counties had higher rates; some signifying 5% to 14.1% of all infants born were vertically exposed to HCV. Limitations of our study included incomplete chronic HCV surveillance data, reporting bias, and external validity. Chronic HCV surveillance in TN was not routine until July 2015, and chronic HCV was not reportable until January 1, 2017. With respect to data included in our study prior to July 2015, only electronic laboratory reports were used, which could have resulted in under-reporting. Additionally, as pregnancy is not currently reportable in the context of HCV, we relied solely on birth certificate and NBS record matching to identify exposure. Lastly, our findings may not be generalizable to the rest of the US, as we only studied women of reproductive age in TN. Strengths to our study included the utilization of two reliable data sources, NBS and Birth Certificate data to determine perinatal HCV exposure. Analyzing data over a 5-year period allowed for a large sample size. Additionally, unlike previous studies, we analyzed laboratory data versus birth certificate data which is physician-reported and has been shown to underestimate the prevalence of maternal HCV infection.5 Conclusions High numbers of reported HCV cases among reproductive aged women translates into high rates of perinatal exposure to HCV among live born infants. As compared to maternal HCV status reported on birth certificates, matching birth records with HCV surveillance databases provides advantages to perinatal surveillance by: 1) detecting more cases, and 2) providing the ability to tease out current versus prior infection in mother and, therefore, actual exposure. This type of maternal surveillance provides unique opportunities to reach out and ensure that HCV infected mothers receive important information regarding appropriate infant testing, as indicated by the 2018 case definition, as well as disease prevention.6 Beginning in 2018, TDH has started to conduct surveillance on HCV exposed infants using these methods to track potential transmission in real-time, allowing us to evaluate testing outcomes among these exposed infants and determine if the infants are in appropriate care. References 1. Zibbell JE, Asher AK, Patel RC, Kupronis B, Iqbal K, Ward JW, Holtzman D. Increases in Acute Hepatitis C Virus Infection Related to a Growing Opioid Epidemic and Associated Injection Drug Use, United States, 2004 to 2014. Am J Public Health. 2018 Feb; 108(2):175-181. 2. Surveillance for Viral Hepatitis – United States, 2015. CDC. 3. Patrick, Stephen W. et al. "Hepatitis C Virus Infection Among Women Giving Birth — Tennessee and United States,

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Roles of Health Literacy in Relation to Social Determinants of Health and Recommendations for Informatics-Based Interventions: Systematic Review

Abstract

Objective To investigate the bacteraemia increase in haemodialysis sector based on data from specific dialysis nosocomial infections national network surveillance (DIALIN) and through an Association of Litigation and Risk Management protocol (ALARM). Introduction In 2017, the dialysis centre of East Reunion Hospital Group (ERHG) based in Saint-Benoit highlighted an increase in bacteraemia's rates. It was a significant rising compared to previous years. Indeed, ERHG is participating since 2013 to the France haemodialysis infections network surveillance (DIALIN)[1], created in 2005 and that is allowing assessing bacteraemia. DIALIN is a multicentre prospective permanent survey that has followed six voluntary centres in 2005 and forty-two in 2016. Objectives of this network are firstly to produce data about acquired infections in haemodialysis sector such as infection incidence rate and standardized ratios allowing centres to compare themselves and, secondly, to improve the quality of care .The current study describe how a root cause analysis has been conducted through the ALARM risk assessment methodology to set up action plans and to reduce the phenomenon[2][3] Methods Five years (2013-2017) of ERHG haemodialysis data were obtained from the haemodialysis infections national network surveillance (DIALIN). To investigate and to analyse clinical incidents, the French National Authority for Health (HAS)[2] recommends the use of an Association of Litigation And Risk Management (ALARM) protocol. It is a powerful method for the investigation and analysis of serious incidents by risks managers [4]. Well established in industries sectors, the ALARM method of investigation is well introduced in French healthcare system since the last ten years. It was used to provide root cause analysis of this phenomenon. Individual's risk factors of each patients (endogenous factors) have been analysed but these risks were identical every year. Thus, we focused on elements different in 2017 from previous years (exogenous factors). We practised audits about hand hygiene, standard precautions, catheter connection and disconnection practices. Our investigations covered several domains of risks or contributary factors such as patient, professional workers, teams, clinical practices protocols, technical and organisational context, care management and Hospital regional health policy. Results Data from DIALIN pointed out that the ERHG bacteraemia's rate was similar or lower to the national network until 2016 (n= 0 in 2016 or 1 in 2015 bacteraemia per year only in catheter"s access vascular). No infections nor bacteraemia on fistula were noted as showned on figure 1 and figure 2. In 2016, there were 68 haemodialysis chronic patients, 8996 dialysis sessions and incidence of all infections was 0.11 over 1000 sessions. In 2017, there were 84 haemodialysis chronic patients,10377 dialysis sessions and incidence of all infections is 0.77 over 1000 sessions. Bacteraemia's rate was higher than national network and ERHG previous years. The analysis of potential causes by ALARM method gave us different explanations. First of all, an increase of dialysis sessions and patients number could explain the increase. Then, this method allowed us to highlight a lower hand hygiene indicator for the service and an equipment issue. A batch of extra-corporal-circuit line was defective and a national withdrawal of any batch was initiated thanks to the ERHG. Secondary, the human factors like recruitment of new members with non-compliance of internal processes, management and human resources issues, under stress work conditions, bad working atmosphere, communication issues between haemodialysis professional workers, contributed to the bacteraemia increase. The investigations had also highlighted a misuse of antiseptic serving to catheter "s connection and disconnection process. Some nurses did not respect the activity time of antiseptic and others nurses splashed the antiseptic instead of cleaned with a sterile wipe. Responses have been taken to stop this issue including the cooperation of healthcare team with the support of hygiene expert team. Nevertheless, because of the multiplicity of risk factors and identified roots causes, the phenomenon has not been stop promptly. Despite a slowdown, the phenomenon persists in 2018. Actions have been decided to standardize practices, to work in pairs, and to improve hand hygiene. News equipments and an other antiseptic following national guidelines (alcoholic chlorhexidin 2%) were chosen by a multidisciplinary team. Conclusions Bacteraemia for dialysis patients might evolve towards serious complications as endocarditis or death in worth cases. During this period, no deaths nor endocarditis linked to bacteraemia have been revealed. The use of a risk management protocol derived from the industry allowed finding roots causes and set up actions plans to solve the phenomenon. ERHG participation to the DIALIN surveillance is continuing. References 1.CPIAS, Auvergne Rhône Alpes. Annual report DIALIN ; 2016. 2.HAS, Gestion des risques, Grille ALARM. 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Roles of Health Literacy in Relation to Social Determinants of Health and Recommendations for Informatics-Based Interventions: Systematic Review

Abstract

Objective The objective of this study was to estimate the prevalence of antibodies to RVFV in domestic cattle, sheep, and goats in a study area in the central interior of South Africa, and to identify factors associated with seropositivity. Introduction Rift Valley fever (RVF) is a mosquito-borne viral zoonosis. This study aimed to estimate the prevalence of antibodies to RVF virus (RVFV) in cattle, sheep, and goats in South Africa, near the 2010-2011 outbreak epicenter and identify factors associated with seropositivity. Methods A cross-sectional study was conducted during 2015-2016 within a ~40,000 km2 region between Bloemfontein and Kimberley. Farms were selected using random geographic points with probability proportional to the density of livestock-owning households. Livestock were randomly sampled from the farm closest to each selected point. A questionnaire was used to collect information concerning animal, management, and environmental factors. Sera samples were screened for RVFV antibodies using IgG inhibition ELISA. Data were analyzed using multilevel logistic regression models. Results On 234 farms, 3,049 animals (977 cattle, 1,549 sheep and 523 goats) were sampled. Estimated RVF seroprevalence, adjusted for clustering and sampling weights, was 42.9% (95% CI: 35.7-50.4%) in cattle, 28.0% (95% CI: 21.3-35.4%) in sheep and 9.3% (95% CI: 5.8-13.9%) in goats. Compared to animals <2y of age, seroprevalence was higher in animals 2-4y (OR=2.8, P<0.001) and >4y old (OR=17.0, P<0.001). Seroprevalence was also higher on private vs. communal land (OR=4.3, P=0.001) and was positively associated with the presence of perennial rivers (OR=1.6, P=0.03) and seasonal pans (OR=1.8, P=0.005) on the farm. The odds of seropositivity was higher in domestic ruminants recently vaccinated between 2014-2015 (OR=2.1, P=0.007) compared to those never vaccinated. Conclusions The presence of IgG antibody against RVFV among domestic ruminants, born after the most recent outbreak (<4y category), and association with known RVF risk factors, indicates the possibility that viral circulation has occurred during the inter-epidemic period.

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Roles of Health Literacy in Relation to Social Determinants of Health and Recommendations for Informatics-Based Interventions: Systematic Review

Abstract

Objective This study aims to describe incidence over time, geographic and seasonal distribution, demographic and clinical characteristics of Lyme disease cases in Canada. Introduction Lyme disease (LD), a multisystem infection that is manifested by progressive stages (1), is emerging in central and eastern provinces of Canada due to northward expansion of the geographic range of Ixodes scapularis, the main vector in these regions (2). In 2004, approximately 40 human cases of LD were reported in Canada. In 2009, LD disease became nationally notifiable, with provincial and territorial health departments reporting clinician-diagnosed cases to the Public Health Agency of Canada (PHAC). This study summarizes seven years (2009-2015) of national surveillance data for LD in Canada. Methods National Lyme disease surveillance data is collected through two surveillance systems, the Canadian National Disease Surveillance System (CNDSS) and the Lyme disease enhanced surveillance system (LDES). The CNDSS collects only demographic data (age and sex), and information on episode date and case classification. The LDES system captures additional data, including: possible geographic location of infection (for both locally acquired and travel-related cases); clinical manifestations; and results of laboratory testing. Nine provinces out of ten participate to LDES that means they provide a part of or all the data elements of this surveillance system. The 2009 national Lyme disease case definition (3) that distinguishes confirmed and probable cases (Table 1) is used to classify and report cases diagnosed by clinicians.This study describes the incidence over time, seasonal and geographic distribution, demographic and clinical characteristics of reported LD cases. Logistic regression was used to explore variations among age groups, sex and year of reporting clinical manifestations to better understand potential demographic risk factors for the occurrence of LD. Different models were used with as outcomes absence or presence of: erythema migrans (early Lyme disease), neurologic and cardiac symptoms and multiple erythema, migrans (early disseminated Lyme disease); and arthritis (late disseminated Lyme disease). The most parsimonious multivariate models were sought by backward elimination of nonsignificant variables until all factors in the model were significant (P<0.05). Results The number of reported LD cases increased more than six-fold, from 144 in 2009 to 917 in 2015, mainly due to an increase in infections acquired in Canada. For the provinces participating into the LDES system, the month of illness onset for Lyme disease cases acquired in Canada was available for 2010 cases. Most cases were reported during the summer months of June (20.7%), July (35.4%) and August (17.3%) (Figure 1). An increase in incidence of LD was observed in provinces from Manitoba eastwards (Figure 2). This is consistent with our knowledge of range expansion of the tick vectors in this region. In the western provinces the incidence has remained low and stable. All cases reported by Alberta, Saskatchewan and Newfoundland and Labrador were acquired outside of the province, either elsewhere in Canada or abroad. There was a bimodal distribution for LD by age with peaks at 5–9 and 45–74 years of age (Figure 3). The most common presenting symptoms were a single erythema migrans rash (74.2%) and arthritis (35.7%) (Figure 4). In the multivariate analysis for clinical manifestations, children aged 0–9 years had a greater number of cases reported as early LD (erythema migrans only) than patients aged 10–19 and 30–39 years (P<0.05). For early disseminated manifestations, young adults 20–29 years of age reported more neurologic manifestations, cardiac manifestations or multiple erythema migrans than the reference age group of 0–9 years (P<0.05). For late disseminated manifestations, children under 15 years of age were more frequently reported as having arthritis than other age groups. Conclusions Lyme disease incidence continues to increase in Canada as does the geographic range of ticks that carry the LD bacteria. This increasing of LD incidence might also be due to changing in knowledge, attitudes, and practices of clinicians who diagnose the disease and or of the public health workers who collect and report the data. Ongoing surveillance, preventive strategies as well as early disease recognition and treatment will continue to minimize the impact of LD in Canada. References 1. Aguero-Rosenfeld ME, Wang G, Schwartz I, Wormser GP (2005) Diagnosis of Lyme borreliosis. Clin Microbiol Rev 18: 484–509. 2. Ogden NH, Koffi KJ, Pelcat Y, Lindsay LR. Environmental risk from Lyme disease in central and eastern Canada: a summary of recent surveillance information. 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Roles of Health Literacy in Relation to Social Determinants of Health and Recommendations for Informatics-Based Interventions: Systematic Review

Abstract

Objective To assess the feasibility of conducting respiratory virus surveillance for residents of long term care facilities (LTCF) using simple nasal swab specimens and to describe the virology of acute respiratory infections (ARI) in LCTFs. Introduction Although residents of LTCFs have high morbidity and mortality associated with ARIs, there is very limited information on the virology of ARI in LTCFs.[1,2] Moreover, most virological testing of LCTF residents is reactive and is triggered by a resident meeting selected surveillance criteria. We report on incidental findings from a prospective trial of introducing rapid influenza diagnostic testing (RIDT) in ten Wisconsin LTCFs over a two-year period with an approach of testing any resident with ARI. Methods Any resident with new onset of respiratory symptoms consistent with ARI had a nasal swab specimen collected for RIDT by nursing staff. Following processing for RIDT (Quidel Sofia Influenza A+B FIA), the residual swab was placed into viral transport medium and forwarded to the Wisconsin State Laboratory of Hygiene and tested for influenza using RT-PCR (IVD CDC Human Influenza Virus Real-Time RT-PCR Diagnostic Panel), and for 17 viruses (Luminex NxTAG Respiratory Pathogen Panel [RPP]). The numbers of viruses in each of 7 categories [influenza A (FluA), influenza B (FluB), coronaviruses (COR), human metapneumovirus (hMPV), parainfluenza (PARA), respiratory syncytial virus (RSV) and rhinovirus/enterovirus (R/E)], across the two years were compared using chi-square. Results Totals of 164 and 190 specimens were submitted during 2016-2017 and 2017-2018, respectively. RPP identified viruses in 56.2% of specimens, with no difference in capture rate between years (55.5% vs. 56.8%). Influenza A (21.5%), influenza B (16.5%), RSV (19.0%) and hMPV (16.5%) accounted for 73.5% of all detections, while coronaviruses (15.5%), rhino/enteroviruses (8.5%) and parainfluenza (2.5%) were less common. Specific distribution of viruses varied significantly across the two years (Table: X2=48.1, df=6; p<0.001). Conclusions Surveillance in LTCFs using nasal swabs collected for RIDT is highly feasible and yields virus identification rates similar to those obtained in clinical surveillance of ARI with collection of nasopharyngeal specimens by clinicians and those obtained in a school-based surveillance project of ARI with collection of combined nasal and oropharyngeal specimens collected by trained research assistants. Significant differences in virus composition occurred across the two study years. RSV varied little between years while hMPV demonstrated wide variation. Simple approaches to surveillance may provide a more comprehensive assessment of respiratory viruses in LTCF settings. References (1) Uršič T, Gorišek Miksić N, Lusa L, Strle F, Petrovec M. Viral respiratory infections in a nursing home: a six-month prospective study. BMC Infect Dis. 2016; 16: 637. Published online 2016 Nov 4. doi: 10.1186/s12879-016-1962-8 (2) Masse S, Capai L, Falchi A. Epidemiology of Respiratory Pathogens among Elderly Nursing Home Residents with Acute Respiratory Infections in Corsica, France, 2013–2017. Biomed Res Int. 2017; 2017: 1423718. Published online 2017 Dec 17. doi: 10.1155/2017/1423718

Roles of Health Literacy in Relation to Social Determinants of Health and Recommendations for Informatics-Based Interventions: Systematic Review

Abstract

Objective The aim of this study is to survey data of ticks distribution of Korean islands and to investigate pathogens in Argasid ticks. Introduction Ticks and tick-borne diseases have been thought global important issues, because it"s affect to animal and human health and are the cause of significant economic losses. The genus Ornithodoros spp., which is included in Family Argasidae, is usually associated with wild animals including seabirds and it was difficult to investigate because seabirds' nests are found in inaccessible uninhabited islands. However, Ornithodoros spp. has been known for the vector of many diseases including African swine fever. Methods In this study, nest with soil and litter of seabirds were collected, to investigate Ornithodoros species from 9 uninhabited islands, Nan-do, Chilsan-do, Chilbal-do, Sogukhol-do, Googul-do, Gaerin-do, Sasu-do, Hong-do (Hallyeohaesang) and Dok-do located western and southern part of the Korea from July, 2017 to September in 2018. The islands are known for breeding places of migratory and resident birds. Maximum ten nests with soil and litter of seabirds were collected from one uninhabited island for the conservation of the islands environment. Ticks were collected from nest with soil and litter of seabirds using Tullgren funnel and were assayed for tick identification by PCR using 16S rRNA gene and tick-borne pathogens including Rickettia spp., Borrelia spp., Bartonella spp., Ehrlichia chaffensis, Ehrlichia canis, Anaplasma phagocytophilum and Anaplasma bovis by nested PCR. Results Total 65 Ornithodoros species ticks from 338 seabird"s (black-tailed gull, Larus crassirotris; streaked shearwater, Calonectris leucomelas and Swinhoe"s storm petrel, Oceanodroma monorhis) nesting soil with litter in 9 uninhabited islands. In the sequence identification of 16S rRNA gene fragment of Ornithodoros species, O. capensis and O. sawaii were 37 and 28, respectively. In the analyses of tick-borne pathogens, Borrelia spp. (n=5) was detected in O. sawaii from Gaerin-do and Googul-do. The total detection rate of Borrelia sp. from Ornithodoros spp. was 7.69% (5/65). Conclusions In this research, we discovered that O. sawaii are habitat in west and southern part of uninhabited islands to breeding place of black-tailed gulls and streaked shearwater and O. capensis are habitat in uninhabited islands related to breeding place of streaked shearwater. This is first report of the Borrelia spp. from Ornithodoros sawaii in Korea.

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Roles of Health Literacy in Relation to Social Determinants of Health and Recommendations for Informatics-Based Interventions: Systematic Review

Abstract

Objective We sought to measure the burden of emergency department (ED) visits associated with injection drug use (IDU), HIV infection, and homelessness; and the intersection of homelessness with IDU and HIV infection in Massachusetts via syndromic surveillance data. Introduction In Massachusetts, syndromic surveillance (SyS) data have been used to monitor injection drug use and acute opioid overdoses within EDs. Currently, Massachusetts Department of Public Health (MDPH) SyS captures over 90% of ED visits statewide. These real-time data contain rich free-text and coded clinical and demographic information used to categorize visits for population level public health surveillance. Other surveillance data have shown elevated rates of opioid overdose related ED visits, Emergency Medical Service incidents, and fatalities in Massachusetts from 2014-2017[1,2,3]. Injection of illicitly consumed opioids is associated with an increased risk of infectious diseases, including HIV infection. An investigation of an HIV outbreak among persons reporting IDU identified homelessness as a social determinant for increased risk for HIV infection. Methods To accomplish our objectives staff used an existing MDPH SyS IDU syndrome definition[4], developed a novel syndrome definition for HIV-related visits, and adapted Maricopa County"s homelessness syndrome definition. Syndromes were applied to Massachusetts ED data through the CDC's BioSense Platform. Visits meeting the HIV and homelessness syndromes were randomly selected and reviewed to assess accuracy; inclusion and exclusion criteria were then revised to increase specificity. The final versions of all three syndrome definitions incorporate free-text elements from the chief complaint and triage notes, as well as International Statistical Classification of Diseases and Related Health Problems, 9th (ICD-9) and 10th Revision (ICD-10) diagnostic codes. Syndrome categories were not mutually exclusive, and all reported visits occurring at Massachusetts EDs were included in the analysis. Syndromes Created For the HIV infection syndrome definition, we incorporated the free-text term "HIV" in both the chief complaint and triage notes. Visit level review demonstrated that the following exclusions were needed to reduce misspellings, inclusion of partial words, and documentation of HIV testing results: "negative for HIV", "HIV neg", "negative test for HIV", "hive", "hivies", and "vehivcle". Additionally, the following diagnostic codes were incorporated: V65.44 (Human immunodeficiency virus [HIV] counseling), V08 (asymptomatic HIV infection status), V01.79 (contact with or exposure to other viral diseases), 795.71 (nonspecific serologic evidence of HIV), V73.89 (special screening examination for other specified viral diseases), 079.53 (HIV, type 2 [HIV-2]), Z20.6 (contact with and (suspected) exposure to HIV), Z71.7 (HIV counseling), B20 (HIV disease), Z21 (asymptomatic HIV infection status), R75 (inconclusive laboratory evidence of HIV), Z11.4 (encounter for screening for HIV), and B97.35 (HIV-2 as the cause of diseases classified elsewhere). Building on the Maricopa County homeless syndrome definition, we incorporated a variety of free-text inclusion and exclusion terms. To meet this definition visits had to mention: "homeless", or "no housing", or, "lack of housing", or "without housing", or "shelter" but not animal and domestic violence shelters. We also selected the following ICD-10 codes for homelessness and inadequate housing respectively, Z59.0 and Z59.1. We analyzed MDPH SyS data for visits occurring from January 1, 2016 through June 30, 2018. Rates per 10,000 ED visits categorized as IDU, HIV, or homeless were calculated. Subsequently, visits categorized as IDU, HIV, and meeting both IDU and HIV syndrome definitions (IDU+HIV) were stratified by homelessness. Results Syndrome Burden on ED The MDPH SyS dataset contains 6,767,137 ED visits occurring during the study period. Of these, 82,819 (1.2%) were IDU-related, 13,017 (0.2%) were HIV-related, 580 (<0.01%) were related to IDU + HIV, and 42,255 visits (0.6%) were associated with homelessness. The annual rate of IDU-related visits increased 15% from 2016 through June of 2018 (from 113.63 to 130.57 per 10,000 visits); while rates of HIV-related and IDU + HIV-related visits remained relatively stable. The overall rate of visits associated with homelessness increased 47% (from 49.99 to 73.26 per 10,000 visits). Rates of IDU, HIV, and IDU + HIV were significantly higher among visits associated with homelessness. Among visits that met the homeless syndrome definition compared to those that did not: the rate of IDU-related visits was 816.0 versus 118.03 per 10,000 ED visits ($X2= 547.12$, p<0. 0001); the rate of visits matching the HIV syndrome definition was 145.54 versus 18.44 per 10,000 ED visits ($X2= 99.33$, p<0.0001); and the rate of visits meeting the IDU+HIV syndrome definition was 15.86 versus 0.76 per 10,000 visits ($X2= 13.72$, p= 0.0002). Conclusions Massachusetts is experiencing an increasing burden of ED visits associated with both IDU and homelessness that parallels increases in opioid overdoses. Higher rates of both IDU and HIV-related visits were associated with homelessness. An understanding of the intersection between opioid overdoses, IDU, HIV, and homelessness can inform expanded prevention efforts, introduction of alternatives to ED care, and increase consideration of housing status during ED care. Continued surveillance for these syndromes, including collection and analysis of demographic and clinical characteristics, and geographic variations, is warranted. These data can be useful to providers and public health authorities for planning healthcare services. References 1. Vivolo-Kantor AM, Seth P, Gladden RM, et al. Vital Signs: Trends in Emergency Department Visits for Suspected Opioid Overdoses — United States, July 2016–September 2017. MMWR Morbidity and Mortality Weekly Report 2018; 67(9);279–285 DOI: http://dx.doi.org/10.15585/mmwr.mm6709e1 2. Massachusetts Department of Public Health. Chapter 55 Data Brief: An

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Roles of Health Literacy in Relation to Social Determinants of Health and Recommendations for Informatics-Based Interventions: Systematic Review

Abstract

Objective Develop a free text query to track synthetic cannabinoid-related ED visits. Assess trends in synthetic cannabinoid use from 2013-2018 using spatial and time-series analysis. Introduction Maryland utilizes ESSENCE for identification of emerging public health threats, including non-fatal overdoses. Synthetic cannabinoids are heterogeneous psychoactive compounds identified as substances of abuse.[1] In March 2018, the Illinois Department of Public Health received reports of unexplained bleeding in patients who reported using these products.[2] As a result, CDC initiated coordination of national surveillance activities for possible cases of coagulopathy associated with synthetic cannabinoids use. By May 2018, state health departments reported 202 cases, including five deaths. [3] On April 3, 2018, Maryland reported its index case - a female in her 20's who presented to an ED with nausea, blood in her stool, vaginal bleeding, bruising, an elevated internal normalized ratio (> 12.2), and bleeding oral ulcers after quitting use of a synthetic cannabinoid. She was successfully treated with Vitamin K. The first reported mortality in a Maryland resident was a male in his 30's who called EMS for fever and blood in his urine but subsequently went into cardiac arrest and was unable to be resuscitated. The patient was known to use synthetic cannabinoids. Brodifacoum exposure was confirmed by laboratory testing. As of September 2018, the Maryland Poison Control Center had received reports of 43 cases, and 3 deaths linked to the outbreak. Methods To support surveillance and timeliness of synthetic cannabinoids reporting, we developed a case definition by conducting key word searches to identify terms/phrases used by providers in Maryland ED's to document synthetic cannabinoid visits. This process yielded the following terms: "synthetic marijuana", "spice", and "K2". Subsequently, we created a free text query based on the case definition and variations of the terms/phrases. This query allowed us to capture data on ED visits for synthetic cannabinoid use in the chief complaint (CC), discharge diagnosis (DD), and clinical impression (CI) fields of ESSENCE data. Finally, descriptive and geographic spatial analyses were conducted of synthetic cannabinoid-related morbidity (ED visits) for 2013-2017 (data for 2018 is incomplete); and time trends analyzed for 2013-2018. Results From 2013 to 2017, a total of 1,097 ED visits across Maryland were synthetic cannabinoid-related (Table 1). The overall crude synthetic cannabinoid-related ED visit rate was 20 per 100,000 population. The number of synthetic cannabinoid-related ED visits increased 8-fold, from 40 in 2013 to 353 in 2017. Females made the most synthetic cannabinoid-related ED visits (n = 861, 78%). Adults aged 15-24 and 25-34 made 349 (32%) and 367 (33%) visits respectively to an ED for a synthetic cannabinoid-related event. Whites and blacks made 466 (42%) and 498 (45%) visits respectively to an ED for a synthetic cannabinoid-related event. People who were non-Hispanic (n= 988, 90%), black (n = 498, 45%), female (n = 861, 78%), and aged 25-34 (367, 33%) visited an ED for a synthetic cannabinoid-related event more than any other demographic group. Time trend analysis shows an increase from baseline in synthetic cannabinoid-related ED visits starting from July 2014 (Figure 1). Three spikes are noted thereafter in April, July, and September 2015 respectively. Consequently, ED visits for synthetic cannabinoid-related events dropped to a new baseline value in December 2015. Two spikes are also noted for synthetic cannabinoid-related ED visits in May and September 2017 respectively with a new baseline established starting January 2018. Spatial analysis shows geographic clustering of synthetic cannabinoid-related morbidity in three Maryland jurisdictions; Baltimore City, Fredrick County, and Washington County (Figure 2). The top five Maryland counties with crude synthetic cannabinoid-related ED visit rates included Allegany, Baltimore City, Frederick, St. Mary's and Washington; ranging from 87 in Washington county to 38 in St. Mary's county. The top ten crude synthetic cannabinoid-related ED visit rates per 100,000 population from 2013 to 2017 among all Maryland ZIP codes ranged from 87 in Washington county to 38 in St. Mary's county. Spatial analysis also shows that hospitals with the greatest burden of synthetic cannabinoid-related ED visits were close to ZIP codes of communities with high crude synthetic cannabinoid-related ED visit rates (Figure 3). Conclusions Data from the ESSENCE program can be considered acceptable for monitoring synthetic cannabinoid-related ED visits in Maryland. It is useful for obtaining near real-time data about synthetic cannabinoid-related events, and as we have shown in our analysis, for the identification of key groups and geographic locations most in need of targeted interventions to reduce morbidity and mortality. Finally, it also provides us with the ability to retrospectively identify outbreaks, and to link data trends to ongoing interventions. References [1] Riederer, Anne et al. Acute Poisonings from Synthetic Cannabinoids — 50 U.S. Toxicology Investigators Consortium Registry Sites, 2010–2015. Centers for Disease Control and Prevention. MMWR. July 2016. 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Roles of Health Literacy in Relation to Social Determinants of Health and Recommendations for Informatics-Based Interventions: Systematic Review

Abstract

Objective We aimed to review the development and changes of National Notifiable Disease Surveillance System (NNDSS) from 1950 to 2013, and to analyze and summarize the changes in regulations and public health surveillance practices in China. Introduction Infectious disease was the second most common cause of death in 1949, and the epidemic situation of infectious diseases was so severe that the Chinese government made major investments to the control and prevention of infectious diseases. During the past 60 years the development of the notifiable disease surveillance system in China has experienced 3 phases, including germination stage, development stage, improvement and consolidation stage (1). As the quality of infectious diseases surveillance has been improved stepwisely, the national morbidity of class A and B notifiable disease decreased from 7157.5 per 100,000 in 1970 to 225.8 per 100,000 in 2013, and the mortality decreased from 56.0 per 100,000 in 1959 to 1.2 per 100,000 in 2013(2). Methods Research articles, online reports and grey literature from January 1950 to February 2013 relevant to disease surveillance in China were searched in databases including PubMed, China National Knowledge Infrastructure (CNKI), and Wanfang Data. Retrieved articles were screened by inclusion criteria of containing the infectious diseases prevention and control, related laws and regulations, and development of surveillance system. Results In the systematic review, 20 articles were retrieved from PubMed, 1129 articles from CNKI, 480 articles from WanFang database, after abstract screening and eliminating overlaps, 73 articles were included, including 10 English articles and 63 Chinese articles. Laws and regulations on notifiable diseases in China Administrative Measures for Infectious Diseases Control was issued in 1955 to deal with 18 diseases (classes A and B) for their notification, monitoring, reporting and treatment. In 1956, 7 more infectious diseases were added into class B infectious diseases. Regulation on the Administration of Acute Infectious Diseases was issued in 1978, infectious diseases in class A and B including suspected cases must be reported within specific time respectively. The Law of the People"s Republic of China on the Prevention and Treatment of Infectious Diseases, the first infectious disease law in China, was issued in 1989 and revised in 2004. The number of notifiable infectious diseases was increased to 35, including 2 class A, 21 class B and 12 class C notifiable diseases in 1989. The 2004 revised version contained total 37 notifiable diseases and clarified infectious disease prevention, epidemic situation report, notification and release, epidemic control, medical treatment, supervision and management, logistic measures, legal responsibility and supplementary provisions. The organization of notifiable disease surveillance and management In 1950s, the Government Administration Council approved the bill of the establishment of Health Epidemic Prevention Stations (HEPS) nationwide. Chinese Academy of Medical Sciences (CAMS) was established in 1956, and the Chinese Academy of Preventive Medicine (CAPM) was established in 1986, which was in charge of the national infectious disease surveillance data collection, management, analysis and feedback. In 2002, the CAPM officially changed its name to the Chinese Center for Disease Control and Prevention (CDC), so did all levels of health epidemic prevention station. As mentioned in the Law of the People"s Republic of China on the Prevention and Treatment of Infectious Diseases, CDCs at all levels are responsible for infectious disease surveillance, prediction, epidemiological investigation, epidemic reporting and other prevention and control. In addition, the law clarified the establishment of infectious disease surveillance system, the specific duties and tasks of the administrative department of public health and healthcare technology institutions in the infectious disease surveillance (Figure 1). Notifiable diseases diagnostic criteria Notifiable Diseases Diagnostic Criteria (Trial Edition) was issued in 1990 and revised in 2004. Diagnostic Criteria defined suspected case, probable case and confirmed case. Suspected case mainly based on clinical symptoms and signs; probable case was the suspected cases with hemogram blood test. Confirmed case was based on blood test results and pathogen specific antigen or antibody test results, eg. Ig G, Ig M or virus tested positive among suspected or probable cases. Reporting method of notifiable diseases surveillance system During 1950 to 1985, monthly collection of reports was delivered by post mail level by level hierarchically (from county HEPSs to prefectural or city HEPSs, then to provincial HEPSs and eventually to CAPM). The notifiable infectious diseases reporting network covered the whole country firmly launched at the mid-1960s. In 1986, the prototype of electronic reporting was sprout. Over 200 network nodes achieved electronic submission of the national notifiable infectious diseases monthly report by post-delivery, some provinces even had adopted more efficient reporting means by e-mail autonomously. During 1986 to 2003, different reporting cards are used for collecting class A, B, and C infectious diseases respectively. At the beginning of each year, the provincial HEPSs updated the population census data and the administrative changes. At the end of each year, the provincial HEPSs reported detailed age-gender and occupation specific diseases morbidity and mortality data, as well as amended monthly reports for delay or missing, to CAPM. The internet-based timely reporting system was officially launched in 2004. China CDC built the notifiable infectious diseases and emergent public health event reporting system that covered all hospitals and medical institutes nationwide, which collected individual case data with unified reporting card. By 2013 the system with over 70,000 reporting units covered 100% county and above level CDCs, 98% of county and above level medical institutions, and 94% of township level healthcare units. Conclusions Monthly reporting

was replaced by real-time reporting, and the weekly, monthly and yearly cumulative incidence and death was replaced by individual case reporting. The hierarchical reporting structure, were changed to reporting directly to national data center. The notifiable disease surveillance system network has been expanded, the diagnosis capacity and criteria, surveillance data report methods and sensitivity have been improved gradually. The notifiable disease surveillance system optimized step by step with internet-based timely reporting technology and direct filling infectious disease case information from healthcare facilities. References 1. Cheng M, etc. The history and development trend of disease surveillance in China. Disease Surveillance, 2005, 20(3): 113-114. 2. The national health and family planning commission of the People"s Republic of China. The national epidemic situation of notifiable diseases in 2012.

Roles of Health Literacy in Relation to Social Determinants of Health and Recommendations for Informatics-Based Interventions: Systematic Review

Abstract

Objective We describe our efforts to prevent a hepatitis A outbreak in Houston. Introduction Since 2017, over 11 states have been impacted by outbreaks of hepatitis A among persons experiencing homelessness (PEH) and drug use. The primary methods of transmission for the hepatitis A virus (HAV) are person-to-person contact and ingestion of contaminated foods. The HAV infection typically presents with minor symptoms, but the infection can cause serious complications and death in those with poor health. Houston, TX, the 4th largest U.S. city, has a large, mobile homeless population and is at risk for such an outbreak. Of the US adults surveyed for NHANES, only 27% reported hepatitis A immunity; and the homeless population is considered high risk for acquiring hepatitis A. The Point in Time Homeless Census (2017) estimated 3,412 PEH in the Houston metro area. Nationally, the HAV outbreaks have been marked by high rates of hospitalizations and deaths. Emergency and ambulatory department data was monitored and assessed for HAV-related visits using the Houston Health Department's (HHD) syndromic surveillance system. Methods Case reports and syndromic surveillance query were used to assess baseline data. HHD provided single-dose units of Hepatitis A vaccine through the Adult Safety Net program to two community medical providers that deliver care to PEH in Houston. Staff administered vaccines via clinics and outreach efforts. Immunization records were recorded in the state immunization registry. Monitoring of potential outbreaks occurred monthly using the syndromic query. Data from case reports or syndromic surveillance were analyzed once immunization efforts concluded. Results From 2015-2017, the annual mean of HAV cases reported was 13. Analyses of syndromic surveillance conducted in March and August 2018 revealed no increase in jaundice complaints. Briefings were conducted with multiple stakeholders including community members, medical providers, academia, and health professionals in December 2017. HHD provided 150 single-antigen hepatitis A vaccine allotments to two community partner agencies. Immunizations began in late January 2018; 400 homeless persons had been immunized as of March 30, 2018. Conclusions Ongoing review of surveillance data in conjunction with community assessments of PEH is necessary to prevent a hepatitis A outbreak among PEH in Houston. Since vaccination is cited as the best method of prevention, continuing immunization efforts are needed to build herd immunity. The availability of vaccines was limited due to the increased demand in responding to the multi-state HAV outbreaks. However, Houston Health Department (HHD) had access to doses of the hepatitis A vaccine post Hurricane Harvey. While a mass immunization campaign of at-risk groups would be ideal, staffing isn't feasible as HHD uses a medical home model for immunization efforts. Innovative public health interventions are required to overcome the inherent challenges of delivering preventive programs to PEH. To prevent a potential HAV outbreak in Houston, comprehensive surveillance strategies should include 1) participatory stakeholder engagement, 2) timely reporting, 3) prompt referrals from providers who care for PEH, 4) community education about transmission and hygiene, and 5) vaccination of at-risk groups to increase herd immunity.

Roles of Health Literacy in Relation to Social Determinants of Health and Recommendations for Informatics-Based Interventions: Systematic Review

Abstract

Objective The aim of our work is to determine the main trends and structure in infectious disease mortality in Ukraine over the last 50 years. Introduction Monitoring of long-term infectious disease mortality trends is of great value to national public health systems both in estimation of the efficacy of preventive programs, and in development of the new strategies of preventive measures. In the developed countries, there are a number of studies with long-term time series of infectious disease mortality analysis in epidemiological and historical aspects. Our research was based on the work by Armstrong GL, Conn LA and Pinner RW, 1999. Literature review revealed that such analysis has been never carried out in Ukraine up to now. **Methods** Our study is designed as a descriptive retrospective epidemiological analysis. We constructed time series of infectious mortality in all oblasts of Ukraine during the period of 1965-2015 years. We used annual statistical forms C-8 "Distribution of deceased by sex, age and death cause" provided by Ministry of Health. The cause of death was accounted in accordance with international statistical classification of diseases, injuries, and causes of death: based on the recommendations of the ninth revision conference, 1975. We analyzed infectious diseases belonging to the class of Infectious and parasitic diseases (45 nosology and nosology groups – codes 001 – 139). We also included into our analysis some other infectious diseases belonging to other classes: Neoplasm (cervix carcinoma – code 180); Heart diseases (Rheumatic fever, rheumatic heart disease – codes 390-398); Diseases of the respiratory system (Acute Respiratory Infection, influenza, viral pneumonia, pneumococcal pneumonia, other acute forms of pneumonia – codes 460-466, 487, 480, 481, 482, 483, 485, 486); diseases of nervous system (non-infectious and non-parasitic meningitis, codes 320-322). Therefore, all infections that are reported in Ukraine were included to this research. Nosologies were grouped using several disease classifications: in accordance with International classification (belonging or not to Infectious disease class); by transmission method or localization of an infectious agent (respiratory, intestinal or alimentary, blood borne, contact and other infections); by ecological principle (anthroponosis, zoonosis, sapronosis and other). All time series were divided onto two periods: 1965-1991 (soviet period) and 1992-2015 (period of independent Ukraine). Average mortality (mortality coefficient) of these periods was compared to each other for calculation of percentage decrease/increase of each disease's mortality rate. Additionally, we determined the proportion (%) of infectious mortality compare to the total mortality of population of Ukraine. Limited scope of this study does not allow us to present data regarding the age distribution, thus we focus on general characteristics. Although the practice of presenting data was changed over the course of 50 years covered by this abstract, the data are comparable and can be used for analysis. **Results** Total number of fatal cases caused by infectious diseases in Ukraine during 1965-2015 years is 1,268,560 or 4.05% of all deaths caused by different reasons. 550,329 deaths or 43.38% of all infectious deaths belong to class of infectious and parasitic diseases, other 718,231 or 56.62% belong to infectious diseases of other classes. Percentage of respiratory infections is 80.28%, intestinal infections – 1.72%, blood infections – 16.94% and other infections – 1.05%. Additionally, proportion of anthroponosis is 98.31%, proportion of zoonosis – 0.42%, sapronosis – 0.22%, other – 1.05%. During 1965-2015, percentage of infectious diseases in overall structure was within the range from 10.53% (1965) to 2.99% (2015). Overall mortality rate of infectious diseases decreased from 80.49 per 100,000 population (1965) to 41.77 per 100,000 (2015). This finding demonstrates to reduction of overall infectious mortality in Ukraine. It is important to mention that decrease of overall infectious mortality happened simultaneously with an increase of mortality caused by non-infectious diseases. Non-infectious mortality increased from 683.92 per 100 000 population (1965) to 1354.77 per 100 000 population (2015). The first 10 causes of death from infectious diseases in Ukraine in 1965-2015 included the following nosological units and infectious groups: 1. Respiratory tuberculosis and other forms of tuberculosis (30.3%); 2. Acute respiratory infections + Influenza + Viral pneumonia + Pneumococcal pneumonia and Other acute pneumonias (28.36%); 3. Acute rheumatic fever + Chronic rheumatic heart disease (15.93%); 4. Malignant neoplasm of cervix uteri (10.42%); 5. AIDS (4.8%); 6. Septicemia (2.86%); 7. Meningococcal infection + Meningitis, excluding infectious and parasitic meningitis (2.64%); 8. Other infectious and parasitic diseases and long-term effects of other infectious and parasitic diseases (1.05%); 9. Acute intestinal infections due to unspecified micro-organisms and ill-defined, including toxical dyspepsia (0.93%) and 10. Viral hepatitis (0.79%). The average mortality rate declined for the most infectious diseases during 1992-2015 comparing to 1965-1991. For certain diseases or their groups, the range varied from 12.71% (pneumonia) to 92.69% (influenza). The biggest decrease was observed in intestinal infections group (up to 73.99%). All respiratory infections demonstrated a decrease to 18.14%; other infections with unknown path of transmission resulted in 4.6% decrease, but blood borne infections demonstrated an increase of 59.72 % (mostly caused by AIDS). Some other infections also demonstrated increase in mortality rate: foodborne botulism – up to 29.94%, tuberculosis – up to 26.52%, diphtheria – up to 376,53%, erysipelas – to 371,26%, AIDS – to 100%. **Conclusions** Infectious diseases are not the main mortality cause among the population of Ukraine during the past 50 years. Over the last half-century, the proportion of infectious diseases in the mortality structure of the population of Ukraine demonstrated a decreasing tendency, while non-infectious disease mortality had an opposite trend, which can be

explained by epidemiological transition (Omran AR, 1971). However, there is always a possibility of rapid spreading of infectious diseases and increasing their proportion in the structure of total mortality. Possible growth of mortality rate caused by AIDS, tuberculosis and diphtheria is an issue of concern. International experience demonstrated that these three infections could be successfully controlled. The long-term trends of AIDS, tuberculosis and diphtheria mortality rates in Ukraine require regulatory interventions and show the need for emergency measures by the state services to these and some other infections, including vaccine-controlled. Thus, our study of the long-term trends of infectious mortality can be used to make decisions of public health in Ukraine on the control of infectious morbidity and mortality. References Armstrong GL, Conn LA and Pinner RW. Trends in Infectious Disease Mortality in the United States During the 20th Century. JAMA, 1999, Vol. 281 (1): 61-66. Omran AR. The epidemiologic transition: a theory of the epidemiology of population change. Milbank Q. 1971; 49:509-538.

Roles of Health Literacy in Relation to Social Determinants of Health and Recommendations for Informatics-Based Interventions: Systematic Review

Abstract

Objective We aim to assess whether influenza circulation, as measured through influenza-like-illness (ILI) in primary care, is reflected in ambulance dispatch (AD) calls. Introduction Surveillance of severe influenza infections is lacking in the Netherlands. Ambulance dispatch (AD) data may provide information about severity of the influenza epidemic and its burden on emergency services. The current gold standard, primary care-based surveillance of influenza-like-illness (ILI), mainly captures mild to moderate influenza cases, and does not provide adequate information on severe disease. Monitoring the severity of the annual epidemic, particularly among groups most at risk of complications, is of importance for the planning of health services and the public health response. Methods We analysed all calls from four ambulance dispatch centers serving 4.3 million people in the Netherlands, between January 2014 and December 2016. The main complaint and urgency level is recorded during triage; those possibly caused by respiratory infections were grouped as respiratory syndrome calls (RSC). We modelled the proportion of all RSC calls against the weekly ILI incidence (we allowed up to 4-week lags and leads), from sentinel primary-care surveillance. We used binomial regression with identity link to obtain differences in proportions. We built separate models by age group, urgency level and time of day. We tested heterogeneity of effects by season. Results We included 289,307 calls; 6.7% were RSC. Overall, proportion of RSC increased by 0.114 percentage points for each increase of 1/10,000 population in ILI incidence. In our study population, this translated into 550 ambulance calls attributable to influenza (as measured by ILI) per year. Association was stronger in the models including only out-of-office hours, children (<15 years) and highest urgency level calls. In the latter two, the effect varied by season. RSC was best associated with ILI from the previous 1-3 weeks in all models, except in children where RSC preceded ILI by 1 week. Conclusions Our results demonstrate the potential usefulness of ambulance dispatch data to complement existing influenza surveillance by providing information on the volume and timing of severe cases attributable to influenza within the yearly epidemics.

Roles of Health Literacy in Relation to Social Determinants of Health and Recommendations for Informatics-Based Interventions: Systematic Review

Abstract

Objective To demonstrate the utility of syndromic surveillance data in aiding public health actions and response across multiple investigations in Tennessee. Introduction Syndromic surveillance data is typically used for the monitoring of symptom combinations in patient chief complaints (i.e. syndromes) or health indicators within a population to inform public health actions. The Tennessee Department of Health collects emergency department (ED) data from more than 80 hospitals across Tennessee to support statewide situational awareness. Most hospitals in Tennessee provide data within 48 hours of the patient being seen in the emergency department. The timeliness of syndromic surveillance data allow for rapid estimates of impact in emergency department populations. Tennessee has successfully used these data to monitor influenza, heat related illnesses, and emergency department impacts from disaster evacuations. In addition to assessing impact and trends, syndromic surveillance can also provide early warnings for conditions of public health concern and increase the lead time public health has to initiate a response. In Tennessee, routine syndromic surveillance for mumps, hepatitis A, and other conditions has been successfully conducted statewide. Three successes from these surveillance efforts include detecting a clinically diagnosed but unreported case of mumps, early identification of hepatitis A cases during Tennessee's ongoing 2018 hepatitis A outbreak, and the detection of an epidemiologically unlikely clinical diagnosis of mumps associated with an exposure at a recreational center. Methods Syndromic surveillance data in Tennessee are monitored daily for chief complaints and discharge diagnosis codes that could require immediate public health actions. Chief complaints are monitored using ESSENCE's built in Record of Interest (ROI) syndrome while ICD10 and SNOMED codes are monitored for specific conditions of interest. Examples include mumps, measles, rubella, hepatitis A, and other immediately notifiable conditions that have time sensitive public health interventions associated with them. Results In 2017, Tennessee was investigating a large increase in mumps cases and outbreaks and exposure responses were occurring across the state. In early June, a patient was seen at a hospital emergency department with a chief complaint of right sided testicular swelling, right sided jaw swelling, and a measured temperature of 99.0 at the time of the visit. Based on presentation alone, the patient was diagnosed by the physician with uncomplicated mumps and discharged. Two days, but less than 48 hours after patient was seen at the emergency department, the discharge diagnosis of mumps was received in Tennessee's syndromic surveillance system and detected during routine review of incoming discharge diagnoses. Upon detection in Tennessee's syndromic surveillance data, both the regional health department where the patient listed his residence and the regional health department where the hospital was located were notified of the ED visit. The hospital was immediately contacted that morning and further investigation revealed that the physician who diagnosed the patient with mumps never ordered laboratory testing to support the diagnosis and that the patient had remained in the jurisdictional area surrounding the hospital. Because no laboratory testing was ordered, the infection preventionist at the hospital was not made aware of the patient's diagnosis and no notification to public health had been made. Rapid contact and coordination with the hospital, regional health departments, and county health department allowed for the patient to be seen at a county health department for specimen collection on the same day the visit was detected. The patient was confirmed PCR positive for mumps the following week. Epidemiologic follow up with the patient revealed that the patient was not linked to any of the ongoing outbreaks in Tennessee, but had likely been exposed and exposed others at multiple out of state events. Tennessee was able to follow up with the affected states and notify them of the potential exposures. In early 2018, Tennessee's ongoing hepatitis A outbreak was detected. To supplement traditional investigative efforts, monitoring for chief complaints generally indicative of hepatitis was initiated across the state, along with diagnosis code monitoring for hepatitis A and unspecified hepatitis. Although all ages were monitored, follow up was focused on visits occurring in the most prevalent age group (18 – 44), chief complaints including substance abuse indicators, and ICD10 codes indicative of Hepatitis A. Routine syndromic surveillance for hepatitis A identified visits meeting the outbreak characteristics which were referred to local and regional health departments for follow up. Although many visits were confirmed to have been already reported or ruled out (particularly in non-outbreak counties), there were numerous times when laboratory tested hepatitis A cases where detected in syndromic surveillance data prior to them being reported. Early detection provided by syndromic surveillance increased the lead time for public health to identify potential high risk contacts and initiate post-exposure prophylaxis. In the summer of 2018, a young child with chief complaint of "diagnosed Monday with mumps" was identified during a regular local review of syndromic surveillance data. Local public health follow up with the infection preventionist revealed that the child was fully vaccinated and had no known exposure to mumps. The patient was brought to the emergency department due to concerns that he was misdiagnosed at the clinic where he was seen previously. Unfortunately, the patient was seen outside of the optimal window for testing, but the evaluation at the emergency department and additional follow up by public health made the concern for mumps very low. Soon after that follow up was initiated, the local health department received a call from the general public about a sign put up at local recreational center stating that children attending the center had been exposed to mumps. There were no known cases of mumps

in Tennessee at that time and the only active mumps investigation in the local jurisdiction was the follow up on the emergency department visit. Rapid follow up with the parent of the patient confirmed that they were the "mumps" exposure being referred to at the recreational center and public health was able to work with the recreational center to remove the signage, as the risk of the patient actually having mumps was low. Information from the investigation initiated by the syndromic surveillance data allowed for public health to rapidly connect the dots between the exposure notice and the patient. Conclusions Regular monitoring of syndromic surveillance data provides important opportunities for public health intervention that would not be possible otherwise. In all of the instances mentioned, timely syndromic surveillance data monitoring and follow up benefited public health responses by filling information gaps, helping initiate conversations with hospitals, and serving as another safety net for unreported illnesses. Conditions with post-exposure prophylactic interventions that can benefit from increased lead time are valuable targets for routine syndromic surveillance.

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Abstract

Objective Examine healthcare seeking behavior in a population exposed to low levels of cyanotoxins in the public drinking water supply and quantify how publicity of the event may have affected perceptions of risk in the affected population. Introduction Cyanotoxins are unregulated, emerging contaminants that have been associated with adverse health effects, including gastroenteritis, when consumed at high levels1,2. In May and June of 2018 cyanotoxins were detected in the public drinking water system for Salem, OR at levels above Environmental Protection Agency (EPA) health advisory levels for sensitive groups3. Sensitive groups were defined as children under 6, elderly adults, pregnant women, nursing mothers, people with compromised immune systems, people receiving dialysis, people with pre-existing liver conditions, and pets. Several health advisories were issued, and there was substantial media coverage of the event. The Oregon Health Authority (OHA) organized an Incident Management Team (IMT), which coordinated activities with other state and local agencies. Oregon ESSENCE staff used syndromic surveillance to monitor the population for health effects and healthcare seeking behavior. Methods Oregon ESSENCE staff developed syndromic surveillance queries to monitor visits made to local emergency departments (i.e., visits by hospital location), as well as visits made by residents of the affected area (i.e., visits by patient location). Specifically, Oregon ESSENCE staff monitored total visits, gastroenteritis syndrome, visits by age group, and mentions of the word 'water' daily during the relevant time period. OHA communications staff tracked media coverage of the event. After the event, Oregon ESSENCE staff reconciled syndromic surveillance visit data with water test data, health advisory status, and media coverage to characterize how messaging may have affected healthcare seeking behavior. Results Cyanotoxins were detected at levels above EPA guidelines for sensitive groups on 9 days between May 23, 2018 and June 19, 2019. OHA identified 67 news articles related to the event published in May and 179 published in June. Additionally, there was an unquantified amount of activity on social media, and a mass text alert that was sent out by the Oregon Office of Emergency Management. Visits for gastroenteritis were highest on the days immediately following the issuance of the first drinking water advisory. The first drinking water advisory was issued three days after the first results that contained cyanotoxins at levels exceeding the EPA guidelines for sensitive groups were received. Visits where the word 'water' was mentioned were similarly elevated immediately after the first drinking water advisory was issued. However, visits for gastroenteritis were also above expected levels on one day that had a water sample above EPA guidelines for sensitive groups, but before the first drinking water advisory was issued. Conclusions Because cyanotoxins are unregulated, limited federal guidance was available and it took several days for the Oregon Health Authority to develop state guidance and educational materials. This delay contributed to public confusion about the level of risk associated with drinking the water, as well as confusion about which groups of people should avoid drinking the water. Our data suggest that emergency department visit behavior was largely driven by publicity of the event. Visits to the emergency department for gastroenteritis and mentions of the word 'water' decreased as more public information and guidance became available. However, we cannot rule out a real health effect related to cyanotoxins in the drinking water for area residents. One lesson learned from this type of high profile event relates to tracking of media coverage; it is difficult to measure how many people media coverage actually reaches, and attempting to characterize media coverage becomes more difficult after the event. References U.S. EPA (United States Environmental Protection Agency). 2015. Drinking Water Health Advisory for the Cyanobacterial Toxin Cylindrospermopsin. EPA 820R15101, Washington, DC; June, 2015. Available from: http://water.epa.gov/drink/standards/hascience.cfm U.S. EPA (United States Environmental Protection Agency). 2015. Drinking Water Health Advisory for the Cyanobacterial Toxin Microcystin. EPA 820R15100, Washington, DC; June, 2015. Available from: http://water.epa.gov/drink/standards/hascience.cfm U.S. EPA (United States Environmental Protection Agency). 2015. 2015 Drinking Water Health Advisories for Two Cyanobacterial Toxins. EPA 820F15003, Washington, DC; June, 2015. Available from: https://www.epa.gov/sites/production/files/2017-06/documents/cyanotoxins-fact_sheet-2015.pdf

Roles of Health Literacy in Relation to Social Determinants of Health and Recommendations for Informatics-Based Interventions: Systematic Review

Abstract

Objective To assess the accuracy of a surveillance-based definition for hepatitis B treatment eligibility among New York City residents with chronic hepatitis B infection. Introduction Approximately 100,000 New York City (NYC) residents are currently diagnosed with chronic hepatitis B virus (HBV) infection.1 Routine monitoring and treatment, where indicated, are necessary to reduce HBV disease progression. Using the 2017 European Association for the Study of the Liver (EASL) 2 guidelines on HBV infection management, we developed a surveillance-based definition for treatment eligibility. Validation of this definition will support the creation of a population-level HBV care continuum, which will allow us to monitor gaps from HBV diagnosis to viral suppression and to develop public health interventions to address these gaps. Methods Laboratories everywhere are required to electronically report the following HBV tests to the NYC Department of Health and Mental Hygiene (DOHMH) for all NYC residents: positive and negative (as of April 2018) DNA, positive surface antigen, positive e antigen, positive core IgM, and Alanine aminotransferase (ALT) (when ordered at the same time as another reportable HBV test). Using reportable HBV tests, treatment eligibility was defined as ever having an HBV DNA result >2000 IU/mL and ALT>40 U/L. We assessed the accuracy of the surveillance-based definition by calculating sensitivity, specificity, positive predictive value (PPV), and negative predictive value (NPV) by applying the definition to the test data of people participating in two DOHMH programs that included clinical information on treatment eligibility: the Enhanced Surveillance Project (provider interviews conducted for 300 randomly selected patients with chronic HBV) and the Check Hep B Patient Navigation Program (program providing HBV-related patient navigation at community organizations, health centers, and hospitals). Everyone meeting inclusion criteria in the Enhanced Surveillance Project who were also identified as being in care and being monitored (two or more HBV DNA results reported at any time) were included in our analysis. For Check Hep B, we included everyone enrolled prior December 31, 2017 who also met our criteria of being in care and being monitored. To determine treatment eligibility using surveillance data, we used all HBV DNA and ALT results reported prior to January 31st, 2016 for the Enhanced Surveillance project and prior to December 31st, 2017 for Check Hep B. Results Treatment eligibility was 62.0% (145/234) among people from the Enhanced Surveillance Project (Table 1A) and 40.0% (161/402) among people enrolled in Check Hep B (Table 1B). Sensitivity of the surveillance-based definition was low using both data sources (Enhanced Surveillance Project: 26.2%; Check Hep B: 24.2%) and specificity high (Enhanced Surveillance Project: 92.1%; Check Hep B: 94.2%). PPV was 84.4% and 73.6% for the Enhanced Surveillance project and Check Hep B, respectively, while NPV was 43.4% and 65.0% for the Enhanced Surveillance project and Check Hep B respectively. Conclusions Our surveillance-based definition had high specificity, indicating that the great majority of patients who were truly not treatment-eligible were correctly classified. However, sensitivity was low, indicating that the surveillance-based definition was unable to accurately identify those considered treatment-eligible from either data source. Low sensitivity suggests that clinicians are likely using other clinical factors not included in laboratory-based reporting to assess a patient's eligibility for treatment, such as fibrosis and cirrhosis, and that clinicians might be using guidelines other than EASL (e.g., American Association for the Study of Liver Diseases (AASLD)3) to determine treatment eligibility. We will conduct chart reviews to better understand the variability in criteria being used. These chart reviews will allow us to further refine our surveillance-based definition (e.g., by incorporating different HBV tests or for clinical criteria that are not laboratory-based, including information from external sources such as Regional Health Information Organizations (RHIOs)), eventually supporting the creation of an HBV care continuum for NYC. 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Roles of Health Literacy in Relation to Social Determinants of Health and Recommendations for Informatics-Based Interventions: Systematic Review

Abstract

Objective The purpose of the study was to confirm the hypothesis of possible intestinal viruses circulation in wastewater in Dnipropetrovsk Oblast, Ukraine. Introduction The main reservoir of intestinal viruses in the environment is human feces and contaminated wastewater. Sewage contamination preconditions further contamination of surface water serving as a source of water supply [2,7,8]. High resistance to physical and biological exposures ensures long-term survival of the viruses in water with various type and level of contaminants, especially in sewage. Detection of enteroviruses of a specific serotype in sewage indicates a significant number of people releasing the virus with feces [1,2]. There are two peaks of enteroviruses concentration in sewage: in January-April, and in June-September [8]. Sewage testing for enteroviruses is one of effective methods for their detection and risk assessment [3]. European region, including Ukraine, is recognized as free from of wild polioviruses, and a systematic study of sewage samples is important for identifying the possibilities of their \"silent\" circulation [6]. Methods Wastewater samples from large sewerage collectors, sewage wells of infectious departments, city hospitals and district sewerage networks of Dnipropetrovsk Oblast were tested in 2007-2017 (39-64 samples monthly in the points are determined by the national regulations [7]). Gauze tampons (Moore"s method) were used to collect wastewater [8]. In addition, samples were collected from wastewater flow into 1-liter sterile bottle with a sampler. Concentration was carried out using Enterosgel (hydroxyl methyl silicic acid) with high adsorption capacity [7]. The supernatant after all the concentration steps was used for culture on cell cultures RD, HEP-2, L20B [4,7,8]. In the presence of cytopathic action in RD cells, culture liquid was inoculated into L20B cells to detect clear cytopathic activity. Culture liquids were investigated to identify enteroviruses in neutralization reaction. In HEP-2, cytopathic effects were observed in the form of clusters of different sizes cells, \"grape clusters\", which indicated the presence of adenoviruses. Adenoviruses were confirmed by immunochromatographic tests for adenovirus antigens \"Cito Test Adeno\" Pharmasko, Ukraine). Results During 10 years, 150 viruses were isolated, 2 of them were a mixture of polioviruses. The frequency of detection of enteroviruses (including polioviruses) and adenoviruses was 2.5% (Tab 1). The isolated strains of enteroviruses, including polioviruses, were sent for confirmation the Public Health Center of the Ministry of Health of Ukraine and Regional WHO polio reference laboratories (Moscow and Helsinki). All polio strains were attributed to the vaccine strain Sabin. Also, the result Coxsackie viruses B typing was confirmed. Conclusions The data testify to presence of Picornaviridae (polioviruses, Coxsackie B, non-polio enteroviruses (NPEVs), and Adenoviridae in the wastewater in Dnipropetrovsk Oblast, Ukraine. The typical composition of viruses was not constant. Types 1, 2 polioviruses (Sabin) were occasionally isolated from wastewater. Type 2 polioviruses (Sabin) were isolated only in 2015. In 2009, 2012-2014, 2017, polioviruses did not stand out. Polioviruses isolation is associated with mass immunization of children against polioviruses carried out to maintain polio-free status of the country. In average, 150,000 children are vaccinated annually. Oral poliomyelitis vaccine (OPV) produced in Russia, France, Belgium was used in 2007-2017 (attenuated Sabin strains, 1,2,3 types). From April 2016, Ukraine refused to use trivalent OPV and switched to bivalent vaccine (Sabin strains, types 1 and 2). Sewage testing for polioviruses and their differentiation at WHO National and Regional Centers for Polio Diagnosis ensures a system for monitoring of possible \"silent\" circulation [6]. Sewage testing using cell cultures is one of the most affordable, effective and reliable methods for controlling the presence of viruses in the environment [4,7,8]. RD and L20B cell lines are useful for poliovirus isolation from sewage [4]. In addition to polioviruses, 1,2,3 types Coxsackie viruses B were isolated from wastewater samples. However, starting from 2013, Coxsackie viruses were isolated only in sporadic cases (Cox.vir.B5). In 2007-2011, NPEVs were isolated in some cases. Because polio is on the verge of eradication, more attention should be paid to study of NPEVs [5]. For 10 years, adenoviruses were isolated, which are well preserved in wastewater [1]. The maximum number of adenoviruses was isolated in 2014. References 1. 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Roles of Health Literacy in Relation to Social Determinants of Health and Recommendations for Informatics-Based Interventions: Systematic Review

Abstract

Objective To conduct surveillance for acute Hepatitis A virus (HAV) infections in Veterans from states reporting outbreaks among high-risk individuals beginning in fiscal year (FY) 2017. Introduction Although cases of acute HAV have declined in recent years, elevated numbers of HAV infections began to be reported by California and Michigan in the fall of 2016.[1,2] Since this time, associated outbreaks have been reported in 9 additional states (Arizona, Utah, Kentucky, Missouri, Tennessee, Indiana, Ohio, Arkansas, and West Virginia).[3] No common source of food, beverages or drugs have been identified and transmission appears to be primarily person-to-person with high-risk individuals including people experiencing homelessness, those who use illicit drugs and their close direct contacts. In June 2018, CDC issued a Health Alert Network Advisory providing additional guidance on identification and prevention of HAV and updates on the outbreaks.[4] This prompted our office to more closely review our HAV surveillance, to identify Veterans who may be part of these outbreaks, and assess risk factors and outcomes of HAV infection. Methods We queried VA data sources starting in FY 2017 (October 1, 2016 – June 30, 2018) for HAV IgM laboratory tests and HAV-coded outpatient encounters and hospitalizations (ICD-10-CM: B15) to identify potential case patients. We performed a detailed chart review on all HAV IgM positive Veterans residing in or treated in an outbreak state during the identified outbreak time frame as reported by each state health department. Data elements collected included: (1) demographics; (2) risk factors, exposures and Hepatitis A vaccination status; (3) treatment locations (i.e. outpatient, Emergency Department, inpatient, intensive care unit); (4) presenting signs and symptoms; (5) laboratory data (including liver function tests (LFTs) and hepatitis testing); and (6) outcomes (i.e. deaths). County-level rates for positive HAV IgM test results were calculated using total unique users of VHA care for matching fiscal year time frames in each county as denominators. Results A total of 247 HAV IgM positive individuals were identified among 136,970 HAV IgM tests performed during the study period. Among these, 67 individuals resided in an outbreak state and were identified for further chart review. Additional laboratory review revealed that 5 of the 67 were positive for HAV Total Ab with no HAV IgM performed (all five patients came from a single facility and were asymptomatic at the time of testing). Based on review of clinical data for the remaining 62 HAV IgM positive patients, 22 (35%) did not meet the CSTE clinical case definition criteria[5] of having signs or symptoms consistent with acute viral hepatitis plus either jaundice or elevated ALT/AST levels. These patients were either asymptomatic or had relevant symptoms that could be explained by other diagnoses. None had documented jaundice and only 4 had any LFT elevation, which was mild (ALT: 60-83 IU/L, AST: 36-103 IU/L). There was often no mention of the positive HAV IgM test result in the patient visit records. In the cases where the results were documented, it was thought to be a false positive or cross reactivity, related to recent receipt of HAV vaccination, or prolonged persistence of HAV IgM from a prior infection. Patient characteristics of the 40 patients meeting the case definition are summarized in Table 1. None of confirmed cases had documentation of HAV vaccination prior to their acute infection. The top 5 counties of residence among confirmed cases were Jefferson, KY (7, 18%), San Diego, CA (6, 15%), Wayne, MO (4, 10%), Butler, MO (3, 8%) and Macomb, MI (3, 8%). Additionally, the top three counties (Jefferson, San Diego and Wayne) were each noted to have clustering of cases of acute HAV with risk factors of homelessness, substance abuse and/or needle exposure. Incidence rates for HAV IgM+ test results were calculated for all reported outbreak counties and the 25 counties with the highest rates are shown in Figure 1. Conclusions Occurrence of acute HAV infections among Veterans during October 2016 – June 2018 followed patterns reported by states with outbreaks during the same time frame, including high hospitalization rates. Risk factors of homelessness, substance abuse and/or needle exposures were noted in the Veteran population, similar to national HAV outbreak data. County-level clustering of cases in states with outbreaks was also observed among Veterans, with incidence rates of HAV IgM+ as high as 13 per 10,000 Veterans. Additional education of VA providers is needed regarding recognition of and appropriate testing for acute HAV infections. HAV IgM should not be ordered in asymptomatic patients with normal LFTs as the pretest probability of HAV infection is low, leading to false positives and confusion in interpreting test results. Improving Hepatitis A vaccination rates among Veterans is important, particularly among individuals who are at increased risk for infection or complications from HAV and in outbreak states to limit further spread of this outbreak. References 1. Hepatitis A Outbreak in California. Available at: https://www.cdph.ca.gov/Programs/CID/DCDC/Pages/Immunization/Hepatitis-A-Outbreak.aspx. Accessed September 18, 2018. 2. Michigan Hepatitis A Outbreak. 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Roles of Health Literacy in Relation to Social Determinants of Health and Recommendations for Informatics-Based Interventions: Systematic Review

Abstract

Objective The aim of this study is to present the syndromic groups that will be routinely monitored for the reactive mortality surveillance based on free-text medical causes of death. Introduction In 2004, Santé publique France, the French Public Health Agency set up a reactive all-cause mortality surveillance based on the administrative part of the death certificate, in the final objectives 1/ to detect unexpected or usual variations in mortality and 2/ to provide a first evaluation of mortality impact of events. In 2007, an Electronic Death Registration System (EDRS) was implemented, enabling electronic transmission of the medical causes of death to the agency in real-time. To date, 12% of the mortality is registered electronically. A pilot study demonstrated that these data were valuable for a reactive mortality surveillance system based on causes of death [1]. A strategy has thus been developed for the analysis in routine of the medical causes of death with the objectives of early detection of expected and unexpected outbreaks and reactive evaluation of their impact. This system will allow approaching the cause accountability when an excess death will be observed. Methods Mortality syndromic groups (MSG) were defined as clusters of medical causes of death (pathologies, syndromes or symptoms) that meet the objectives of the surveillance system. The causes of death are available reactively in free-text (words, terms, expressions) and with a delay of 6 to 24 months in ICD10 codes format. We explored multiple biomedical classifications such as the Mesh, SNOMED, UMLS or ICD10 to learn from their various ways to classify diseases. Based on ICD10, we defined MSGs by a list of ICD10 codes, each codes belonging to a unique MSGs. Each MSG definition was then discussed in working group including medical and epidemiological experts. Additionally, we used a dictionary (provided by the Epidemiology Center on Causes of Death (Inserm-CépiDc)) of each term/expression found in the death certificates since the early 2000 to enrich variety of expression of each MSG. We classified causes of death into MSGs from E-death certificates from 2012 to 2016: 1/ using the ICD10 codes assigned by Inserm-CépiDc based on rules defined by WHO in order to produce the national mortality statistics and 2/ using a linear Support Vector Machine (SVM) method to classify free-text causes of death. Then we compared the fluctuations of the weekly numbers of each MSG built by using both classification methods (ICD10 codes and the SVM classification) [2]. Results A list of a hundred MSGs was defined, divided into 20 topics (Respiratory conditions, Digestive conditions, Infectious conditions, Cardio and Cerebrovascular conditions, General symptoms…). 60 MSGs were dedicated to alert and detection of both expected seasonal epidemics (12 MSGs) and unexpected events (42 MSGs). They contain unspecific or acute pathologies and symptoms. 40 MSG included medical causes of death related to chronic diseases and medical history. The list of established MSGs was composed of: - MSGs for detection of expected seasonal events such as: "Influenza", "Low acute respiratory infection", "Gastroenteritis", "Chikungunya", "Heat related death", "Dehydration"… - MSGs for detection of the impact of unexpected events such as: "Epilepsy", "Choc", "Coma", "Unspecified fever", "Headache", "Suicide", "Drugs/opioids poisoning"… - MSGs for Chronic diseases and Medical history: "Chronic digestive diseases", "Chronic endocrine diseases", "Genitourinary chronic diseases", "History of diseases"… The weekly number of MSGs built using SVM classification was close and highly correlated to the weekly number of MSGs built using ICD10 codes (Figure 1). Seasonality and peaks were visible using both classifications. For instance, the increase of the MSG "Influenza" occurred during winter months which are known to be the circulating months of the influenza virus (Figure 1, left) [3]. For unusual and rare events such as death due to burns, we observed that the weekly numbers of MSG "Burns" were also similar using both methods. We observed (Figure 1, right) that the outbreak that occurred in September 2016 related to a major bus accident was found using ICD10 codes or SVM classification. Conclusions The use of free-text causes of death for reactive mortality surveillance requires the development of a strategy for the analysis of these data. Defining MSGs was essential for the implementation of automatic classification methods of the death certificates in routine. The dynamic of MSGs using ICD10 codes or SVM classification were comparable. However, the use of ICD10 codes for reactive mortality surveillance is not an option due to the delay of availability of the codes. The uses of machine learning methods, thus, enable to harness free-text causes of death for the reactive mortality surveillance with an objective of detection and early impact assessment. References 1. 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Roles of Health Literacy in Relation to Social Determinants of Health and Recommendations for Informatics-Based Interventions: Systematic Review

Abstract

Objective Laboratory of the Ministry of Agriculture (LMA) conducts Anthrax diagnostics using Bacteriology and Molecular Biology Methods: Isolated cultures through the classical bacteriology methods are always confirmed by Molecular Biology assay (PCR). In the study the samples were screened for the presence of B. anthracis via two concurrent approaches to compare classical methods and a novel PCR method. Before the TAP-7 project, PCR was only used to confirm the identity of cultures isolated by the Bacteriology. New SOPs and algorythm was created for better laboratory diagnostic. Introduction Bacillus anthracis, the etiologic agent of anthrax, is a member of a highly diverse group of endospore-forming bacteria. Bacillus anthracis spores are typically found in soil, from which they may spread via contaminated dust, water, and materials of plant and animal origin. Although anthrax is primarily a disease of herbivores, humans may contract anthrax directly or indirectly from animals. Laboratory of the Ministry of Agriculture (LMA) conducts Anthrax diagnostics using Bacteriology and Molecular Biology Methods: Isolated cultures through the classical bacteriology methods are always confirmed by Molecular Biology assay (PCR). In 2014, within Tap7 project ,Identification and Mapping of Anthrax foci in Georgia'' Anthrax suspected soil samples were tested using two lab diagnostic methods and they were compared to each other. Methods Anthrax suspected samples were tested by two methods - classical method and new method. Classical method included isolation of bacterium from soil samples using standard bacteriology tests and then PCR confirmed its identity. New method was initial PCR testing of soil samples. 302 soil samples were tested by classical method. At the same time, approximately 10% (32 samples) of the already mentioned 302 soil samples were also tested by initial PCR. Results 24 cultures isolated through bacteriology tests (Gram staining; lysis by gamma phage; motility testing; detection of polyDglutamic acid capsule by direct fluorescent antibody (DFA) were confirmed by PCR. Out of the above mentioned 32-suspected samples, 11 were confirmed positive using the classical methods, versus 9 confirmed positive using the direct PCR approach. Two bacteriologically positive samples appeared negative by the direct PCR method, i.e. only two samples did not match. Conclusions The samples were screened for the presence of B. anthracis via two concurrent approaches to compare classical methods and a novel PCR method. Before the TAP-7 project, PCR was only used to confirm the identity of cultures isolated by the Bacteriology. The purpose of the investigation of the new method was to identify if a less labor-intensive process with fewer points of operator manipulation was as efficacious as the classical method of bacteriology followed by PCR analysis of suspected samples. Despise the limited sampling and the little difference in the efficacy of the two methods, classical method stays prior to new one.

Roles of Health Literacy in Relation to Social Determinants of Health and Recommendations for Informatics-Based Interventions: Systematic Review

Abstract

Objective To describe the strategy and process used by the Florida Department of Health (FDOH) Bureau of Epidemiology to onboard emergency medical services (EMS) data into FDOH's syndromic surveillance system, the Electronic Surveillance System for the Early Notification of Community-based Epidemics (ESSENCE-FL). Introduction Syndromic surveillance has become an integral component of public health surveillance efforts within the state of Florida. The near real-time nature of these data are critical during events such as the Zika virus outbreak in Florida in 2016 and in the aftermath of Hurricane Irma in 2017. Additionally, syndromic surveillance data are utilized to support daily reportable disease detection and other surveillance efforts. Although syndromic systems typically utilize emergency department (ED) visit data, ESSENCE-FL also includes data from non-traditional sources: urgent care center visit data, mortality data, reportable disease data, and Florida Poison Information Center Network (FPICN) data. Inclusion of these data sources within the same system enables the broad accessibility of the data to more than 400 users statewide, and allows for rapid visualization of multiple data sources in order to address public health needs. Currently, the ESSENCE-FL team is actively working to incorporate EMS data into ESSENCE-FL to further increase public health surveillance capacity and data visualization. Methods The ESSENCE-FL team worked collaboratively with various public health program stakeholders to bring EMS data, aggregated by the FDOH Bureau of Emergency Medical Oversight Emergency Medical Services Tracking and Reporting System (EMSTARS) team, into ESSENCE-FL. The ESSENCE-FL team met with the EMSTARS team to discuss use cases, demonstrate both systems, and to obtain project buy-in and support. Initial project meetings included review of ESSENCE-FL system support, user types (roles and access), as well as data security and compliance. An overall project timeline was established, and deliverables were added into system support contracts. Multiple stakeholders, across disciplines representing each key use case, reviewed the Florida version of the National Emergency Medical Services Information System (NEMSIS) version 3.4 data dictionary to identify program-specific data element needs. An element scoring spreadsheet was returned to the ESSENCE-FL team. These scores were aggregated and discordant scores were reviewed by the ESSENCE-FL team. A one-month extract of EMS data was reviewed to assess variable completeness and relevance. Monthly team meetings facilitated the final decisions on the data elements by leveraging lessons learned through onboarding other data sources, findings from the analysis of the one-month extract, stakeholder comments, and advice from other states known to be leveraging EMS data for public health surveillance. Results Through a collaborative and broad approach with partners, the ESSENCE-FL team attained stakeholder buy-in and identified 81 data elements to be included in the EMS feed to ESSENCE-FL. The final list of data elements was determined to best support health surveillance of this population prior to presenting to the ED. The inclusion of the EMS data in ESSENCE-FL will increase the epidemiologic characterization and analysis of the opioid epidemic in Florida. Additional key use cases identified during this project included enhanced injury surveillance, enhanced occupational health surveillance, and characterization of potential differences between EMS and ED visits. Conclusions This comprehensive approach can be used by other jurisdictions considering adding EMS data to their syndromic surveillance systems. When considering onboarding a new data source into a surveillance system, it is important to work closely with stakeholders from disciplines representing each of the key use cases to broaden buy-in and support for the project. Through employing this comprehensive approach, syndromic surveillance systems can be better developed to include data that are widely utilizable to many different stakeholders in the public health community.

Roles of Health Literacy in Relation to Social Determinants of Health and Recommendations for Informatics-Based Interventions: Systematic Review

Abstract

Objective Schmallenberg virus (SBV) is an orthobunyavirus that primarily infects domestic and wild ruminants and causes symptoms such as transient fever, diarrhea, reduced milk production, congenital malformations and abortion. The first virus was identified in 2011 at the onset of a major outbreak in Europe (Germany, Hungary, and France). Introduction In 2012 - 2017 in Azerbaijan there was an unexpected increase of abortions in cattle and sheep that was unrelated to brucellosis or chlamydia infection. The first confirmed case of Schmallenberg disease was received from Beylagan district of Azerbaijan in October 2012. The import of cattle from Europe to Azerbaijan has commenced in 2012. Therefore, the surveillance study was launched to determine spread of infection among cattle and sheep and to monitor the situation in the country. Methods State Veterinary Control Service notified 42 Regional Veterinary Offices of Azerbaijan to commence the monitoring of Schmallenberg disease. Blood samples were collected from sheep, and cattle and biopsies of heads or necks from aborted fetuses were sampled too.. The collected samples were tested in the Republican Veterinary Laboratory. ELISA was used to investigate the presence of specific antibodies against Schmallenberg virus in the blood samples using IDEXX Schmallenberg Ab Test Kit. The commercially available real-time PCR kits (VetMAX™ Schmallenberg Virus Kit) were applied to test the biopsy samples. Both tests were recommended by the World Organization for Animal Health. Results Total, 40,257 blood samples were collected from suspicious cattle and sheep. 671 biopsies samples were taken from fetuses. 4,281 cattle and 999 sheep with antibodies against SBVwere detected. The PCR results showed that the 77 biopsies samples were positive for SBV. The highest numbers of seropositive animals were found in Ganja, Aghdash, Barda, and Baku. Conclusions This biosurveillance study determined SBV in the samples of cattle and sheep in Azerbaijan, therefore, it is important to carry out annual seromonitoring and start the vaccination program. It is essential to check the passport of imported cattle, which has the disease history and seroprevalence of SBV. References Laloy, E., Breard, E., Sailleau, C., Viarouge, C., Desprat, A., Zientara, S., Klein, F., Hars, J., Rossi, S., 2014. Schmallenberg virus infection among red deer, France, 2010-2012. Emerg. Infect. Dis. 20, 131–134. https://doi.org/10.3201/eid2001.130411 Larska, M., Krzysiak, M.K., Kesik-Maliszewska, J., Rola, J., 2014. Cross-sectional study of Schmallenberg virus seroprevalence in wild ruminants in Poland at the end of the vector season of 2013. BMC Vet. Res. 10, 967. https://doi.org/10.1186/s12917-014-0307-3

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Roles of Health Literacy in Relation to Social Determinants of Health and Recommendations for Informatics-Based Interventions: Systematic Review

Abstract

Objective Q fever is poorly understood in Georgia and its prevalence is largely underestimated in both humans and animals.One of the main goal of the project was shedding study in domestic animals – isolation of C. burnetii from suspected seropositive animal blood, milk samples. Introduction Q fever is a zoonotic bacterial disease resulting from infection by Coxiella burnetii. Domestic ruminants (cattle, sheep, and goats) are considered the main reservoir for the pathogen, which can also infect humans. Q fever is poorly understood in Georgia and its prevalence is largely underestimated in both humans and animals. In Georgia Q fever laboratory diagnostic was started and implemented at the Laboratory of the Ministry of Georgia (LMA) within GG20 „Prevalence, Epidemiological Surveillance, and Laboratory Analysis of Coxiella burnetii in Georgia". Methods LMA conducted Coxiella burnetii shedding evaluation in three specific farms from Kvemo Kartli (Tsalka, Dmanisi) and Mtskheta-Mtianeti (Dusheti). Seropositive cattle and small ruminants were sampled per week. Sampling lasted 7 weeks and totally 581 samples samples (blood, milk and swab) were tested. Testing were conducted in a BSL3 laboratory under BSL3 working conditions. ACCM medium was used (2XACCm-2 acidified Citrate Cysteine Medium PH-4.75G N NaOH). The samples were incubated at 37°C using CO2. Results As a result of the study, one culture was bacteriologically isolated from seropositive cattle milk sample (the sample was taken on the third week of the study in Beshtasheni farm, Tslka, Kvemo Kartli) and confirmed by Molecular biology (PCR). Conclusions The study confirmed Q fever existence in Georgia. Traditionally considered an obligate intracellular agent, the requirement to be grown in tissue culture cells, embryonated eggs, or animal hosts has made it difficult to isolate C. Burnetii strains. Within the study one culture was isolated from the seropositive animal milk sample that was collected in the third week of the study. shedding of Coxiella burnetii in milk by infected cows appeared to be the most frequent positive sample for the bacterium.

Roles of Health Literacy in Relation to Social Determinants of Health and Recommendations for Informatics-Based Interventions: Systematic Review

Abstract

Objective In the presented study, we examined the impact of school holidays (Autumn, Winter, Summer, and Spring Breaks) and social events (Super Bowl, NBA Finals, World Series, and Black Friday) for five age groups (<4, 5-24, 25-44, 45-64, >65 years) on four health outcomes of influenza (total tested, all influenza positives, positives for influenza A, and B) in Milwaukee, WI, in 2004-2009 using routine surveillance. Introduction Influenza viral infection is contentious, has a short incubation period, yet preventable if multiple barriers are employed. At some extend school holidays and travel restrictions serve as a socially accepted control measure1,2. A study of a spatiotemporal spread of influenza among school-aged children in Belgium illustrated that changes in mixing patterns are responsible for altering disease seasonality3. Stochastic numerical simulations suggested that weekends and holidays can delay disease seasonal peaks, mitigate the spread of infection, and slow down the epidemic by periodically dampening transmission. While Christmas holidays had the largest impact on transmission, other school breaks may also help in reducing an epidemic size. Contrary to events reducing social mixing, sporting events and mass gatherings facilitate the spread of infections4. A study on county-level vital statistics of the US from 1974-2009 showed that Super Bowl social mixing affects influenza dissemination by decreasing mortality rates in older adults in Bowl-participating counties. The effect is most pronounced for highly virulent influenza strains and when the Super Bowl occurs closer to the influenza seasonal peak. Simulation studies exploring how social mixing affects influenza spread5 demonstrated that impact of the public gathering on prevalence of influenza depends on time proximity to epidemic peak. While the effects of holidays and social events on seasonal influenza have been explored in surveillance time series and agent-based modeling studies, the understanding of the differential effects across age groups is incomplete. Methods The City of Milwaukee Health Department Laboratory (MHDL), Wisconsin routinely collect tests from residents of metropolitan areas and vicinities of the Marquette University (MU). We obtained weekly counts of total tested, all influenza positives, positives for influenza A and B, from MHDL between 5/16/04-3/7/09 (before the surge of tests associated with "swine flu"). Cases for <1 and 1-4 age groups were combined. Meteorological data are routinely collected by a monitoring station at the General Mitchell International airport located 7.5 miles from Milwaukee. Daily dewpoint values representing the perceived ambient temperature corrected for the air moisture content were downloaded from the open source website6 and aggregated to weekly averages with Sunday designating the beginning of each week. School holidays were obtained from academic calendars on the MU website with holiday weeks defined as having one or more school holiday observed.7 Selected social events were retrieved from a public website.8 As part of exploratory analysis, average cases per week (c/w) for each outcome for school holiday and non-holiday weeks were compared using a non-parametric the Mann–Whitney U-test. We analyzed the association between weekly cases and holiday effects using negative binomial regression with sets of indicator variables for non-overlapping school holidays and social events and with adjustments for weather fluctuations with harmonic terms (Model 1). Results are presented as Relative Risk (RR) estimates along with their confidence intervals (95%CI). Further analyses examined seasonal signatures (lead-lag structures) using a segmented regression approach for weekly counts and rates 5 academic weeks (aw) before, 2-6 weeks during, and 5 weeks after select holidays (Model 2). Results Over 251 study weeks, 2282 tests were submitted, out of which 1098 cases were from 5-24 y.o. age group. 477 (21%) tests we positive, with 399 (84%) cases of influenza A (73 tests were not subtyped) and 78 (16%) cases of influenza B. Figure 1 shows the time series of weekly counts of influenza tests and percent positives with superimposed information on school holiday occurrences. Overall, during 135 weeks of the school period the average number of tests was two times higher as compared to those during 116 holiday weeks (11.9±10.3 vs 5.8±6.5 c/w, p<0.001). Similarly, the average weekly number of positive tests was higher in non-holiday than during holiday periods (2.9±5.7 vs 0.7±2.6 c/w, p<0.001). The reduction in tests during holidays was confirmed by the regression model (RR=0.71; 95%CI=[0.60-0.86]). The reduction in weekly tests was most pronounced during the Winter Break (15-19 aw) for all age groups (4.8±3.0 c/w, p<0.001; RR=0.3; 95%CI=[0.23-0.41]) and especially for school-aged children, young adults and adults (RR=0.14; 95%CI=[0.09-0.22] and RR=0.32; 95%CI=[0.16-0.62] for 5-24 and 25-44 age groups, respectively). In contrast, during the Spring Break (27-30 aw) the number of tests has almost doubled (20.4±10.4 c/w; p<0.001) as compared to the school period, with the most noticeable increase in 5-24 and 25-44 age groups. Spring Break differential effects were primarily due to later peaks in influenza B shown by segmented regression results in Figure 2. The seasonal increase in weekly rates is the steepest after the winter holidays. The effects of the selected sporting and social events were inconclusive. Conclusions The differential effects of calendar events on seasonal influenza can be detected by routine surveillance and further explored with respect to lead-lag structures. We recommend incorporating location-specific calendar effects in influenza near-term forecasting models tailored to susceptible age groups to better predict and assess targeted intervention measures. References 1. Jackson C, et al. (2016). The relationship between school holidays and transmission of influenza in England and wales. Am Journal of Epidemiology. 184(9), 644-51. 2. Chu Y, et al. (2017). Effects of school breaks on influenza-like

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Roles of Health Literacy in Relation to Social Determinants of Health and Recommendations for Informatics-Based Interventions: Systematic Review

Abstract

Objective To compare prevalence estimates obtained by the ADDM cerebral palsy surveillance method to other administrative or diagnostic indications of cerebral palsy. Introduction Cerebral Palsy (CP) is the most common cause of motor disability in children. CP registries often rely on administrative data such as CP diagnoses or International Classification of Diseases (ICD) codes indicative of CP. However, little is known about the validity of these indicators. We calculated sensitivity, specificity, positive and negative predictive values of CP ICD-9 codes and CP diagnoses compared to a "gold standard" CP classification based on detailed medical and education record review. Methods This sample includes 50,332 8-year-olds living in four US sites (32 counties in Alabama, 5 counties in Georgia, 10 counties in Wisconsin, and 5 counties in Missouri) in 2006, 2008, and 2010. The Autism and Developmental Disabilities Monitoring (ADDM) Network reviewed medical and education records for these children as part of the US Centers for Disease Control and Prevention population-based surveillance of developmental disabilities. All of these children received special education services or were assigned one or more ICD-9 codes associated with a variety of developmental disabilities by community medical providers. Medical and education records were reviewed by trained staff; if the records contained CP diagnoses or motor findings indicative of CP, detailed clinical information was abstracted for additional review by trained clinicians who determined whether the child met the CP case definition based on all information available. Abstracted records were also reviewed for evidence of known motor disorders or genetic conditions that disqualified a child from being a CP case, such as inborn error of metabolism or muscular dystrophy. Trained clinicians reviewed and excluded children with confirmed disqualifying conditions. We calculated CP prevalence, sensitivity, specificity, and positive and negative predictive values for three different methods used to identify cases, using the ADDM surveillance case identification as the gold standard. These methods include: 1) ICD-9 codes for CP (342–344); 2) a CP diagnosis written in the medical or education records, excluding children with disqualifying conditions, and 3) both ICD-9 codes (342–344) and a CP diagnosis written in the medical or education records, excluding children with disqualifying conditions. In an attempt to avoid requiring record review for method 1, we considered using ICD-9 codes for disqualifying conditions. However, we found that ICD codes for these conditions did not correlate well with disqualifying conditions identified in medical record reviews; therefore disqualifying conditions were not considered for method 1. Methods 2 and 3 did require review of medical records for disqualifying conditions and for a written CP diagnosis, but overall were less extensive than traditional ADDM surveillance methods. In order to determine the impact of different classification criteria on how and which children are captured by surveillance methods, we compared demographic and other characteristics of all children who met the ADDM surveillance case definition. We compared children who would and would not be classified as CP cases using method 3. Results Out of the total 50,332 children, 1294 met the ADDM surveillance case definition, 2201 had CP ICD codes (method 1), 1502 had a written CP diagnosis and no disqualifying conditions (method 2), and 1345 had both CP ICD codes and a written diagnosis and no disqualifying conditions (method 3). Each study year, between 32—48% of abstracted children were excluded due to disqualifying conditions found in medical records. The ADDM network gold standard CP prevalence was 3.3 per 1000 in 2006, 3.1 per 1000 in 2008, and 2.9 per 1000 in 2010. For method 1, sensitivity was 90.0%, specificity was 97.4%, positive predictive value was 51.6% and negative predictive value was 99.7%. Method 1 prevalence estimates were 5.3 per 1000 in 2006, 4.6 per 1000 in 2008, and 4.6 per 1000 in 2010. For method 2, sensitivity was 98.1%, specificity was 88.4%, PPV was 84.5% and NPV was 98.4% compared to the ADDM Network definition. Method 2 estimated prevalence was 3.9 per 1000 for 2006, 3.6 per 1000 for 2008, and 3.2 per 1000 for 2010. For method 3, sensitivity was 89.6%, specificity was 99.5%, PPV was 84.3% and NPV was 99.7%. Method 3 estimated prevalence was 3.5 per 1000 for 2006, 3.2 per 1000 for 2008, and 2.8 per 1000 for 2010. Using Pearson's Chi-Square tests, we compared demographic and other characteristics of ADDM Network CP case children who also met method 3 case definition (n = 1134) and children who met the ADDM Network CP definition but not method 3 case definition (n = 160). Demographic information was not different between these children. ADDM Network CP case children who did not meet method 3 criteria were significantly less likely to require a wheelchair for mobility than children who met method 3 criteria (4.4% versus 27.4%, p < .05). Conclusions Relying on ICD-9 codes without excluding disqualifying conditions to identify CP cases (method 1) resulted in high sensitivity (90%), but low positive predictive value as well as an overestimated CP prevalence when compared with the ADDM Network method. Use of a written diagnosis and excluding disqualifying conditions (method 2) resulted in very high sensitivity (98%), with fewer false positives but overestimated CP prevalence compared to the ADDM estimate. In contrast, using both CP ICD codes and a written CP diagnosis and excluding disqualifying conditions (method 3) yielded prevalence estimates similar to ADDM Network CP estimates; this approach also had high sensitivity, specificity, and PPV. Methods 2 and 3 still require manual record review, unlike method 1. For method 2, reviewers would need to review all records for CP and disqualifying conditions. Method 3 only requires review of records with CP ICD codes, comprising 4% of all records currently reviewed. Method 3 would fail to capture children

without both a written diagnosis and ICD codes; and this approach may be less sensitive for detecting CP among children with less severe motor impairment than using the gold standard. Using ICD codes and written CP diagnoses contained in medical and education records combined with a limited medical record review to identify disqualifying conditions could lower operational costs of CP surveillance while preserving accurate prevalence estimates compared with the more labor-intensive processes currently used. Further evaluation is needed to determine if improvements in efficiency are worth potential trade-offs in the data collected by the system. Of particular importance is whether the approach could capture all the necessary indicators that are important to stakeholders. Additional analyses would also need to evaluate whether the surveillance methods affect other findings, such as previously observed disparities, co-occurring conditions, or CP severity.

Roles of Health Literacy in Relation to Social Determinants of Health and Recommendations for Informatics-Based Interventions: Systematic Review

Abstract

Objective To determine the merits of different surveillance methods for cluster detection, in particular when used in conjuction with small area data. This will be investigated using a simulated framework. This is with a view to support further surveilance work using real small area data. Introduction Health surveillance is well established for infectious diseases, but less so for non-communicable diseases. When spatio-temporal methods are used, selection often appears to be driven by arbitrary criteria, rather than optimal detection capabilities. Our aim is to use a theoretical simulation framework with known spatio-temporal clusters to investigate the sensitivity and specificity of several traditional (e.g. SatScan and Cusum) and Bayesian (incl. BaySTDetect and Dcluster) statistical methods for spatio-temporal cluster detection of non-communicable disease. Methods Count data were generated using various random effects (RE). A subset of areas was randomly given an increased relative risk (RR) to simulate disease clusters. Simulations were conducted in R using a grid of 625 areas. We used 12 times= nteps within a hierarchical Poisson model. Multiple values of model parameters, including REs and the RR within clusters, were then tested. The range of RE (values) was derived from real-world data from England on common and rare diseases. RR ranging between 1.2 and 1.8 were tested to reflect both low and high exposures to pollutants and other risk factors. ROC analysis, based on 50 simulations, was used to assess the performance of each statistical method for each combination of parameter values. Results Our ROC analysis suggested that SaTScan usually had the highest specificity at low sensitivities (<0.5), although its maximum sensitivity was often lower than when using the Bayesian methods. In scenarios where the RR within clusters was lower, all methods had less sensitivity at a given specificity. Cusum usually performed quite similarly to SatScan, while the two Bayesian methods considered often misidentified a high proportion of disease clusters. P-values generated by SaTScan need to be considered with caution as they did not relate closely with the sensitivity or specificity of the ROC curves from our simulations. Conclusions Real-world investigations of spatio-temporal signals (e.g. disease clusters) are often complex and time consuming. Identifying the best method to reduce the risks of identifying false positives and of missing real clusters is therefore essential. Despite the inherent constraints of theoretical simulations, such a framework allows to objectively assess the performance of different methods. Overall, our simulation framework suggested that SatScan would usually be the easiest, most user-friendly and best performing space-time methods for non-communicable disease surveillance.

Roles of Health Literacy in Relation to Social Determinants of Health and Recommendations for Informatics-Based Interventions: Systematic Review

Abstract

Objective Epidemiologists will understand the differences between syndromic and discharge emergency department data sources, the strengths and limitations of each data source, and how each of these different emergency department data sources can be best applied to inform a public health response to the opioid overdose epidemic. Introduction Timely and accurate measurement of overdose morbidity using emergency department (ED) data is necessary to inform an effective public health response given the dynamic nature of opioid overdose epidemic in the United States. However, from jurisdiction to jurisdiction, differing sources and types of ED data vary in their quality and comprehensiveness. Many jurisdictions collect timely emergency department data through syndromic surveillance (SyS) systems, while others may have access to more complete, but slower emergency department discharge datasets. State and local epidemiologists must make decisions regarding which datasets to use and how to best operationalize, interpret, and present overdose morbidity using ED data. These choices may affect the number, timeliness, and accuracy of the cases identified. Methods CDC partnered with 45 states and the District of Columbia to combat the worsening opioid overdose epidemic through three cooperative agreements: Prevention for States (PFS), Data Driven Prevention Initiative (DDPI), and Enhanced State Opioid Overdose Surveillance (ESOOS). To support funded jurisdictions in monitoring non-fatal opioid overdoses, CDC developed two different sets of indicator guidance for measuring non-fatal opioid overdoses using ED data, with each focusing on different ED data sources (SyS and discharge). We report on the following attributes for each type of ED data source1,2: 1) timeliness; 2) data quality (e.g., percent completeness by field); 3) validity; and 4) representativeness (e.g., percent of facilities included). Results When comparing timeliness across data sources, SyS data has clear advantages, with many jurisdictions receiving data within 24 hours of an event. For discharge data, timeliness is more variable with some jurisdictions receiving data within weeks while others wait over 1.5 years before receiving a complete discharge dataset. Data quality and completeness tends to be stronger in discharge datasets as facilities are required to submit complete discharge records with valid ICD-10-CM codes in order to be reimbursed by payers. By contrast, for SyS data systems, participating facilities may not consistently submit data for all possible fields, including diagnosis. Validity is dependent on the data source as well as the case definition or syndrome definition used; with this in mind, SyS data overdose indicators are designed to have high sensitivity, with less attention to specificity. Discharge data overdose indicators are designed to have a high positive predictive value, while sensitivity and specificity are both important considerations. Discharge datasets often include records for 100% of ED visits from all nonfederal, acute care-affiliated facilities in a state included. By contrast, representativeness of facilities in SyS data systems varies widely across states with some states having less than 50% of facilities reporting. Conclusions CDC funded partners share overdose morbidity data with CDC using either ED SyS data, ED discharge data, or both. CDC indicator guidance for ED discharge data is designed for states to track changes in health outcomes over time for descriptive, performance monitoring, and evaluation purposes and to create rates that are more comparable across injury category, time, and place. Considering these objectives, CDC placed a higher priority on data quality, validity (i.e., positive predictive value), and representativeness, all of which are stronger attributes of discharge data. CDC's indicator guidance for ED SyS data is designed for states to rapidly identify changes in nonfatal overdoses and to identify areas within a particular state that are experiencing rapid change in the frequency or types of overdose events. When considering these needs, CDC prioritized timeliness and validity in terms of sensitivity, both of which are stronger attributes of SyS data. SyS and discharge ED data each lend themselves to different informational applications and interpretations based on the strengths and limitations of each dataset. An effective, informed public health response to the opioid overdose epidemic requires continued investment in public health surveillance infrastructure, careful consideration of the needs of the data user, and transparency regarding the unique strengths and limitations of each dataset. References 1. Pencheon, D. (2006). Oxford handbook of public health practice. 2nd ed. Oxford: Oxford University Press. 2. Centers for Disease Control and Prevention (CDC) Evaluation Working Group on Public Health Surveillance Systems for Early Detection of Outbreaks. (May 7, 2004). Framework for Evaluating Public Health Surveillance Systems for Early Detection of Outbreaks. MMWR. Morbidity and Mortality Weekly Reports. Retrieved from: https://www.cdc.gov/mmwr/preview/mmwrhtml/rr5305a1.htm

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Roles of Health Literacy in Relation to Social Determinants of Health and Recommendations for Informatics-Based Interventions: Systematic Review

Abstract

Objective To develop specimen pooling algorithms that reduce the number of tests needed to test individuals for infectious diseases with multiplex assays. Introduction An essential tool for infectious disease surveillance is to have a timely and cost-effective testing method. For this purpose, laboratories frequently use specimen pooling to assay high volumes of clinical specimens. The simplest pooling algorithm employs a two-stage process. In the first stage, a set number of specimens are amalgamated to form a "group" that is tested as if it were one specimen. If this group tests negatively, all individuals within the group are declared disease free. If this group tests positively, a second stage is implemented with retests performed on each individual. This testing algorithm is repeated across all individuals that need to be tested. In comparison to testing each individual specimen, large reductions in the number of tests occur when overall disease prevalence is small because most groups will test negatively. Most pooling algorithms have been developed in the context of single-disease assays. New pooling algorithms are developed in the context of multiplex (multiple-disease) assays applied over two or three hierarchical stages. Individual risk information can be employed by these algorithms to increase testing efficiency. Methods Monte Carlo simulations are used to emulate pooling and testing processes. These simulations are based on retrospective chlamydia and gonorrhea testing data collected over a two-year period in Idaho, Iowa, and Oregon. For each simulation, the number of tests and measures of accuracy are recorded. All tests were originally performed by the Aptima Combo 2 Assay. Sensitivities and specificities for this assay are included in the simulation process. The R statistical software package is used to perform all simulations. For reproducibility of the research, programs are made available at www.chrisbilder.com/grouptesting to implement the simulations. Results Reductions in the number of tests were obtained for all states when compared to individual specimen testing. For example, the pooling of Idaho female specimens without taking into account individual risk information resulted in a 47% and a 51% reduction in tests when using two and three stages, respectively. With the addition of individual risk information, further reductions in tests occurred. For example, the pooling of Idaho female specimens resulted in an additional 5% reduction of tests when compared directly to not using individual risk information. These reductions in tests were found to be related to the type of risk information available and the variability in risk levels. For example, males were found to have much more variability than females. For Idaho, this resulted in a 15% further reduction in tests than when not using the risk information. Conclusions Significant reductions in the number of tests occur through pooling. These reductions are the most significant when individual risk information is taken into account by the pooling algorithm.

Roles of Health Literacy in Relation to Social Determinants of Health and Recommendations for Informatics-Based Interventions: Systematic Review

Abstract

Objective To utilize clinical data in Electronic Health Records (EHRs) to develop chronic disease phenotypes appropriate for conducting population health surveillance. Introduction Chronic diseases, including hypertension, type 2 diabetes mellitus (diabetes), obesity, and hyperlipidemia, are some of the leading causes of morbidity and mortality in the United States. Monitoring disease prevalence guides public health programs and policies that help prevent this burden. EHRs can supplement traditional sources of chronic disease surveillance, such as health surveys and administrative claims datasets, by offering near real-time data, large sample sizes, and a rich source of clinical data. However, few studies have provided clear, consistent EHR phenotypes that were developed to inform population health surveillance. Methods Retrospective EHR data were obtained for patients seen at New York University Langone Health in 2017 (n=1,397,446). To better estimate chronic disease burden among New York City (NYC) adults, the patient population was limited to NYC residents aged 20 or older, who were seen in the ambulatory primary care setting (n=153,653). Rule-based algorithms for identifying patients with hypertension, statin-eligibility, diabetes, and obesity were developed based on a combination of diagnostic codes, lab results or vitals, and relevant prescriptions. We compared the performance of our metric definitions to selected phenotypes from the literature using percent agreement and Cohen's kappa. Patients with discordant disease classifications between the two sets of definitions were analyzed through natural language processing (NLP) on the patients' 2017 medical notes using a support vector machine model. Statin-eligibility is a novel phenotype and therefore did not have a comparable definition in the literature. Sensitivity analyses were conducted to determine how disease burden changed under alternative rules for each metric. Results Of 153,653 adult ambulatory care patients in 2017, an estimated 53.7% had hypertension, 12.4% had diabetes, 27.8% were obese, and 30.0% were statin-eligible under our proposed definitions. The estimated prevalence of hypertension increased from 28.1% to 53.7% when diagnostic codes were supplemented with blood pressure measurements and anti-hypertensive medications, while the estimated prevalence of diabetes increased less than one percentage point with inclusion of diabetes-related medications and elevated A1C measurements. There was high agreement between our obesity (94.5% agreement, k=0.86) and diabetes (96.2% agreement, k=0.81) definitions and selected definitions from the literature and moderate agreement between the hypertension definitions (74.8% agreement, k=0.41). NLP classification of discordant cases had greater alignment with the classification results of our definitions for both hypertension (78.0% agreement) and diabetes (71.2% agreement) but did not show strong agreement with either obesity algorithm. Sensitivity analyses did not have large impacts on prevalence estimates for any of the indicators, with all estimates within two percentage points of the final algorithms. Conclusions Our proposed rule-based phenotypes using prescriptions, labs, and vitals improved ascertainment of conditions beyond diagnostic codes and were robust to modifications per sensitivity analyses. Results from our algorithms were highly consistent with standard phenotypes from the literature and may improve case capture for surveillance purposes. These algorithms can be replicated across diverse EHR networks and can be weighted to generate population prevalence estimates.

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Roles of Health Literacy in Relation to Social Determinants of Health and Recommendations for Informatics-Based Interventions: Systematic Review

Abstract

Objective To share progress on a custom spell-checker for emergency department chief complaint free-text data and demonstrate a spell-checker validation Shiny application. Introduction Emergency department (ED) syndromic surveillance relies on a chief complaint, which is often a free-text field, and may contain misspelled words, syntactic errors, and healthcare-specific and/or facility-specific abbreviations. Cleaning of the chief complaint field may improve syndrome capture sensitivity and reduce misclassification of syndromes. We are building a spell-checker, customized with language found in ED corpora, as our first step in cleaning our chief complaint field. This exercise would elucidate the value of pre-processing text and would lend itself to future work using natural language processing (NLP) techniques, such as topic modeling. Such a tool could be extensible to other datasets that contain free-text fields, including electronic reportable disease lab and case reporting. Methods Chief complaints may contain words that are incorrect if they are misspelled (e.g.,"patient has herpertension"), or, if the word yields a syntactically incorrect phrase (e.g., the word "huts" in the phrase: "my toe huts"). We are developing a spell-checker tool for chief complaint text using the R and Python programming languages. The first stage in the development of the spell-checker is the identifying and handling of misspellings; future work will address syntactic errors. Known abbreviations are identified using regular expressions, and unknown abbreviations are addressed by the spell-checker. The spell checker performs 4 steps on chief complaint data: identification of misspellings, generation of a substitute candidate word list, word sense disambiguation to identify replacement word, and replacement of the misspelled word, based on methods found in the literature.[1] As the spell-checker requires a dictionary of correctly spelled, healthcare-specific terms including all terms that would appear in an ED corpus, we used vocabularies from the Unified Medical Language System, ED-specific terminology, and domain expert user input. Dictionary construction, misspelling identification algorithms, and word list generation algorithms are in the development stage. Simultaneously, we are building an R Shiny interactive web application for syndromic surveillance analysts to manually correct a subset of misspelled words, which we will use to validate and evaluate the performance of the spell-checker tool. [1] Tolentino HD, Matters MD, Walop W, et al. A UMLS-based spell checker for natural language processing in vaccine safety. BMC Medical Informatics and Decision Making. 2007;7(1). doi:10.1186/1472-6947-7-3. Results Project still in development phase. Conclusions The audience will learn about important considerations for developing a spell-checker, including those for data structure of a dictionary and algorithms for identification of misplaced words and identification of candidate replacement words. We will demonstrate our word list generation algorithm and the Shiny application which uses these words for spell-checker validation. We will share relevant code; after our presentation, audience members should able to apply code and lessons to their own projects and/or to collaborate with the NYC Department of Health and Mental Hygiene.

Roles of Health Literacy in Relation to Social Determinants of Health and Recommendations for Informatics-Based Interventions: Systematic Review

Abstract

Objective To develop and implement a classifcation algorithm to identify likely acute opioid overdoses from text fields in emergency medical services (EMS) records. Introduction Opioid overdoses have emerged within the last five to ten years to be a major public health concern. The high potential for fatal events, disease transmission, and addiction all contribute to negative outcomes. However, what is currently known about opioid use and overdose is generally gathered from emergency room data, public surveys, and mortality data. In addition, opioid overdoses are a non-reportable condition. As a result, state/national standardized procedures for surveillance or reporting have not been developed, and local government monitoring is frequently not specific enough to capture and track all opioid overdoses. Lastly, traditional means of data collection for conditions such as heart disease through hospital networks or insurance companies are not necessarily applicable to opioid overdoses, due to the often short disease course of addiction and lack of consistent health care visits. Overdose patients are also reluctant to follow-up or provide contact information due to law enforcement or personal reasons. Furthermore, collected data related to overdoses several months or years after the fact are useless in terms of short-term outreach. Therefore, given the potentially brief timeline of addiction or use to negative outcome, the current project set to create a near real-time surveillance and treatment/outreach system for opioid overdoses using an already existing EMS data collection framework. Methods Marin County Department of Health and Human Services EMS data (2015-2017) was used for development of the system. The pool of data for model development and evaluation consisted of 15,000 EMS records randomly selected from 2015, 2016, and 2017. Each record was manually classified in a binary manner with the criteria of "more likely than not opioid related", using only selected text fields. The event did not need to be exclusively opioid related, nor did opioids have to be the primary cause for the EMS call. 2,000 records were selected for review by the medical director for Marin County EMS, with a Cohen's kappa coefficient of approximately 0.94. Overall, the proportion of opioid overdoses was less than 0.01 amongst the 15,000 records. An enriched data set of 80 randomly selected overdoses and 320 randomly selected non-overdoses was created for the purposes of feature engineering. These 400 records were excluded for further use in model training and testing. Within the enriched set, the descriptive text fields were tokenized based on the hypothesis that opioid overdoses and non-overdoses are separable based on the content of the descriptive fields. Each field was tokenized as words, bigrams (pairs of consecutive words), and trigrams (triplets of consecutive words). The frequencies of each token as a percentage of overall words were calculated separately for opioid overdoses and non-overdoses. Structured fields used in the analysis were not tokenized prior to frequency calculations. The frequencies for each token/phrase were then compared across opioid overdoses status with a proportion test for equality at an alpha of 0.05 with a Bonferroni correction for multiple comparisons. The tokens/phrases that were statistically significantly more likely to be present in opioid overdoses were assigned to a quintile based on their p-value, with smallest p-values assigned five, and largest p-values assigned one. Tokens/phrases statistically significantly more likely to be present in non-overdoses were scored in the same manner, with the smallest p-value assigned negative five, and the largest p-value negative one. The tokens/phrases that were statistically different across opioid overdose status were stored along with their quintile scores in dictionaries that were kept for future modeling use. From the initial 15,000 classified records, excluding the 400 used for the enriched data set, 10,000 records were randomly selected for model training and development. Each record had their text fields tokenized into words, bigrams, and trigrams, and each was compared with the corresponding dictionary. If a token was present in the entry and also in the dictionary, that token's quintile score was assigned to the record, with multiple tokens being summed to produce a score for each field-token option. The final created feature was the count of opioid specific terms such as "heroin", "fentanyl", "narcan", etc. within the main narrative field. The intent was to create a variety of numerical features that were indicative of presence of tokens/phrases that were positively associated with opioid overdoses such that higher scores were more associated. Several models including support vector machines, neural nets, gradient boosted machines, and logistic regression were tested via 10-fold cross validation, with logistic regression yielding the best error rates and lowest computational costs. Although all models resulted in a sensitivity greater than 85 percent, logistic regression was by far the best in terms of false positive rate. The coefficients for the logistic regression model were selected from the eight created features along with patient sex and patient age by best subsets selection via Akaike information criterion (AIC), and the probability threshold for classification was selected via optimizing the receiver operating curve (ROC). Results Following the variable selection and threshold optimization for logistic regression, the sensitivity and specificity of the model were between 90 percent and 95 percent. However, given the large number of records fed through the algorithm either each week for "real-time" surveillance and treatment/outreach, or for larger retrospective data sets, improving specificity is crucial to reduce the number of false positives. Additionally, given that a public health treatment/outreach staff has a finite amount of time and resources, limiting false positives will allow them to focus on the true cases. Further model improvements were made with a series of binary filters that allowed for overall sensitivity/specificity improvements as well as ensuring that the records

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sent for outreach are appropriate for outreach. The application of the filters pushed the classification sensitivity and specificity to greater than 99 percent. Further, the filters removed cases inappropriate for outreach at greater than 90 percent efficiency. Conclusions The algorithm was able to classify opioid overdoses in EMS data with a sensitivity and specificity greater than 99 percent. It was implemented into a viable public health treatment/outreach system through the Marin County Department of Health and Human Services in May 2018, and has identified approximately 50 overdoses for outreach as of September, 2018. It is possible, using minimal computational power and infrastructure to develop a fully realized surveillance system through EMS data for nearly any size public health entity. Additionally, the framework allows for flexibility such that the system can be tailored for specific clinical or surveillance needs - there is no "black box" component. Lastly, the application of this methodology to other diseases/conditions is possible and has already been done using the same data for both sepsis and falls in older adults. References 1) R Core Team. 2018. R: A Language and Environment for Statistical Computing. Available: https://www.r-project.org/. 2) RStudio Team. 2018. RStudio: Integrated Development Environment for R. Available: http://www.rstudio.com/.

Roles of Health Literacy in Relation to Social Determinants of Health and Recommendations for Informatics-Based Interventions: Systematic Review

Abstract

Objective The presentation describes the results of the daily monitoring of health indicators conducted by the French public health agency during the major floods and the cold wave that occurred in January 2018 in France, in order to early identify potential impact of those climatic events on the population. Introduction The Seine River rises at the north-East of France and flows through Paris before emptying into the English Channel. On January 2018 (from 22th January to 11th February, Weeks 4 to 6), major floods occurred in the Basin of Seine River, after an important rainy period. This period was also marked by the occurrence on the same area of a first cold wave on Week 6 (from 5th to 7th February), including heavy snowfall and ice conditions from 9th to 10th February. A second similar cold wave occured from 28th February and 1st March. Floods of all magnitude are known to have potential health impacts on population [1], both at short, medium and long term both on physical (injuries, diarrhoeal disease, Carbon Monoxyde poisoning, vector-borne disease) and mental health. Extreme cold weather have also the potential to further impact on human health through direct exposure to lower temperatures, and associated adverse conditions, such as snow and ice [2]. Such situations may be particularly associated to direct impact like hypothermia, frostbite and selected bone/joint injuries). Methods Since 2004, the French Public Health Agency (Santé publique France) set up a national syndromic surveillance system SurSaUD, enabling to ensure morbidity and mortality surveillance [3]. In 2018, morbidity data were daily collected from a network involving about 700 emergency departments (ED) and 58 emergency general practitioners' associations SOS Médecins. 92% of the national ED attendances and 95% of national SOS Médecins visits are caught by the system. Both demographic (age and gender), administrative (date and location of consultation, transport) and medical information (chief complaint, medical diagnosis using ICD10 codes in ED and specific thesauri in SOS Médecins associations, severity, hospitalization after discharge) are recorded for each patient. The daily and weekly evolution of the number of all-cause ED attendances and SOS Médecins consultations during the flooding period were compared to the evolution on the two previous years. The number of hospitalisations after ED discharge was also monitored. The immediate health impact of floods and cold waves was assessed by monitoring eight syndromic indicators: gastroenteritis, carbon monoxide poisoning, burnt, stress, faintness, drowning, injuries and hypothermia. Analyses were performed by age group (<15 years, 15-64 years, more than 65 years) and at different geographical levels (national, Paris region and districts located in the Basin of Seine River). Results In 2018, syndromic surveillance did not show any major impact on all-cause ED attendances and SOS Médecins consultations from week 4 to week 6, neither in Paris area nor in other areas along the Seine River. The recorded numbers were comparable to the two precedent years in all age groups. A decrease of the all-cause ED attendances was observed during the 1st day with ice conditions in Normandy and Paris, mainly in children and adults aged 15-64 years. During week 6 in Paris area, an increase of ED attendances was observed for injuries (+4% compared to the past weeks – figure 1) and to a lesser extent for hypothermia and frostbite (16 attendances compared to less than 9 for the past weeks). Similar increase in injuries were observed in Normandy during the second cold wave (Figure 1). Conclusions During the flood episode, the rising water level was slow with foreseeable evolution, compared to other sudden flood events occurring in south of France in 2010 due to violent thunderstorms. This progressive evolution allows French authority to deploy wide specific organization in order to mitigate impact on concerned populations. That may explain the absence impact observed in ED at regional and national levels during the flood disaster. The evolution of injuries during 2018 episode is attributable to the cold wave that occurred simultaneously. As the French syndromic surveillance system is implemented on the whole territory and collects emergency data routinely since several years, it constitutes a reactive tool to assess the potential public health impact of both sudden and predictable disasters. It can either contribute to adapt management action or reassure decision makers if no major impact is observed. References [1] Ahern M, Kovats S. The health impacts of floods. In: Few R, Matthies F, eds. Flood hazards and health: responding to present and future risks. London, Earthscan, 2006:28–53. [2] Hughes H, Morbey R, Hughes T. et al. Using an Emergency Department Syndromic Surveillance System to investigate the impact of extreme cold weather events Public Health. 2014 Jul;128(7):628-35. [3] Caserio-Schönemann C, Bousquet V, Fouillet A, Henry V. The French syndromic surveillance system SurSaUD (R). Bull Epidémiol Hebd 2014;3-4:38-44.

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Roles of Health Literacy in Relation to Social Determinants of Health and Recommendations for Informatics-Based Interventions: Systematic Review

Abstract

Objective To identify additional data elements in existing syndromic surveillance message feeds that can provide additional insight into public health concerns such as the influenza season. Introduction Syndromic surveillance achieves timeliness by collecting prediagnostic data, such as emergency department chief complaints, from the start of healthcare interactions. The tradeoff is less precision than from diagnosis data, which takes longer to generate. As the use and sophistication of electronic health information systems increases, additional data that provide an intermediate balance of timeliness and precision are becoming available. Information about the procedures and treatments ordered for a patient can indicate what diagnoses are being considered. Procedure records can also be used to track the use of preventive measures such as vaccines that are also relevant to public health surveillance but not readily captured by typical syndromic data elements. Some procedures such as laboratory tests also provide results which can provide additional specificity about which diagnoses will be considered. If procedure and treatment orders and test results are included in existing syndromic surveillance feeds, additional specificity can be achieved with timeliness comparable to prediagnostic assessments. Methods HL7 messages were collected for syndromic surveillance using EpiCenter software. They were retroactively scanned for PR1 procedure segments; procedure codes and descriptions were extracted when available. Influenza-related procedures were identified and classified as either a test for the virus or an administration of a vaccine. Classification was based on the procedure code when a standard code set was used and could be identified, otherwise it was based on the text description of the procedure. Messages were also scanned for the presence of 'influenza' in text fields. Influenza test results were identified first by selecting messages with 'influenza' in an OBX segment and then further refining based on the test code and description. Results A total of 443,074,748 messages from 2,577 healthcare facilities received between July 1, 2017 and August 31, 2018 were scanned for procedure information. Procedure codes were present in 39,142,670 messages from 287 facilities. The most common procedures included blood glucose measurements and other diabetes maintenance activities, incentive spirometry, blood count and metabolic panels, safety observation, and vital signs. Of those, 995,754 messages from 142 facilities contained influenza-related procedure codes for 106,610 visits. 14,672 visits from 62 facilities had one of 48 vaccine procedure codes, and 91, 948 visits from 127 facilities had one of 66 test codes. Time series of both types of procedures showed a seasonal trend consistent with the influenza season. Figure 1 shows the daily counts of influenza test orders and vaccine administrations. Figure 2 breaks out the test orders by test type (antibody assay, antigen assay, PCR, or unspecified). Seven facilities sent a total of 58,182 messages containing influenza test results. These included both positive and negative results. These results distinguished between influenza A and influenza B. Figure 3 shows the daily counts of both positive and negative results by virus type; this also follows the expected seasonal pattern. Conclusions Since procedure information was not specifically requested from healthcare facilities, the overall representation of procedure data elements was low. These initial results indicate that such data would be useful both as a supplement to syndromic surveillance activities and as a new data source for other surveillance activities such as vaccine uptake tracking. Given the frequency of procedures and treatments for chronic diseases such as diabetes and heart disease, these data may be relevant for understanding the prevalence of those conditions as well. Tests and treatments relevant to other public health concerns like opioid use disorder were also present, suggesting a wide range of potential applications. It is also possible to obtain and extract influenza test results from these syndromic surveillance messages. Both positive and negative results were present, providing information not just on the number of positive cases but also the rate of testing and rate of positive results. The pattern of testing and results also indicates that at least some facilities test for influenza throughout the season, contrary to some conventional wisdom about testing patterns.

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Roles of Health Literacy in Relation to Social Determinants of Health and Recommendations for Informatics-Based Interventions: Systematic Review

Abstract

Objective To investigate epidemiological features and identify high relative risk space-time Intestinal infectious diseases clusters at the township level in Beijing city in order to provide the scientific evidence for making prevention and control measures. Introduction Intestinal infectious diseases (IID) is a common cause of illness in the community and results in a high burden of consultations to general practice, mostly affecting the health of infants, preschool children, young adults and elderly people, especially those living in low income countries. According to the published study on the global burden of disease, intestinal infectious diseases were responsible for 221,300 deaths worldwide in 2013. The Chinese Ministry of Health has listed bacillary dysentery, amebic dysentery, typhoid fever and paratyphoid fever as notifiable Class-B communicable diseases and other infectious diarrhea as notifiable Class-C communicable diseases to be included in the surveillance system and reporting network since 2004. Many studies of IID in different regions have been published. However, the epidemiological characteristics and space-time patterns of individual-level IID cases in a major city such as Beijing are still unknown. We aim to analyze the epidemiology features and identify space-time clusters of Beijing IID at a fine spatial scale in this study. Methods Data collection. Data on IID cases in the 2008-2010 period were provided by Beijing Center for Disease Prevention and Control, China, including basic social-demographic information and clinical diagnosis (mainly including upper respiratory tract infection, indigestion, gastrointestinal disorders, bacillary dysentery, amebic dysentery, typhoid fever, paratyphoid fever and other infectious diarrhea). The demographic data for each township was calculated based on 2010 census data and the data published in the Beijing Statistical Yearbook. Epidemiological analysis. The home addresses from IID case records were matched to the geographic coordinates of the township level divisions. Age-gender incidence of IID (1/100,000) was defined as the number of IID cases in each age-gender group divided by the population size of that age-gender group. Total incidence was defined as the total number of IID cases divided by the average population size during the study period. Space-time analysis. Local spatial autocorrelation analysis based on Indicators of Spatial Association (LISA) was used to measure the spatial autocorrelation of IID incidence. The High-High and Low-Low townships suggested the clustering of similar values for IID incidence, whereas the Low-High and High-Low townships indicated spatial outliers. The spatial and space-time scan statistics combined the covariates (gender and age) method were used to reveal the space-time clusters of Beijing IID. Results Epidemiological features. A total of 561,199 individual-level IID cases were reported in Beijing in the period, in which 95 cases without the township information. 22.1% (124,025) of the cases were in the 0 to 4-year age group. Secondly 21.8% (122,345) were in the 50+-year age group. Next 13.17% were in the 25 to 29-year age group (73,931) and 11.9% were in the 20 to 24-year age group (66,787). Among the total IID cases, 307,920 were male, and 253,278 were female. The average male-to-female sex ratio was 1.22. Total IID incidence was 1003.54 /100,000 (1035.16 in 2008, 992.67 in 2009 and 985.30 in 2010). Total IID age-specific incidence in the 0 to 4-year age group (19,004.95) was the highest, followed by 3267.40 in the 25 to 29-year age group. The sex ratio of IID cases varied among the different age-gender groups. For the 50+-year age group, the incidence in female was higher than that in male. However, for the other age groups, the incidence in female was usually lower. The monthly distribution of IID cases exhibited significant seasonality and periodicity. The annual peaks in incidence mostly occurred between May and July. The annual number of IID cases was the lowest (183,326) in 2008 and the greatest (193,237) in 2010. Space-time Patterns. LISA analysis found that the borders between old city (Xicheng and Dongcheng) and urban districts (Haidian, Chaoyang, Shijingshan and Fengtai) showed the clear High-High positive spatial association for IID incidence. Rural areas (Yanqing, Huairou, Miyun and Pinggu) and outlying districts (the west of Mentougou and Fangshan, the southeast of Daxing and Tongzhou) showed the stable Low-Low positive spatial association for IID incidence. The townships showing Low-Low negative spatial association were mainly distributed in the urban-rural transition zones around the old city, while the High-Low spatial outliers mainly scattered in Xinggu county of Pinggu and Shahe town of Changping. Detected spatial scan clusters varied from year to year. The most likely clusters occurred in 15 townships around Chongwenmenwai of Dongcheng district (2008, Relative risk (RR) = 9.39, Log likelihood ratio (LLR) = 53927.93, P-value (P) < 0.001), Donghuamen and Qianmen of Dongcheng district (2009, RR = 35.01, LLR = 53286.52, P < 0.001), Donghuamen of Dongcheng district (2010, RR= 43.83, LLR = 62674.76, P < 0.001). The most likely space-time cluster (RR = 41.3, P < 0.001) was located in Donghuamen and Qianmen of Dongcheng district during the period from 2009/5/1 to 2010/10/31. The secondary space-time clusters (RR = 2.02, P < 0.001) were mainly scattered in the west part of Beijing including 133 townships during the period from 2010/6/1 to 2010/9/30. Conclusions The detected locations and space-time patterns of Beijing IID clusters are important for the local health officials to determine the source of the cluster to design effective prevention strategies and interventions against Beijing IID. The variations in Beijing IID epidemics over population, space, and time that were revealed by this study emphasize the need for more thorough research about the driving forces and risk factors (climate, geography, environment, and social-economic) that contribute to prevent and control Beijing IID outbreaks. References Abubakar I I et al.

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Global, regional, and national age-sex specific all-cause and cause-specific mortality for 240 causes of death, 1990-2013: a systematic analysis for the Global Burden of Disease Study 2013. Lancet, 2015, 385(9963): 117-171. Ghoshal U C et al. The role of the microbiome and the use of probiotics in gastrointestinal disorders in adults in the Asia-Pacific region background and recommendations of a regional consensus meeting. Journal of gastroenterology and hepatology, 2018, 33(1): 57-69.

Roles of Health Literacy in Relation to Social Determinants of Health and Recommendations for Informatics-Based Interventions: Systematic Review

Abstract

Objective Our presentation will explain current use, and barriers to use, of reproducible research practices in public health. We will also introduce a set of modules for researchers wishing to increase their use of reproducible research practices. Introduction An important goal of surveillance is to inform public health interventions that aim to reduce the burden of disease in the population. Ensuring accuracy of results is paramount to achieving this goal. However, science is currently facing a "reproducibility crisis" where researchers have found it difficult or impossible to reproduce study results. Organized and well-documented statistical source code that is publicly available could increase research reproducibility, especially for research relying on publicly available surveillance data like the BRFSS, NHANES, GSS, SEER, and others. As part of our overall goal to improve training around reproducible research practices, we surveyed public health data analysts to determine current practices and barriers to code sharing. Methods We conducted a cross-sectional web-based survey about code organization, documenting, storage, and sharing. We surveyed public health scientists who reported recently conducting statistical analyses for a report or manuscript. A total of 247 of 278 screened eligible to filled out the survey, and 209 answered every applicable question. We used traditional descriptive statistics and graphs to examine the survey data. Results Most participants reported using some promising coding practices, with 67% including a prolog to introduce the code and 85% including comments in statistical code to explain operations and analyses. Of 10 common code organization strategies (e.g., naming variables logically, using white space), most (82%) respondents reported employing at least three of the strategies and just under half (47%) reported using five or more. Over half of participants (59%) reported code was developed or checked by two or more people. Many participants also reported promising file management habits for data and code used in publications. Three-quarters (75%) had a variable dictionary to accompany the dataset used, 48% created clean versions of code files, and 64% created clean versions of data files at the time of publication. Forty three percent of participants reported that if they suddenly left their current position, it would not be easy for others to find their statistical code files. Public code sharing was much less common among participants with just 9% reporting sharing code publicly from a recent publication and 20% of those surveyed reported ever having shared code publicly. The top two barriers to using reproducible research practices were lack of training in reproducible research (n=108) and data privacy issues (n=105). Journals and funders not requiring reproducible practices were barriers selected by 94 and 84 participants, respectively. Few participants identified fear of errors being discovered (n=26) or a lack of workplace incentives (n=32) as barriers. Conclusions Most participants were using some promising practices for organizing and formatting statistical code but few were sharing statistical code publicly. The second most frequently identified barrier to using reproduciible practices was data privacy, which could prohibit easily sharing a data source. With surveillance data often being publicly available, researchers working with surveillance data have overcome this top barrier without any change to current research practices. Researchers using surveillance data could greatly increase research reproduciblity by adopting promising practices for code formatting, like using logical variable names and limiting line length, and posting code in a public repository like GitHub. To overcome the top barrier to use of reproducible research practices, lack of training, we developed brief training modules on formatting, documenting, and sharing statistical code and data. As part of our presentation we will introduce and provide access to these online modules. The introduction will focus on the relevant modules for surveillance data users, which include statistical code formatting and statistical code sharing via GitHub. With fewer barriers to practicing reproducible research, public health researchers using surveillance data have the opportunity to be leaders in improving the adoption of reproducible research practices and subsequently improving the quality of research we rely on to improve public health.

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Objective By the end of this session, users will be able to describe the innovative and multilayered suppression rules that are applied to Missouri"s homegrown health data web query system. They will also be able to use the lessons learned and user feedback described in the session to facilitate discussions surrounding the application of suppression to their specific data systems. Introduction In Spring 2017, the Missouri Department of Health and Senior Services (MODHSS) launched the Missouri Public Health Information Management System (MOPHIMS) web-based health data platform. Missouri has supported a similar data system since the 1990s, allowing the public, local public health departments, and other stakeholders access to community level birth, death, and hospitalization data (among other datasets). The MOPHIMS system is composed of two separate pieces. Community Data Profiles are topic-, disease-, or demographic-specific reports that contain 15-10 indicators relevant to the report. Because these static reports are developed in-house a multilayered suppression rule is not required. The second piece of MOPHIMS, the Data MICAs, or Missouri Information for Community Assessent, can be used to create customized datasets that slice and dice up to a dozen demographic and system-specific variables to answer complex research questions. The MOPHIMS interface features, among other things, a new and innovative method for addressing confidentiality concerns through the suppression of health data. This pioneering approach integrates multi-level logic that uses inner and outer cell analytics, the use of exempt and conditionally exempt variables, and multiple levels of user access. Moving beyond a simple model of suppressing any values below a certain threshold, MOPHIMS takes a bold step in providing users exceptionally granular data while still protecting citizen privacy. Methods In order to implement this new suppression methodology, MODHSS worked with both internal information technology resources (OA-ITSD) and outside contractors to develop the suppression rules utilized in the Data MICAs. Before these meetings began, MODHSS analysts met weekly to determine the overall goals and frames for the rule, knowing that writing the code to implement the complicated and comprehensive vision would be a collaborative and iterative process. Because the MOPHIMS system is homegrown and this specific confidentiality process is not currently utilized (to our knowledge) elsewhere, all of those at the discussion table were required to be innovative, open to criticism, and willing to engage in extremely detailed explanations. A team of users from Missouri's local public health departments provided feedback throughout this process. A basic description of the process flow that occurs before suppression is applied in MOPHIMS follows. To begin, de-identified record-level data are loaded into online analytical processing (OLAP) cubes and relational databases. No suppression is applied to these back end databases. The information is then aggregated for display on the front end screens of the Data MICAs based on customized user selections. Depending upon which level of access a user has logged in, suppression is then applied to the data output generated using these customized selections. Not only are the rules applied to data tables but also to the MOPHIMS data visualization tools, which include multiple types of charts and maps. Results In addition to the rules themselves, MOPHIMS contains a mechanism that allows users to log in at different levels of access. Public and Registered user levels are free and available to all operators with a valid e-mail address. Partner level access is reserved for epidemiologists at the state and local level who are using the Data MICAs for program planning, evaluation, and grant writing. Because these individuals are required to adhere to the same data dissemination policies as those who create the MOPHIMS system, Partner level access turns off suppression in the MOPHIMS system. Values that would be suppressed at the Public or Registered user levels are shown in italicized, red font. A multi-level approval process is required for individuals to obtain Partner level access to MOPHIMS. Conclusions MODHSS created an innovative suppression system that allows public health planners to access granular data through customizable queries without risking a confidentiality breach. Users have indicated this is highly preferable to a blanket suppression rule that hides any value under a certain threshold. Additionally, approved MOPHIMS users can view specially formatted values that would otherwise have been suppressed. The flexibility associated with creating a homegrown web query system has allowed the formation and implementation of this multilayered rule, which likely would not have been possible if using an off-the-shelf product. Data disseminators are encouraged to review current confidentiality and suppression rules to determine whether they might be modified to provide more granular data users while still protecting the privacy of citizens.

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Roles of Health Literacy in Relation to Social Determinants of Health and Recommendations for Informatics-Based Interventions: Systematic Review

Abstract

Objective Using the information that we have available, our primary objective is to explore if there was any cross-correlation between pneumonia admissions and hospital influenza positivity. We then aim to develop a data driven approach to forecast pneumonia admissions using data from our hospital's weekly surveillance. We also attempted using external sources of information such as national infectious diseases notifications and climate data to see if they were useful for our model. Introduction Influenza peaks around June and December in Singapore every year. Facing an ageing population, hospitals in Singapore have been constantly reaching maximum bed occupancy. The ability to be able to make early decisions during peak periods is important. Tan Tock Seng Hospital is the second largest adult acute care general hospital in Singapore. Pneumonia-related emergency department (ED) admissions are a huge burden to the hospital"s resources. The number of cases vary year on year as it depends on seasonal vaccine effectiveness and the population's immunity to the circulating strain. While many pneumonia cases are of unknown origin, they tend to mirror the influenza seasons very closely. Methods We used data from epidemiological week (e-week) 1 of 2013 to e-week 34 of August 2017 to train our model, with the next 52 weeks (e-week of 35 of 2017 to e-week 34 of 2018) being used as validation cohort. Pneumonia and influenza data were obtained from our hospital's weekly surveillance. National level acute upper respiratory illness (AURI) was obtained from Ministry of Health's (MOH) weekly infectious diseases bulletin. Climate data were obtained from the National Environment Agency's website. Daily rainfall, temperature and wind data from the S20 satellite station were used. Automatic autoregressive (A-ARIMA), non-seasonal and seasonal vector autoregressive models (VAR) were used to either analyse the univariate pneumonia trends or simultaneously model pneumonia, influenza, AURI notification and climatic data. Granger-causality tests were performed to check if these variables were causal of pneumonia admissions. As most of the seasonal variation are seen in older patients, stratified analysis were performed on those that were below and above 65 years old. Forecasts were calculated up to 3 weeks in advance. Mean absolute error (MAE), mean absolute percentage error (MAPE), and root mean squared error (RMSE) were used to validate the model performance. These performance metrics were applied on 3-week ahead forecasts comparing A-ARIMA, VAR, and seasonal-adjusted VAR. Results Figure 1 shows that both influenza and pneumonia admissions follow similar trends. We see that the number of influenza cases have reduced as compared to the previous years. The number hospital influenza cases and the number of AURI cases nationwide are strongly cross-correlated with pneumonia admissions. Granger-causality tests confirmed the directionality of the relationships (p <0.01). Climate factors do not strongly affect the number of pneumonia admissions. (Fig 2) Unsurprisingly, the A-ARIMA model showed that the 1-day forecasts were most accurate (MAE: 7.0; MAPE: 12.7; RMSE: 8.7 for elderly subgroup). However, the 3-day ahead forecasts were only slightly less precise (MAE: 7.2 ; MAPE: 13.2; RMSE: 9 for elderly subgroup). Testing for significant lags using the various information criteria suggested that a lag3 model should be used. The non-seasonal and seasonal VAR models showed that historical pneumonia admissions and influenza positivity was the best model. The MAPE for all 3 models hovered between 12-13%, with the A-ARIMA model performing slightly better. This is not surprising as the A-ARIMA takes the latest information at hand to derive the best model. Accounting for seasonality allowed better precision as compared to the non-seasonal VAR but was not better as compared to the A-ARIMA model. Conclusions Hospital surveillance data are the most useful for developing forecast models for hospital pneumonia admissions. Climate data were likely not to be useful as Singapore does not experience much variaton in weather throughout the year. Pneumonia peaks do not follow necessarily fall on the same week every season. Therefore, both the autoregressive and seasonal-adjusted vector autoregressive models can be useful complements to each other for forecasting pneumonia admissions.

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Objective To develop a set of clinical indicators of opioid overdose using Emergency Medical Services (EMS) records that included data from Computer Aided Dispatch (CAD), ProQA systems, Electronic Patient Care Reporting (ePCR) and Hospital Medical Records. Introduction In North America we experience the highest rate of drug related mortality in the world. In the US, overdose is now the leading cause of death among adults under 50. Each day more than 115 people in the United States die due to an opioid overdose. The opioid overdose national crisis is rapidly evolving due to changes in drug availability and the presence of adulterated fentanyl in some areas leading to a critical need for innovative methods to identify opioid overdoses for both surveillance and intervention purposes. As an effort to strengthen our understanding of the epidemic through surveillance of Emergency Medical Services (EMS) we have developed a set of clinical indicators that identify opioid overdose within the information provided by an Electronic Patient Care Reporting (ePCR), Computer Aided Dispatch (CAD), ProQA systems and Hospital Medical Records. Methods We initially created a set of EMS agency specific opioid overdose filters using FirstWatch® software as part of a public health research study. Following that initial development, we have built a generic set of opioid overdose identifiers. In the initial approach we used a Zoll Data System software for ePCR and TriTech Inform CAD to define 3 set of identifiers: (T1) captured calls in which naloxone was administered and a positive clinical response was documented, (T2) had the same criteria as T1 except there was no positive response to the administration of naloxone, and (T3) consisted of calls in which one or more drug-related keywords were present within the narrative of the ePCR. Because the initial analysis was conducted in the context of a single research study, we aimed to create a more generalizable set of identifiers of opioid overdose that would function across different EMS agencies, software, and data sources. In addition, we included variables provided by Hospital Medical Records to our filtering criteria to provide a more robust and complete set of opioid overdose clinical indicators. Results Utilizing the EMS data sources CAD, ProQA and ePCR as well as Hospital Medical Records we have developed a set of identifiers of opioid overdose. Utilizing FirstWatch® software analytics the following variables where coded into the software: 1. CAD Data.- Chief Complaint and Opioid Overdose Keyword search; 2. ProQA.- Protocols 6, 9, 23, 31 and 32; 3. ePCR.- Primary and Secondary Impressions, Chief Complaint, Intervention of Narcan (Naloxone) Administration, Vital Signs and Opioid Overdose Keyword search; 4. Medical Records.- Patient"s Admission and Discharge Diagnosis (Diagram 1). The clinical indicators obtained from this analysis where created to be utilized across different EMS specific software vendors for CAD, ProQA and ePCR systems. For the Medical Records variables a single software vendor was available to be integrated into the analysis. Nonetheless, as we used the International Statistical Classification of Diseases and Related Health Problems codes on their 10th revision (ICD-10) our determining variable codes could be generalized to other Hospital Record system if they would become available. Conclusions Correctly identifying an opioid overdose can a be a challenge. Its clinical features are non-specific and bystanders fear repercussions of disclosing the nature of the 911 call. Determining the correct number of opioid overdoses requires a tailored identification process. A combination of clinical determinants and incorporation of multiple EMS data sources appears to be feasible in determining opioid overdose related 911 calls. References 1. The United Nations Office on Drugs and Crime (UNODC) "2017 World Drug Report". 2. Hedegaard H, Warner M, Miniño AM. Drug overdose deaths in the United States, 1999–2016. NCHS Data Brief, no 294. Hyattsville, MD: National Center for Health Statistics. 2017. 3. Multiple Cause of Death 1999–2016 on CDC Wide-ranging Online Data for Epidemiologic Research (CDC WONDER). Atlanta, GA: CDC, National Center for Health Statistics. 2017. 4. CDC/NCHS, National Vital Statistics System, Mortality. CDC Wonder, Atlanta, GA: US Department of Health and Human Services, CDC; 2017.

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Roles of Health Literacy in Relation to Social Determinants of Health and Recommendations for Informatics-Based Interventions: Systematic Review

Abstract

Objective We develop new spatial scan models that use individuals" movement data, rather than a single location per individual, in order to identify areas with a high relative risk of infection by dengue disease. Introduction Traditionally, surveillance systems for dengue and other infectious diseases locate each individual case by home address, aggregate these locations to small areas, and monitor the number of cases in each area over time. However, human mobility plays a key role in dengue transmission, especially due to the mosquito day-biting habit,1 and relying solely on individuals' residential address as a proxy for dengue infection ignores a multitude of exposures that individuals are subjected to during their daily routines. Residence locations may be a poor indicator of the actual regions where humans and infected vectors tend to interact more, and hence, provide little information for dengue prevention. The increasing availability of geolocated data in online platforms such as Twitter offers a unique opportunity: in addition to identifying diseased individuals based on the textual content, we can also follow them in time and space as they move on the map and model their movement patterns. Comparing the observed mobility patterns for case and control individuals can provide relevant information to detect localized regions with higher risk of dengue infection. Incorporating the mobility of individuals into risk modeling requires the development of new spatial models that can cope with this type of data in a principled way and efficient algorithms to deal with the ever-growing amount of data. We propose new spatial scan models and exploit geo-located data from Twitter to detect geographic clusters of dengue infection risk. Methods As the spatial tracking of a large sample of infected and non-infected individuals is expensive and raises serious privacy issues, we instead analyze geo-located Twitter data (tweets), which is readily and publicly available. We identify "infected" individuals (cases) as those individuals who have at least one tweet classified as a current, personal experience with dengue. We note that, because of the incubation period and recovery time, infected Twitter users are likely to mention dengue in their tweets days after they are infected, and usually not at the location where the exposure (mosquito bite) occurred. Once we have identified cases and controls based on the textual content of the messages, we then compare the mobility patterns of the two groups. The key aspect of our method is that the input is a series of locations rather than a single location, such as the residence address, for each individual. The number of positions n_i composing each mobility pattern can vary substantially between individuals i, and thus simple approaches like counting the total numbers of case and control tweets per location would be biased and inaccurate; moreover, individuals with larger numbers of tweets may be more likely to be identified as a case. Nevertheless, our assumption is that the entire mobility patterns will be informative of the riskier areas if we compare the spatial patterns from infected and non-infected individuals. We have developed two new spatial scan methods (unconditional and conditional spatial logistic models) which correctly account for the multiple, varying number of spatial locations per individual. Both models use the proportion of an individual's tweets in each location as an estimate of the proportion of time spent in that location; the estimate is biased by individuals' propensity to tweet in different locations, but is expected to capture the large amounts of time spent at frequently visited locations. Our unconditional model controls the variable contribution of each individual through a non-parametric estimation of the odds of being a case and has a semi-parametric logistic specification. When estimating the previous offset becomes a complex task, we propose a case-control matching strategy in the conditional model to control for the number of tweets n_i. Based on the subset scan approach,3 we search for localized regions where the infection risk is substantially higher than in the rest of the map by maximizing a log-likelihood ratio statistic over subsets of the data. Results We demonstrate the detection of high-risk clusters for dengue infection using Twitter data we collected in Brazil during the year of 2015, when a strong surge of dengue hit several cities. We apply our method to the cities with highest number of case individuals. There are many points of interest, such as hospitals and parks, inside the detected regions. As those places are non-residential, standard approaches would fail to consider them as potential infection places in the event of a spike in the number of cases. Figure 1 shows the detected regions in the city of Campinas, Brazil. Synthetic and real-world evaluation results demonstrate that our methods work better than either just mapping each individual to their most frequent location (which is a proxy for home address) and running a traditional spatial scan, or scanning using tweet volume as an input. Conclusions Identifying places where people have higher risk of being infected, rather than focusing on residential address locations, may be key to surveillance for vector-borne diseases such as malaria and dengue, allowing public health officials to focus mitigation actions. The stochasticity of location data is not appropriate for typical spatial cluster detection tools such as the traditional spatial scan statistic.2 Each user is represented by a different number of geographic points and the variability of these numbers is large; traditional approaches can be easily misled if not extended to account for this special structure. Dengue is just one of many infectious diseases with a well-known etiology but a huge number of uncertain and difficult to obtain parameters that quantify factors such as infected mosquito population, likelihood of being bitten by an infected mosquito, and human movement in the mosquito-infested areas. Our methods add to the set of tools that spatial epidemiologists have available to search for spatially localized risk clusters using readily available Twitter data. We expect that our method will

also be useful to other public health surveillance problems where movement data can bring relevant information. References   1. Stoddard, ST., et al. The role of human movement in the transmission of vector-borne pathogens. PLOS NTDS. 2009; 3 (7): 1–9 2. Kulldorff M. A spatial scan statistic. Commun Stat Theory Methods. 1997; 26(2): 1481-1496 3. Neill DB. Fast subset scan for spatial pattern detection. J. Royal Stat. Soc. B. 2012; 74(2): 337-360

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Abstract

Objeicve The study aims to evaluate the potential impact of the revision of the thesaurus used by ED physicians to code medical diagnoses, on the syndromic indicators used daily to achieve the detection objective of the French syndromic surveillance system. Introduction As part of the French syndromic surveillance system SurSaUD®, the French Public Health Agency (Santé publique France) collects daily data from the emergency department (ED) network OSCOUR® [1]. The system aims to timely identify, follow and assess the health impact of unusual or seasonal events on emergency medical activity. Individual ED data contain demographic (age, gender, residence zip code), administrative (dates of attendances and discharge, ED, etc.) and medical information (chief complaint, main and associated medical diagnoses, severity). Medical diagnoses are encoded using the ICD10 classification. Then syndromic groups are built based on these ICD10 codes for ensuring syndromic surveillance in routine. Even if ICD10 is recommended on the national guidelines for coding ED attendances, this thesaurus offers a too large variety of codes. Particularly, it includes lots of diseases that may never be observed or confirmed in ED. This variety let selection of the appropriate codes difficult for physicians in a reactive use and could discourage them to code diagnoses. In order to encourage appropriate and reactive coding practice, we decided in 2017 to produce a new diagnoses thesaurus with a limited list of ICD10 codes. Then a committee of medical and epidemiological experts was created by the Federation of regional emergency observatories (FedORU), to propose an operational thesaurus that includes relevant codes for both ED in a daily routine practice and syndromic surveillance. Methods The committee has met 10 times since 2017. Since it would have been hard to work on the complete ICD10 list, the work was based on a more limited thesaurus already used by part of French ED. Only codes, which were pertinent regarding ED activity and interest for public health alert, have been considered. The main principles that have guided the selection were to 1) keep codes related to diagnoses that physicians are able to diagnose on a clinical basis or with rapid diagnostic tests, 2) remove diagnoses providing redundant information regarding other variables (such as circumstantial information) and 3) ensure that a substitution code was kept when a removed code was frequently used or was of interest for syndromic surveillance. Among the 86 syndromic groups defined on the basis of a list of ICD10 codes selected in the complete thesaurus, 34 are daily analyzed by Santé publique France for outbreak detection and early assessment of public health events. Those 34 syndromic groups have been recalculated by considering the revised thesaurus on a three-year period (from 2015 to 2017) at national level. In order to measure the potential impact of the revised thesaurus on the syndromic groups, we have considered three evaluation measures: 1. the proportion of ICD10 codes deleted (removal rate) from the initial definition of each syndromic group, due to the limitation of the thesaurus (calculated for the 86 syndromic groups); 2. the mean difference in the daily number of attendances between the initial and the new versions of each syndromic group (calculated for the 34 syndromic groups); 3. the linear correlation coefficient between the daily numbers of attendances of the initial and the new version of each syndromic group, in order to assess if the daily fluctuations of the new syndromic group are similar to those of the initial syndromic group (calculated for the 34 syndromic groups). Results Among the 86 syndromic groups, 75 (85%) have been impacted by the revised thesaurus, which implied codes removal. Among those 75 syndromic groups, the number of ICD10 codes included in their definition has been reduced by 71% on average. This removal rate varied between 17% and 100%. Syndromic groups including initially more than 100 codes have been the most concerned by a limitation of the number of ICD10 codes. Among the 34 syndromic groups daily analyzed for outbreak detection, 32 have been impacted by code removal with a mean removal rate of 68% (0%-97%). On average, 77% of daily attendances have been retained by the new version of syndromic groups, varying from 15% to 100%. Only 3 syndromic groups have kept less than 60% of attendances: Decrease of well-being (36%), Conjunctivitis (32%) and Hypothermia (15%). On average, the correlation coefficient has been of 0.96, varying from 0.57 to 1. The lowest values have been observed for the same three syndromic groups listed above: Decrease of well-being (0.57), Conjunctivitis (0.91) and Hypothermia (0.59). 18 among the 34 syndromic groups had a correlation coefficient higher than 0.99. Conclusions The study showed that most of the syndromic groups were impacted by the revised thesaurus, which resulted in a removal of about two thirds of the ICD10 codes usually considered in daily surveillance. However, more than three quarters of attendances were still retained in the new syndromic groups. This new thesaurus was conceived to rationalize the number of diagnoses codes but a substitution code was systematically proposed to replace removed codes. Those results highlighted that a large number of codes included in the complete ICD10 thesaurus were rarely used and that the most frequent codes were kept in the revised thesaurus version. However, this study showed that a few syndromic groups were strongly impacted by the revised thesaurus and can suffer of reduced performances to detect unusual variations. Based on those results, a second round of exploration of specific parts of the complete ICD10 thesaurus will be necessary to adapt either syndromic groups or the revised thesaurus. Even if the number of attendances may be reduced due to the removal of ICD10 codes, temporal variations remain similar for the majority of syndromic groups. Syndromic surveillance system does not aim to provide exhaustive quantification of attendances for a pathology, but aims to be able to detect expected

or unusual public health variations. These evaluation results correspond to the worst-case scenario assuming that ED physicians will not modify their encoding habits by using the substitution codes but keep using their current thesaurus. However, we expect that this new and simplified version will facilitate diagnosis encoding task and lead toward a better diagnosis encoding rate. Once this new thesaurus will be widely used, we can expect a substantial improvement of the quality of ED medical data and then of syndromic surveillance results. Finally, this study enhances the importance that both data providers and epidemiologists in charge of syndromic surveillance work closely, in order to improve system in shared objectives. References [1] Fouillet A, Bousquet V, Pontais I, Gallay A, Caserio-Schönemann C. The French emergency department OSCOUR network: evaluation after a 10-year existence. Online J Public Health Inform. 2015; 7(1): e74.

Roles of Health Literacy in Relation to Social Determinants of Health and Recommendations for Informatics-Based Interventions: Systematic Review

Abstract

Objective To describe influenza laboratory testing and results in the Military Health System and how influenza laboratory results may be used in DoD Electronic Surveillance System for Early Notification of Community-based Epidemics (ESSENCE) Introduction Timely influenza data can help public health decision-makers identify influenza outbreaks and respond with preventative measures. DoD ESSENCE has the unique advantage of ingesting multiple data sources from the Military Health System (MHS), including outpatient, inpatient, and emergency department (ED) medical encounter diagnosis codes and laboratory-confirmed influenza data, to aid in influenza outbreak monitoring. The Influenza-like Illness (ILI) syndrome definition includes ICD-9 or ICD-10 codes that may increase the number of false positive alerts. Laboratory-confirmed influenza data provides an increased positive predictive value (PPV). The gold standard for influenza testing is molecular assays or viral culture. However, the tests may take 3-10 days to result. Rapid influenza diagnostic tests (RIDTs) have a lower sensitivity, but the timeliness of receiving a result improves to within <15 minutes. We evaluate the utility of RIDTs for routine ILI surveillance. Methods Administrative medical encounters for ILI and influenza laboratory-confirmed data were analyzed from the MHS from June 2013 – September 2017 (Figure 1). The medical encounters and laboratory data include outpatient, inpatient, and ED data. The ILI syndrome case definition is a medical encounter during the study period with an ICD-9 or ICD-10 codes in any diagnostic position (ICD-9 codes = 79.99, 382.9, 460, 461.9, 465.8, 465.9, 466.0, 486, 487.0, 487.1, 487.8, 488, 490, 780.6, or 786.2; ICD-10 codes = B97.89, H66.9, J00, J01.9, J06.9, J09, J09.X, J10, J10.0, J10.1, J10.2, J10.8, J11, J11.0, J11.1, J11.2, J11.8, J12.89, J12.9, J18, J20.9, J40, R05, R50.9). The ILI dataset was limited to care provided in the MHS as laboratory data is only available for direct care. We describe influenza laboratory testing practices in the MHS. We aggregated the ILI encounters and RIDT positive results into daily counts and generated a weekly Pearson's correlation. Results Influenza tests are ordered throughout the year; the mean weekly percentage of ILI encounters in which an influenza laboratory test is ordered is 5.62%, with a range from 0.68% in the off season to 19.2% during peak influenza activity. The mean weekly percentage of positive influenza laboratory results among all ILI encounters is 0.82%, with a range from 0.01% to 5.73% (Figure 2). The percent of ILI encounters in which a test is ordered increases as the influenza season progresses. Influenza laboratory tests conducted in the MHS include RIDTs, PCR, culture, and DFA. Among all influenza tests ordered in the MHS, 66.0% were RIDTs, 22.7% were PCR, and 11.3% were viral culture. Often, a confirmatory test is ordered following a RIDT; 20% of RIDTs have follow-up tests. The mean timeliness of influenza test result data in the MHS was 11.26 days for viral culture, 2.94 days for PCR, and 0.11 days for RIDTs. The RIDT results were moderately correlated with ILI encounters for the entire year (mean weekly Pearson correlation coefficient rho=0.60, 95% CI: 0.55, 0.66, Figure 3). During the influenza season, the mean weekly Pearson correlation coefficient increases to rho=0.75, 95% CI: 0.70, 0.79. Conclusions The DoD has the unique advantage of access to the electronic health record and laboratory tests and results of all MHS beneficiaries. This analysis provides evidence for increased utilization of positive RIDTs in ESSENCE. The moderate correlation between the ILI syndrome and positive RIDTs may be associated with ICD-10 codes included in the ILI syndrome definition that contribute to false positive influenza cases. Ongoing research is focused on improving this ILI syndrome definition using ICD-10 codes. Rapid influenza diagnostic tests provide more timely results than other influenza test types. In conjunction with ILI medical encounter data, positive RIDT data provides a more complete and timely picture of the true burden of influenza on the MHS population for early warning of influenza outbreaks.

Roles of Health Literacy in Relation to Social Determinants of Health and Recommendations for Informatics-Based Interventions: Systematic Review

Abstract

Objective To describe population-level response to influenza-like illness (ILI) as measured by wearable mobile health (mHealth) devices across multiple dimensions including steps, heart rate, and sleep duration and to assess the potential for using large networks of mHealth devices for influenza surveillance. Introduction Influenza surveillance has been a major focus of Data Science efforts to use novel data sources in population and public health [1]. This interest reflects the public health utility of timely identification of flu outbreaks and characterization of their severity and dynamics. Such information can inform mitigation efforts including the targeting of interventions and public health messaging. The key requirement for influenza surveillance systems based on novel data streams is establishing their relationship with underlying influenza patterns [2]. We assess the potential utility of wearable mHealth devices by establishing the aggregate responses to ILI along three dimensions: steps, sleep, and heart rate. Surveillance based on mHealth devices may have several desirable characteristics including 1) high resolution individual-level responses that can be prospectively analyzed in near real-time, 2) indications of physiological responses to flu that should be resistant to feedback loops, changes in health seeking behavior, and changes in technology use, 3) a growing user-base often organized into networks by providers or payers with increasing data quality and completeness, 4) the ability to query individual users underlying aggregate signals, and 5) demographic and geographic information enabling detailed characterization. These features suggest the potential of mHealth data to deliver "faster, more locally relevant" surveillance systems [3]. Methods During the 2017/2018 influenza season, surveys were conducted within the Achievement platform, a health app that integrates with a variety of wearable trackers and consumer health applications [4]. The Achievement population has given consent agreeing to participation in studies like the one presented here and permitting access to their data. Surveys queried users as to whether they had experienced flu-like (ILI) symptoms in the preceding 14 days. Respondents who had experienced symptoms were then asked to identify symptom days. Those who had not experienced symptoms were queried again two weeks later. Positive responses were re-indexed to align by date of symptom onset. Individual respondent's measures were standardized on a per-individual level in the 6 week period centered on the index date. Population-level mean signals were directly computed across several dimensions including steps, sleep, and heart rate. Uncertainty was quantified using resampling. Results Beginning February 17th, 2018, surveys were distributed to Achievement users. Within the first week 31,934 users had responded to the survey. Over a 12-week period, 124,892 individuals completed the survey with 25,512 reporting flu-like symptoms in a two week period prior to the survey. Of these, 9,495 had wearable device data in the 90-day window surrounding their symptom dates and 3,362 respondents had "dense" data defined as no more than 4 consecutive missing days in the 6-week period surrounding the index date. Population-level signals to ILI were clearly evident for five measures across the three dimensions. Step count [fig. 1] and time spent active [fig. 2] decreased 1 day prior to reported symptom onset date (index date), with a minimum at day 2 of -.24 std. dev. for step count and -.25 std. dev for time spent active, and a return to baseline at day 8. Sleeplessness [fig.3] and time spent in bed [fig. 4] increased one day prior to index, peaking 4 days after index at a mean increase of .16 std. dev. for sleeplessness and .13 std. dev. for time spent in bed, and returning to baseline at 7 days. Heart rate was elevated from 1 day before index to day 6 with a peak increase of .18 std. dev. on days 2 and 3 after index. Conclusions The potential of mHealth devices to register illness has been recognized [5]. This study is the first to present population-level influenza signals in a large network of mHealth users. Mobile health device data linked to ILI-specific survey responses taken during the 2017/18 flu season demonstrate clear aggregate patterns across several dimensions including sleep, steps, and heart rate. These signals suggest the potential for systems to rapidly process individual-level responses to classify ILI and to use such classifiers for ILI surveillance. The data described here, high resolution individual-level behavioral and physiological data linked to timely survey responses, suggests the potential to further enhance outbreak detection and improve characterization of ILI patterns. The setting of our study, a very large network of mobile health device users who have consented to the prospective use of their data and to being queried about their health status, could provide a framework for automated prospective influenza surveillance using "real world evidence" [6]. Employed over a population-representative sample, this approach could provide adjunct to standard clinically-based sentinel systems. References [1] Althouse, Benjamin M., et al. \"Enhancing disease surveillance with novel data streams: challenges and opportunities.\" EPJ Data Science 4.1 (2015): 17. [2] Henning KJ. What is syndromic surveillance?. Morbidity and Mortality Weekly Report. 2004 Sep 24:7-11 [3] Simonsen L, Gog JR, Olson D, Viboud C. 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Roles of Health Literacy in Relation to Social Determinants of Health and Recommendations for Informatics-Based Interventions: Systematic Review

Abstract

Objective We aim to 1) develop and implement a novel theoretical and technical framework able to dynamically model HIV transmission clusters in near-real time; 2) validate the model with real data; and 3) host focus groups with governmental stakeholders to identify optimal strategies for precision public health interventions. Introduction Reducing HIV incidence requires a 'precision public health' approach encompassing prevention campaigns, targeted interventions, and 'next-generation' surveillance through multimodal instruments, including sequencing. Molecular epidemiology methods (phylogenetics and phylodynamics) have recently gained traction for use in identifying and tracking epidemic transmission clusters, as well as reconstructing the demographic history of viral pathogen populations. However, such methods are not equipped to identify both transmission clusters and their corresponding dynamics in real time, and transmission clusters are assumed to be unrealistically static over the course of the epidemic. We will focus on the ongoing HIV epidemic in Florida, which has one of the highest HIV incidence rates in the United States. Although key HIV transmission risk groups have been identified in Florida through classical epidemiology surveillance methods, there remains a critical need for detection and tracking of expanding transmission clusters in near-real time. Methods We propose to develop and test a new phylodynamic method, HIV Dynamic Identification of Transmission Epicenters (HIV-DYNAMITE), that will support existing HIV surveillance efforts. In collaboration with the Florida Department of Health (FDOH), we will leverage an existing dataset, which contains over 44,300 sequences, and apply HIV-DYNAMITE to identify transmission clusters and infer growth trends of these clusters within epidemics. HIV-DYNAMITE will also be used to identify and predict infection trends and virus spread by conferring with demographic data. The system will be validated using newly obtained longitudinal data. Focus group discussions with the FDOH, the Centers for Disease Control and Prevention (CDC), and other stakeholders will be conducted to confer how to employ HIV-DYNAMITE into statewide informatics systems and to design future intervention strategies. Results These methods are still under development. Conclusions In conclusion, this study aims to both complement and enhance existing efforts, such as the CDC's HIV-TRACE, which is currently based on sequence data alone and lacks dynamic or geographic spread components. This approach has the potential to be incorporated into other settings within the US with comparable statewide surveillance and virus sequencing coverage through national reference centers.

Roles of Health Literacy in Relation to Social Determinants of Health and Recommendations for Informatics-Based Interventions: Systematic Review

Abstract

Objective To estimate effectiveness of PCR method for epidemiology surveillance for leptospirosis in Lviv Oblast and compare it with microscopic agglutination test (MAT). Introduction Leptospirosis is one of the most important zoonotic diseases based on the severity of the clinical course, frequency of fatal outcome and long-term clinical consequences. In Ukraine, leptospirosis is one of the most widespread natural-focal infectious diseases. Based on data of the Public Health Center of the Ministry of Health of Ukraine in 2017, the incidence rate was 0.77 per 100,000 population (330 cases), mortality rate was 0,08 per 100 000 population (case fatality rate was 10,9 %). In Lviv Oblast, the disease was registered as sporadic cases that were not related to each other (in 2017, the incidence rate was 0.72 per 100,000 population [1]. Laboratory testing of samples collected from patients and environmental objects that may be the source of the pathogen is an integral part of the epidemiological surveillance of leptospirosis. Modern laboratory diagnostics of leptospirosis is based on microbiological, immunological and molecular-biological methods used in various combinations [2, 3]. Molecular genetic diagnostic methods that allow detection of the Leptospira spp. RNA/DNA are the most promising for diagnosis of leptospirosis in the early stages of the disease. Investigation of environmental objects allows timely detection of the pathogen in natural foci and conducting a set of anti-epidemic necessary measures. Methods We used the following PCR kits "Leptospira pathogenic-Real time (FR001) Genecam Biotechnology AG" and "LPS PCR kit variant FRT-50F "Amplisens" for leptospira DNA detection. "Ultra Clean Blood Spin DNA isolation kit MO BIO Laboratories, Inc." and a set of reagents from the clinical materials "RIBO-prep" for the isolation of RNA / DNA loci of Leptospira spp. were used. In parallel, 37 human and 27 rodent serum samples were studied using MAT. PCR and MAT positive gray rats samples were additionally studied using the bacteriology method (adrenal cortex seeded on the liquid media). Epidemiological investigation (namely, patient interviewing, investigation of places where the infection was acquired, exploring the living conditions) and outbreak investigation report writing were conducted for all recorded cases (41). Results Results of the human samples investigation. During 2016-2017 and 7 months of 2018, 41 cases of leptospirosis were registered in Lviv Oblast. All these cases were confirmed with laboratory methods, including PCR; DNA of Leptospira spp. was detected in 15 patients (36,6 %), and MAT was positive in 26 cases (63,4%). In 8 patients (19,5%) both PCR and MAT testing gave positive results. Over the past three years, 5 fatal cases of leptospirosis (12.1%) have been registered, including two patients who died during the first week of the disease. For those two patients, the diagnosis was confirmed by PCR and MAT (leptospira lysis in MAT was noticed in the titre of 1:100-1:200); for other two patients, the diagnosis was confirmed using MAT only (1:800); and in the last patient from this group, leptospira lysis was noticed in low titres in MAT. Results of epidemiological investigation revealed that the most patients were infected through contact way of transmission (78.1%), including contact with objects and food contaminated with rodent excrement, and water-borne transmission (19.5%) during bathing, fishing, hunting, field work; in other 2.4% of cases the way of transmission was not identified. Epidemiological history showed that the main source of infection for humans in natural and urban foci were grey rats and rodents that could adapt to transforming ecosystems conditions. Results of animal samples investigation. Among 27 samples of gray rats, caught in places where patients probably got infected, in 11 samples (40.7%) a specific 16S rRNA of Leptospira spp. was detected and also MAT was positive; 1 samples (3,7 %) from this group was seropositive in MAT only. L. icterohaemorrhagiae live culture was isolated from 3 samples of grey rats that were positive in PCR and MAT. Results of environmental samples investigation showed the following: among 89 of water samples collected from recreation areas (lakes), 4 samples (4.5%) were positive (16S rRNA of Leptospira spp.). PCR of 8 samples of drinking water collected from leptospirosis foci gave negative results. Conclusions In Lviv Oblast, Ukraine, the potential of laboratory diagnostics of leptospirosis has increased due to introduction of PCR method in diagnostic algorithm. Results of clinical materials investigations revealed that with PCR it is became possible to confirm the diagnosis within the first several days from the onset of the disease (in 15 patients). Diagnosis was confirmed using MAT in 26 patients starting from the second week of the disease. At the same time, MAT is crucial, since it enables to identify the etiological structure of the disease and monitor the dynamics of the immune response. Investigation of animal and environmental samples with MAT and PCR methods allowed to establish causal relationships of patients with possible sources of infection. PCR method allowed to conduct epidemiological surveillance for leptospirosis at a new level, as the time for receiving results compare to the classical methods as well as biological risks during work with biomaterials have decreased. Currently, the combination of PCR and MAT methods for laboratory research in the surveillance of leptospirosis is optimal. Understanding environmental and epidemiological determinants allows for the identification of appropriate public health approaches to improve the situation with leptospirosis, such as reducing populations of pathogen reservoirs (rats) by conducting deratization measures, vaccinations of dogs and livestock, and regulatory compliance. References 1. About the epidemiological situation with leptospirosis in Ukraine in 2017 and measures to prevent it / Information letter of PHC of the Ministry of Health of Ukraine , 20.07.2018 # 2651. – Kyiv. – 2018. – 26 p. 2. Leptospirosis diagnosis: competancy

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Roles of Health Literacy in Relation to Social Determinants of Health and Recommendations for Informatics-Based Interventions: Systematic Review

Abstract

Objective Using the two largest commercial laboratory data sources nationally, we estimated the annual rates of hepatitis C testing among individuals who were recommended to be tested (i.e., baby boomer cohort born between 1945 and 1965) by the CDC and United States Preventive Services Task Force. This panel will discuss strengths and weaknesses for monitoring hepatitis C testing using alternative data sources including self-reported data, insurance claims data, and laboratory testing data. Introduction Hepatitis C virus (HCV) infection is a leading cause of liver disease-related morbidity and mortality in the United States. Approximately 75% of people infected with chronic HCV were born between 1945 and 1965. Since 2012, the CDC has recommended one-time screening for chronic HCV infection for all persons in this birth cohort (baby boomers). The United States Preventive Services Task Force (USPSTF) subsequently made the same recommendation in June 2013. We estimated the rate of HCV testing between 2011 and 2017 among persons with commercial health insurance coverage and compared rates by birth cohort. Methods Hepatitis C virus testing data were obtained from Quest Diagnostics (Quest) and Laboratory Corporation of America (LabCorp), two large U.S. commercial laboratories serving clinicians and hospitals in all 50 U.S states and the District of Columbia. Analysis was based on de-identified person-level data from HCV antibody immunoassay tests ordered by clinicians in the U.S. between 2011 and in 2017 (with LabCorp data in 2017 limited to January through October). HCV antibody testing rates were calculated and defined as: the number of unique individuals who received their first HCV antibody test during a particular month per 100 unique individuals who had any laboratory test performed by the commercial laboratory during the same month, presented as an annual average (mean) testing rate. Persons born between 1945 and 1965 were classified as baby boomers and compared to persons born in all other years. Results In 2011, prior to the CDC recommendation change, rates of HCV antibody testing relative to overall testing with each cohort were higher for the non-baby boomer cohort served by both Quest and LabCorp. In contrast, from 2012 thorugh2017, testing was more frequent among baby boomers than among non-baby boomers as a proportion of overall testing in each cohort. The rate of testing among baby boomers served by Quest rose from 1.7 per 100 test requests in 2011 to 3.8 per 100, an increase of 131%, while the rate of testing among non-baby boomers rose from 2.3 per 100 to 3.1 per 100, a 35% increase. Changes among patients served by LabCorp were nearly identical; a 132% increase among baby boomers (1.7 per 100 in 2011 to 4.0 per 100 in 2017) and a 31% increase among non-baby boomers (1.7 per 100 in 2011 to 3.2 per 100 in 2017). Conclusions This study demonstrates the utility of commercial laboratory data for assessing changes in HCV testing, as well as the potential impact of national recommendations supporting HCV testing of baby boomers. The study also highlights a prominent, the increase in HCV antibody testing in 2017 relative to 2011, prior to the recommendation change.

Roles of Health Literacy in Relation to Social Determinants of Health and Recommendations for Informatics-Based Interventions: Systematic Review

Abstract

Objective To identify best practices for combining public health data for multi-jurisdiction surveillance projects. Introduction Sentinel surveillance, where selected jurisdictions follow standardized protocols to collect and report enhanced public health data not available through other routine surveillance efforts, is a key part of national surveillance of sexually transmitted diseases (STDs). Although four STDs are nationally notifiable conditions (chlamydia, gonorrhea, syphilis and chancroid), the burden of these conditions (over 2.3 million cases were reported in 2017) limits the amount of detailed clinical and demographic data available for all cases. Sentinel surveillance in clinical settings serving at-risk populations, such as STD clinics, provides an opportunity to collect enhanced data elements on persons seeking STD-related services, such as sex of sex partners and anatomic site of infection. However, there are challenges in combining data across jurisdictions as estimated effect measures may vary by jurisdiction (e.g., some may have higher observed burden of disease among certain populations) and the amount of data contributed by jurisdiction may vary; combined this could lead to biased estimates if heterogeneity is not taken into account. Methods Using data from the STD Surveillance Network (SSuN), a sentinel surveillance project implemented in 10 jurisdictions, we investigated the effect of using different statistical methods to combine data across jurisdictions. We evaluated 5 methodologies: ● "Fully stratified" where estimates were provided separately for each jurisdiction; ● "Aggregated" where numerators and denominators were summed across jurisdictions without weighting; ● "Mean estimate" where the mean of the jurisdiction-specific estimates was estimated; ● "Random effects" where jurisdiction-specific estimates were combined using an inverse variance weighted random effects model to adjust for heterogeneity between jurisdictions; and ● "Stratified random effects" where a possible effect modifier was identified and used to group jurisdictions prior to calculating the estimate from the random effects model. Through SSuN, jurisdictions collect visit-level data on patients attending selected STD clinics and report clinical and demographic data. As an illustrative example, we estimated rectal gonorrhea positivity among gay, bisexual, and other men who have sex with men (MSM) attending participating clinics. Jurisdiction-specific positivity was estimated as the # of unique MSM testing positive at least once for rectal gonorrhea divided by all MSM tested 1 or more times for rectal gonorrhea in all of the clinics in the jurisdiction. The stratifying variable for the stratified random effects method was the percent of MSM screened in the jurisdiction's clinics, as low screening coverage may reflect targeted testing of MSM likely to be infected which may inflate observed positivity. For each of the five methods, we estimated rectal gonorrhea positivity and the corresponding 95% confidence interval (CI). Results In 2017, 123,210 patients attended 30 STD clinics participating in the 10 SSuN jurisdictions, of which 31,052 (25.2%) were identified as MSM (jurisdiction-specific range: 8.8% to 70.0%). (Table 1) One jurisdiction (I) accounted for 39% of all MSM included in the analysis while one jurisdiction (J) accounted for only 1.6% of MSM included. The proportion of MSM tested for rectal gonorrhea at least once varied by jurisdiction, ranging from 44.3% to 76.9%. The fully stratified method identified differences in rectal gonorrhea positivity across jurisdictions, with jurisdiction-specific positivity ranging from 9.9% to 24.1%. Aggregating across jurisdictions masked this heterogeneity and provided a single summary estimate of 15.2% (95% CI: 14.7, 15.7). Taking the mean across the jurisdiction-specific estimates also provided a summary estimate; however, the uncertainty of the estimate increased (15.8%, 95% CI: 13.3, 18.7). Accounting for the heterogeneity by using a random effects model resulted in an estimate of 15.5% (95% CI: 13.9, 17.2). After stratifying by a likely confounder (% of MSM screened); the random effects estimate among 3 jurisdictions with lower screening coverage (<60%) was 19.7% (95% CI: 14.6, 24.8) and among 7 jurisdictions with higher screening coverage (≥60%) was 14.3% (95% CI: 12.9, 15.7). Conclusions In a sentinel surveillance project implemented in 10 jurisdictions, there was substantial heterogeneity in the observed proportion of MSM testing positive for rectal gonorrhea in selected STD clinics. Although a stratified analysis captured the heterogeneity across jurisdictions, it may not be feasible to present fully stratified estimates for all analyses (e.g., surveillance reports likely provide metrics for multiple diseases). Additionally, it limits the ability to succinctly communicate key findings. Aggregating numerators and denominators across jurisdictions to calculate a single summary estimate masks this heterogeneity and biases estimates toward high volume jurisdictions. Taking the mean across jurisdictions ensures that high-volume jurisdictions do not bias the overall estimate; however, the mean may be biased by very high or very low positivity estimates in a few jurisdictions. Using a random effects model accounted for both varying sample sizes and differences in observed heterogeneity; although the summary estimate was similar to the aggregate in this example, the wider 95% CI more accurately reflects the uncertainty in the estimate. Finally, stratifying by a likely effect measure modifier (% of MSM screened) prior to estimating the measure from the random effects model captured key differences in jurisdictions while still providing a limited number of summary estimates. Analysts using data from multi-jurisdiction surveillance projects should fully investigate possible biases when combining estimates across jurisdictions. If there is observed heterogeneity across jurisdictions and it is not feasible to provide fully stratified estimates, analysts could consider using methods to account for heterogeneity and minimize bias due to differing sample sizes, such as stratified random effects models.

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Roles of Health Literacy in Relation to Social Determinants of Health and Recommendations for Informatics-Based Interventions: Systematic Review

Abstract

Objective One of the main objectives of these studies was to improve Anthrax laboratory diagnostics in order to properly monitor the prevalence and distribution of the disease in Georgia. For this geographic information system (GIS) was implemented and used as the additional tool to the laboratory tests for better visualization, summary results and risk assessment. Introduction Anthrax is an acute infectious disease of historical importance caused by Bacillus anthracis (B. anthracis), a spore-forming, soil-borne bacterium with a remarkable ability to persist in the environment. Anthrax is endemic in many countries, including Georgia. Laboratory of the Ministry of Agriculture (LMA) has been actively working on the disease science 1907 and constantly improving diagnostics. In 2009-2017 the laboratory participated in cooperative biological studies. One of the main objectives of these studies was to improve Anthrax laboratory diagnostics in order to properly monitor the prevalence and distribution of the disease in Georgia. Methods In 2009 -2011, within GG18, LMA tested 130(animal and environmental) anthrax suspected samples collected from different regions of Georgia. Later, in 2014 – 2017, studies (TAP7; GG27) were focused on soil sample collection and 2825 specimens were collected from the entire country. Samples were tested according to Treat Agent Detection and Response (TADR) algorithm following standard operation procedures (SOPs). Cultures were isolated through Bacteriology tests - Gram strain, Lysis by gamma phage, Motility test, DFA and confirmed by Molecular Biology (PCR). In 2009, within the studies , geographic information system (GIS) was implemented and used as the additional tool to the laboratory tests for better visualization, summary results and risk assessment. Results Totally, 2955 collected samples were tested. 86 cultures were isolated and confirmed. The results - anthrax cases were mapped by regions, rayons and villages, also positive cases were mapped by sample type and course, Majority of positive cases were in Kvemo Kartli (53%), 19% were from Kakheti, 19% - from Imereti and less distributed in other regions. Applying modern GIS the final map of anthrax foci in Georgia was created including both - old (historical data) and new (recent data) foci. Conclusions The studies aimed to improve Anthrax laboratory diagnostic in Georgia. Better Laboratory diagnostic with modern GIS analysis supports the monitoring of the disease prevalence in Georgia and significantly improves public health system in the country.

Roles of Health Literacy in Relation to Social Determinants of Health and Recommendations for Informatics-Based Interventions: Systematic Review

Abstract

Objective We present a new approach for pre-syndromic disease surveillance from free-text emergency department (ED) chief complaints, and evaluate the method using historical ED data from New York City's Department of Health and Mental Hygiene (NYC DOHMH). Introduction An interdisciplinary team convened by ISDS to translate public health use-case needs into well-defined technical problems recently identified the need for new "pre-syndromic" surveillance methods that do not rely on existing syndromes or pre-defined illness categories1. Our group has recently developed Multidimensional Semantic Scan (MUSES), a pre-syndromic surveillance approach that (1) uses topic modeling to identify newly emerging syndromes that correspond to rare or novel diseases; and (2) uses multidimensional scan statistics to identify emerging outbreaks that correspond to these syndromes and are localized to a particular geography and/or subpopulation2,3. Through a blinded evaluation on retrospective free-text ED chief complaint data from NYC DOHMH, we demonstrate that MUSES has great potential to serve as a "safety net" for public health surveillance, facilitating a rapid, targeted, and effective response to emerging novel disease outbreaks and other events of relevance to public health that do not fit existing syndromes and might otherwise go undetected. Methods Multidimensional semantic scan uses topic modeling to learn illness categories directly from the data, eliminating the need for pre-defined syndromes. Topic models are a set of algorithms that automatically summarize the content of large collections of documents by learning the main themes, or topics, contained in the documents4. Our method learns two sets of topics: a set of topics over the historical data designed to capture common illnesses, and a set of emerging topics over only the most recent data that are optimized to capture any new illnesses not captured by the historical topics. We then use multidimensional scan statistics to identify clusters of cases isolated to a certain topic, hospital, and/or demographic group of patients5. To evaluate the ability of MUSES to detect a diverse set of emerging patterns relevant to public health in large and complex data, we apply our algorithm to historical chief complaint data from NYC. This dataset has over 28 million ED cases from 53 NYC hospitals during 2010-2016. For each hospital we have data on the patients" free-text chief complaint, date and time of arrival, age group, gender and discharge ICD-9 diagnosis code. Public health practitioners at NYC DOHMH performed a blinded evaluation of the top 500 highest-scoring clusters detected by our method and by a competing state of the art keyword-based approach6,7,8. For each of these clusters, the evaluators indicated if the cluster (1) represents a meaningful collection of cases and (2) is, in their judgement, of significant interest to public health. Results The blinded evaluation by NYC DOHMH demonstrated that our method correctly identifies a larger number of events of interest to public health than the baseline keyword-based scan method. 320 (64%) of the top 500 results from MUSES corresponded to meaningful health events, while the keyword-based method only detected 246 such events (49.2%). MUSES also identified 6 more highly relevant events and 74 less meaningless clusters than the keyword-based method. Figure 1 shows that for any fixed number of clusters that public health officials choose to examine, MUSES identifies more meaningful events than keyword-based scan. Alternatively, for any desired number of true clusters detected, MUSES exhibits substantially higher precision: for example, in order to identify 100 true clusters, it had to report 159 total clusters (precision = 63%) as compared to 225 total clusters (precision = 44%) for the keyword-based scan. This corresponds to a 53% reduction in the number of false positive clusters. Additionally, to determine how our approach might provide situational awareness of emerging health concerns following a natural disaster, we examined the clusters identified by our approach in the week following October 29, 2012, when Hurricane Sandy struck New York City and caused a historic level of damage. These results show a progression of clusters from acute cases related to falls and shortness of breath, to mental health issues like depression and anxiety, to chronic health issues that require maintenance procedures, like dialysis and methadone distribution. It is of note that public health officials manually inspected emergency room data immediately following Hurricane Sandy and noticed an increase in the words "methadone", "dialysis" and "oxygen"7. The ability of MUSES to automatically identify similar symptoms as human experts highlights its ability to learn meaningful but novel combinations of symptoms. Conclusions Our MUSES system offers a novel method for pre-syndromic surveillance that achieves the goals set forth by public health practitioners during the ISDS Consultancy. When evaluated against a state of the art baseline, MUSES identifies a larger number of events of interest, has a lower false positive rate, and produces more coherent results. This ability to report newly emerging case clusters of high relevance to public health, without overwhelming the user with a large number of false positives, suggest high potential utility of the approach for day-to-day operational use as a "safety net" for public health surveillance, complementing existing syndromic surveillance approaches. We are currently building a pre-syndromic surveillance system based on the MUSES approach and plan to make this software widely available to public health partners in the near future. References 1. Faigen Z, Deyneka L, Ising A, et al. Cross-disciplinary consultancy to bridge public health technical needs and analytic developers: asyndromic surveillance use case. Online J. Public Health Inform. 2015;7(3). 2. Maurya A, Murray K, Liu Y, Dyer C, Cohen WW, Neill DB. Semantic scan: detecting subtle, spatially localized events in text streams. 2016. arXiv preprint arXiv:1602.04393. 3. Nobles, M., Deyneka,

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Roles of Health Literacy in Relation to Social Determinants of Health and Recommendations for Informatics-Based Interventions: Systematic Review

Abstract

Objective To improve linkage between North Carolina's Emergency Medical Services (EMS) and Emergency Department (ED) data using an iterative, deterministic approach. Introduction The opioid overdose crisis has rapidly expanded in North Carolina (NC), paralleling the epidemic across the United States. The number of opioid overdose deaths in NC has increased by nearly 40% each year since 2015.1 Critical to preventing overdose deaths is increasing access to the life-saving drug naloxone, which can reverse overdose symptoms and progression. Over 700 EMS agencies across NC respond to over 1,000,000 calls each year; naloxone administration was documented in over 15,000 calls in 2017.2 Linking EMS encounters with naloxone administration to the corresponding ED visit assists in understanding the health outcomes of these patients. However, less than 66% of NC EMS records with naloxone administration in 2017 were successfully linked to an ED visit record. This study explored methods to improve EMS and ED data linkage, using a multistage process to maximize the number of correctly linked records while avoiding false linkages. Methods EMS data were provided by the EMS Performance Improvement Center2 (EMSPIC); ED data were provided by NC DETECT.3 Optimization of current EMS/ED linkage methods began by extracting a non-random subset of EMS encounters with naloxone administration between January 1, 2017 and November 30, 2017 from 12 NC counties, representing eastern, central and western regions and the overall linkage performance of the larger dataset. Records were eligible for linkage if EMS recorded that the patient was "treated and transported" to the ED. All records in the subset were manually reviewed in NC DETECT to identify corresponding ED visit records. This produced a "gold standard" dataset of linked EMS/ED records. To evaluate linkage performance, we first identified all records eligible for linkage. Any EMS transport to either a hospital outside of NC or an NC ED not included in NC DETECT (e.g., military, VA and tribal hospitals) was excluded. Since existing linkage is performed daily and both EMS and ED records are updated over time to correct errors and missing data, existing linkage methods were re-run on updated data to evaluate the improvement provided solely by linking the most up-to-date data. Unlinked EMS records for which the encounter was an inter-facility transfer, transfer to helicopter transport, or the patient died during transfer were deemed ineligible for linkage, as these patients likely either bypassed or never made it to the ED. To initially improve linkage quality, we updated the mapping file of EMS/ED destinations. An exact destination match was required for linkage and the EMS destination variable is recorded as free-text; thus, all variations of a destination name and spelling were identified and mapped to a standardized name. The maximum time difference between EMS drop-off and ED intake was then allowed to exceed 60 minutes, in iterations of 90, 120, 240, and 360 minutes. With each iteration, we compared the linked IDs with the gold standard dataset to identify false links. Finally, a multistage linkage process was applied. First, deterministic linkage was run requiring exact matches for date of birth (DOB), sex/gender, and destination, and up to 360-minute difference between EMS/ED times. The unlinked records were then processed a second time, requiring exact matches for sex/gender and destination, DOB to be within +/- 10 days or +/- 1 year, and up to 60-minute difference between EMS/ED times. This multistage process was then run for all 2017 EMS encounters with naloxone administration to ensure that the new method was not over fit to the data subset. Potential bias in the linkage was assessed by comparing the distributions of age (mean and median) and gender (% male) among the linked and unlinked records in each dataset. Statistical analyses were completed using SAS 9.4 (Cary, NC). Linkage was executed using SQL Server. Results Between 1/1/2017 and 11/30/2017, there were 14,793 EMS encounters with documented naloxone administration. Of these, 12,089 (81.7%) were recorded as "treated and transported"; 1,906 EMS encounters were included in the 12-county subset. The average age of patients was 45.1 years among all naloxone encounters and 45.2 years in the subset. 57.5% of all encounters were male; 58.1% were male in the subset. After removing EMS transports to non-NC or non-NC DETECT hospitals, the existing subset linkage was 61.8% (1,154/1,866). This included 38 (2.0%) false positives, apparently caused by ED records purged since this linkage was conducted. When the existing methods were run against the most current data, linkage improved to 72.2% (1,389/1,866), reflecting an absolute improvement of 10.4% by simply using updated data. Only 1 (0.05%) false positive was identified in this process. Following removal of unlinked inter-facility transfers, deaths during EMS transport, and transfers to helicopters, the records eligible for linkage dropped to 1,781. Linkage improved to 79.5% (1,417/1,781) when hospital names were standardized. Linkage using standardized hospital names and relaxing the EMS/ED time difference performed at the following levels: 82.3% at 90 minutes, 83.3% at 120 minutes, 87.9% at 240 minutes, and 89.4% at 360 minutes. Even when using the most relaxed time difference (+/- 360 minutes), only one false positive was identified, the same produced during initial linkage at +/- 60 minutes. The final multistage method produced linkage of 91.0% (1,620/1,781), with no additional false positives. Applying the initial methods to the statewide EMS dataset produced linkage of 64.8%. The multistage linkage process performed nearly identically on statewide data as observed for the subset, at 91.1%. For statewide data, the age of linked patients was younger (mean = 44.7 years [SD = 18.4], median = 41.0 years) than that of unlinked patients (mean = 48.0 years [SD = 19.3], median = 47.0 years). Additionally, linked patients were more likely to be male (58.1%) when

compared to unlinked patients (54.2%). Conclusions High quality linkage between EMS and ED records is essential for research and public health surveillance examining health outcomes. Using a multistage process, we improved the linkage of EMS encounters with documented naloxone administration to ED visits in North Carolina in 2017 from 64.8% to 91.1%, with less than 0.05% false positive rate. This improved linkage will facilitate future analyses of relationships between exposures during EMS encounters and outcomes experienced in hospitals. Future research should evaluate the generalizability of this linkage methodology to all EMS records, not just those with naloxone administration, as well as to pre-2017 data. Implementation of probabilistic linkage or machine learning as a final stage in a multistage process may further improve linkage outcomes, overcoming missing data or unpredictable errors in the data. References 1. Kansagra SM, Cohen MK. The Opioid Epidemic in NC: Progress, Challenges, and Opportunities. N C Med J 2018; 79(3): 157-62. 2. EMS Performance Improvement Center. About EMSPIC. https://www.emspic.org/about. 3. NC DETECT. Background. http://ncdetect.org/background/

Roles of Health Literacy in Relation to Social Determinants of Health and Recommendations for Informatics-Based Interventions: Systematic Review

Abstract

Objective To prove the role of partnerships in Disease Surveillance and Response to emerging public health threats in Kerala state, India. Introduction Kerala is a small state in India, having a population of only 34 million (2011 census) but with excellent health indices, human development index and a worthy model of decentralised governance. Integrated Disease Surveillance Program, a centrally supported surveillance program, in place since 2006 and have carved its own niche among the best performing states,in India. Laboratory confirmation of health related events/disease outbreaks is the key to successful and timely containement of such events, which need support from a wide range of Laboratories-from Primary care centers to advanced research laboratories, including private sector. In a resource constraint setting, an effective model of Partnership have helped this state in achieving great heights. Networking with laboratores of Medical Education Department, and Premier Private sector laboratories, Financing equipments and reagents through decentralised governance program, resource sharing with other National programs, Laboraotries of Food Safety, Fisheries and Water authorities have resulted in laboratory confirmation of public health events to the extend of 75-80% in the past 5 years in the state. Etiological confirmation accelerated response measures, often multidsciplinary, involving Human health sector, Animal Health, Agriculture, wild life and even environemntal sectors, all relevant in One Health context. Methods During 2013-14,state launhced a laboratory networking initiative, with aid and guidance from central government,through a mutually beneficial MoU, linking all the 5 Govt Medical College Microbiology Laboratories with the State Health surveillance system. A State Laboratory Cordinator was designated, and these teaching Hospital were requested to assist the state in testing of outbreak samples from adjoining 3-4 districts.Additional funds were provided for these institutions after a team assessment and periodic monitoring.All the 14 disricts of state gained remarkably in laboratory confirmation of various outbreaks. During 2013, when one of the remote districts in the state detected an unusual fever cluster among the indigenous community, investigation by a multidisciplinary team, supported by a reputed private sector virology laboratory of an academic institution of the neighbouring state, confirmed Lyme disease, first time in the state. In 2014 and 2015, the same laboratory confirmed another hitherto unreported disease, Kyasanur Forest disease, in the same district. These two events lead to the establishing of a Private Public Partnership model in disease surveillance in the state. This model shared physical infrastructure in the govt hospital premises with technological support from the virology center. Since then, this laboratory has contributed to >90% of laboratory confirmation of health events in the district. Eventually, the same laboratory became the pioneer in confirmation of the first Nipah Virus outbreak in the state in 2018. This laboratory is also the Reference laboratory for H1N1 and Avian Influenza for whole of South India. This surveillance network, has since then, established additional units in other parts of the state through special government order. From the response perspective also, the state adopted similar partnership approach. The strategy for control of Kyasanur Forest Disease(KFD) is a classical example. Monkey deaths were autopsied by Wildlife experts, domestic animals were treated for tick infestation by the veterinary officers, research work done at Veterinary university, human cases treated and vulnerable population vaccinated by Human Health officers, Tribal and Revenue department addressed the welfare aspects of the affected indigenous communities, and the district collector cordinated all related activities. It was a pathbreaking experience, and since 2015, till date, no new case is reported from the district, unlike hotspots in other parts of India. In 2014, the state gained from Fisheries department laboratory, by confirmation of a fish toxin from an event of food borne infection outbreak. In the same year, Veterinary Univerisity laboratory isolated Vibrio Cholera from water samples from a Cholera outbreak.In 2018, the state surveillance unit, engaged with Veterinary University of the state to undertake MAT testing of Human Leptospirosis cases for facilitating the identification of serovars, another landmark effort, approved by Govt of India. The state surveillance system also receives tremendous support from laboratories of research centers like Rajeev Gandhi center for Biotechnology and Vector Control Research Center of ICMR (Indian council of Medical Research center). The state is now, preparing a draft action plan for constituting a One Health Governance Secretariate in Kerala, to bring together all the stakeholders in disease surveillance, for optimizing their contribution. Results State Health surveillance system detected 135,130,140,130,disease outbreaks during the years 2014,15,16,17,and 93, till date in 2018. The laboratory confirmation of 65%,75%,80%,82.5% and 65.5% in respective years facilitated prompt response by the state. This was made possible with an extensive laboratory collaboration with partners ranging from Institutional labs of state government as well as decentralised local self governments,(12.3%) Regional Public Health labs(13.8%), Referral Network Labs of Govt Medical College Hospitals (16.2%), Manipal Center for Viral Research Lab(11.5%) Kerala Water Authority Labs (6.2%), Food Security and Safety department (2.3%) and a small contribution by Private Laboratories (1.5%) during 2017. In 2018, 324 human samples were tested and 16 samples confirmed for Nipah virus disease,from MCVR Manipal. The same laboratory confirmed Lyme disease (2013) and Kyasanur Forest Disease (2014 and 2015) from human sampels. 3 environemntal samples were tested positive for Legionnaires bacteria from cooling system of 2 Tourist Hotels, following notification of Legionnaires Pneumonia among 2 foreign tourists.(2016 and 17). Fish toxin \"Ciguaterin\" was confrimed from an incident of food borne

outbreak by a laboratory attached to Fisheries department (2015) - a unique example of One Health application in disease surveillance and outbreak response. Laboratories attached to Kerala Water Authority supports testing of water sampels during water borne infections and Food Safety department facilitates analysis of food items during food borne infections. 7 water samples tested positive for Vibrio Cholerae during a Cholera outbreak, done through Reserch wing of Veterinary Univerisity Micobiology Lab in 2016. An instance of Primary Amoebic Meningoencephalitis was confirmed through a premier private tertiary center laboraotry.Leptospira serovars are being identified through a collaborative project with a Veterinary University(2018). Conclusions Kerala state in India has shown many successful models in development sector. Partnership in Laboratory surveillance is the most recent one in the segment. Besides interdepartmental collaboration, a unique model of Private Public Partnership is also tried by this state, resulting in historic achievements like high eteological confirmation of outbreks including the mos recent and first ever Nipah virus disease,ample evidence for state"s commitment to IHR compliance as well.This model, I feel is replicable in similar situations in resource poor countries across the globe.

Roles of Health Literacy in Relation to Social Determinants of Health and Recommendations for Informatics-Based Interventions: Systematic Review

Abstract

Objective This study aims to implement and evaluate two automatic classification methods of free-text medical causes of death into Mortality Syndromic Groups (MSGs) in order to be used for reactive mortality surveillance. **Introduction** Mortality is an indicator of the severity of the impact of an event on the population. In France mortality surveillance is part of the syndromic surveillance system SurSaUD and is carried out by Santé publique France, the French public health agency. The set-up of an Electronic Death Registration System (EDRS) in 2007 enabled to receive in real-time medical causes of death in free-text format. This data source was considered as reactive and valuable to implement a reactive mortality surveillance system using medical causes of death (1). The reactive mortality surveillance system is based on the monitoring of Mortality Syndromic Groups (MSGs). An MSG is defined as a cluster of medical causes of death (pathologies, syndromes, symptoms) that meet the objectives of early detection and impact assessment of events (2). Since causes of death are entered in free-text format, their automatic classifications into MSGs require the use of natural language processing methods. We observe a constant increase in the use of these methods to classify medical information and for health surveillance over the last two decades (3). **Methods** Data consisted of the medical part of electronic death certificates received in routine by Santé publique France from 2012 to 2016. We split the dataset into training and test sets. Among each set, a subset of certificates was selected by a random sampling without replacement. Two annotators manually assigned MSGs to each death certificates in all subsets. Discordances were discussed and corrected if necessary. The agreement rate between the two annotators was 0.90 on the test set. Final annotated subsets represent the ground truth against which the methods tested were evaluated. The final evaluation was performed on the test set of 1,000 death certificates while the classifiers were trained on 3500 death certificates. Two classification methods were implemented: a rule-based method and a supervised machine learning method. The rule-based method was based on four processing steps: applying standardization rules, splitting of medical expression using delimiters, spelling correction and dictionary projection. The supervised machine learning method was set up using a linear Support Vector Machine (SVM) classifier. We trained a multi-label classifier using the one-versus-all strategy. We implemented two models: one based on surface features (SVM model) and the other, a hybrid model, combining surface features and features obtained by the rule-based method. Surface features were bags-of-word unigrams and bigrams and of character trigrams. The rule-based method and the two supervised machine learning models were evaluated using the three evaluation measures: precision (Positive Predictive Value), recall (Sensitivity) and F-measure (P/R/Fm). The study focused on the classification performance of MSGs defined for the reactive detection of outbreaks and are composed of unspecific or acute pathologies, or general symptoms (related to pain, fever, cognitive disorder…). Only the 40 MSGs mentioned at least 3 times in the test set were considered in this study, they belonged to 13 topics (Respiratory conditions, Cardio and cerebrovascular conditions, Infectious diseases, Digestive conditions…). **Results** With the rule-based method, among the 40 MSGs, 24 obtained a P/R/Fm over 0.90. They belonged mainly to the topics Cardio and Cerebrovascular conditions (5 MSGs), Respiratory conditions (6), and General symptoms (5). Four MSGs obtained P/R/Fm below 0.85 belonging to the topics Infectious conditions (2), Blood condition (1) and Unspecified causes of death (1). The hybrid model obtained P/R/Fm over 0.90 for 25 MSGs. Among them, 21 were the same as the rule-base method. Performance of the rule-based method and the hybrid model were over 0.95 for the same 13 MSGs. The hybrid model obtained P/R/Fm below 0.85 for 4 MSGs also belonging to the same topics as those of the rule-based method. The SVM model had lower classification performance than the two other models. **Conclusions** For syndromic mortality surveillance both precision and recall are important for all MSGs. Indeed to meet the objective of a reactive detection of events, high precision is needed to limit false alarms. To measure the impact of an event, the surveillance system should have high recall, to avoid an underestimation of this impact. This is especially true for rarer diseases. The results showed that the rule-based method and the hybrid model are the most effective to classify causes of death into MSGs. For some MSGs with less than 5 mentions in the test set (7%), these results must be qualified. Also, to improve classification performance for MSGs with performance below 0.90, and to confirm these results further analysis must be conducted. The results suggest the relevance of these methods to set up a reactive mortality surveillance system for detection and alert based on free-text causes of death. Such a system will provide useful information to health authorities regarding the causes of death during an event, helping them to adapt counter and prevention measures. **References** 1. Lassalle M, Caserio-Schönemann C, Gallay A, Rey G, Fouillet A. Pertinence of electronic death certificates for real-time surveillance and alert, France, 2012–2014. Public Health. 2017;143:85-93. (1) 2. Baghdadi Y, Gallay A, Caserio-Schönemann C, Thiam M-M, Fouillet A. 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Roles of Health Literacy in Relation to Social Determinants of Health and Recommendations for Informatics-Based Interventions: Systematic Review

Abstract

Objective Due to the lack of information about the phylogenetic origins of Ukrainian Bacillus anthracis strains, the goal of this work was to make phylogenetic analysis of Ukrainian isolates obtained from various sources (soil, clinical material from infected humans and animal products) for better understanding of phylogenetic origins of this pathogen in Ukraine and Eastern Europe. Introduction Anthrax is a widely spread zoonotic disease with natural transmissive cycle involving wildlife, livestock and humans [1]. It is caused by Bacillus anthracis, a highly pathogenic gram-positive, spore-producing bacterium, which poses a serious threat to public and animal health due to its mortality both for animals and for humans [2, 3, 4]. The ability of B. anthracis spores to remain viable in soils for decades enables their isolation from freely accessible environment [5]. This unique feature to form highly resistant spores in the environment plays a major role in the ecology and evolution of this pathogen [6]. During the spore phase, evolution is greatly reduced in rate, which limits the amount of genetic diversity found among isolates of this species [1]. All these factors demonstrate the need for reliable anthrax diagnosis and trace-back methods. This comprises bio forensic capabilities including state-of-the-art methods for accurate genotyping of B. anthracis strains. Methods 23 thermolysates of B. anthracis broth cultures isolated from various sources (vesicles from eleven different people infected with cutaneous anthrax when disease's sporadic outbreaks were detected in Ukraine in 1963-2002, as well as two samples from sheep wool, and eight soil samples) were obtained from the Central Epidemiological Station (Kyiv, Ukraine), as well as from I.I. Mechnikov Ukrainian Scientific and Research Anti-plaque Institute (Odessa, Ukraine). These anthrax cultures were confirmed with classical microbiological methods (microscopy, cultivation on solid and liquid media), "string of pearls" reaction, and using bioassay on living white mice (the mortality was observed two days after subcutaneous injection of 0,2-0,5 ml of cells' suspension). All these tests were carried out at the institutions where samples were obtained. Besides, one B. anthracis isolate was cultivated from soil sample of an animal grave site nearby Koviagy village, Valky district, Kharkiv region. All samples were analyzed at the Bundeswehr Institute of Microbiology (Munich, Germany). To confirm the presence of the anthrax genome and plasmids, we isolated genomic DNA (gDNA) from thermolysates and studied the presence of the genomic marker dhp61 as well as the plasmid specific marker pagA (pXO1) and capC (pXO2) using qPCR. Quality of the isolated gDNA was tested using the Agilent bioanalyzer. To characterize regional and global phylogeographic patterns of these strains, canonical Single Nucleotide Polymorphisms analysis (canSNP) was conducted using high resolution melt (HRM). Three thermolysates of broth cultures isolated and soil sample isolated from animal grave site in Kharkiv region were analyzed using NewSeq Full genome sequencing. Results B. anthracis chromosomal DNA-marker dhp61 as well as pXO1 marker pagA and pXO2 plasmid marker capC could be detected in all thermolysates. However, the soil isolate from the Koviagy grave site was positive for dhp61 but contained only the pXO1 plasmid. The Bioanalyzer assay revealed that only 6 out of the 23 thermolysates had good enough DNA quality to be sequenced. So far only genomes of thermolysates of soil samples from Mykolaiv and Sumy regions, the thermolysate of sick patient"s vesicle from Kherson region as well as the soil sample from the animal grave site in Kharkiv region have been sequenced. For the residual 3 thermolysates the full genome analysis is still in progress. The sequencing results showed that the B. anthracis strain isolated from Mykolaiv soil sample belongs to the Vollum linage group and other thermolysates from Sumy and Kherson regions are closely clustering with isolates from Japan. Thus, human isolate from Kherson region is clustering with the Japanese isolate BA104 which was obtained from pig during sporadic anthrax incident in 1982 and soil isolate from Sumy region is clustering with the BA 103 isolate which was obtained from beef cattle in Japan in 1991. In contrast, we analyzed the genomic sequence of the pXO2-negative isolate from grave site in Kharkiv region using BioNumerics software and found that it has high similarity to STI strain. Conclusions The infrequent sporadic occurrence of anthrax in the country of Ukraine is likely caused by a heterogeneous population of B. anthracis. The found STI strain in the grave site of Kharkiv region is probably an environmental recovery of the Russian anthrax live vaccine which was commonly used for vaccination of animals in the former Soviet Union The sequencing result of the soil isolate from Mykolaiv region indicates the occurrence of another canSNP group, the Vollum group, which is quite untypical for Ukraine. The latter is mainly prevalent in the Asian regions (namely Pakistan) and therefore might have been introduced to Ukraine over the silk road. Other two thermolysates from Sumy and Kherson regions also showed unexpected results clustering with Japanese isolates. The further research of Ukrainian B. anthracis isolates will allow us to expand our knowledge about the population structure and evolution of anthrax in Ukraine. References 1. Van Ert MN, Easterday WR, Huynh LY, Okinaka RT, Hugh-Jones ME, Ravel J, et al. (2007) Global Genetic Population Structure of Bacillus anthracis. PLoS ONE 2(5); 2. Freidlander, A. 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Roles of Health Literacy in Relation to Social Determinants of Health and Recommendations for Informatics-Based Interventions: Systematic Review

Abstract

Objective To describe the use of syndromic surveillance data for real-time situational awareness of emergency department utilization during a localized mass overdose event related to the substance K2. Introduction On August 15, 2018, the Connecticut Department of Public Health (DPH) became aware of a cluster of suspected overdoses in an urban park related to the synthetic cannabinoid K2. Abuse of K2 has been associated with serious adverse effects and overdose clusters have been reported in multiple states. This investigation aimed to characterize the use of syndromic surveillance data to monitor a cluster of suspected overdoses in real time. Methods The EpiCenter syndromic surveillance system collects data on all emergency department (ED) visits at Connecticut hospitals. ED visits associated with the event were identified using ad hoc keyword analyses. The number of visits by facility location for the state, county, and city were communicated to state and local partners in real time. Gender, age, and repeated ED visits were assessed. After the event, surveillance findings were summarized for partners Results During the period of August 15–16, 2018 the number of ED visits with a mention of K2 in the chief complaint increased from three to 30 in the impacted county, compared to a peak of 5 visits during the period of March–July, 2018. An additional 25 ED visits were identified using other related keywords (e.g., weed). After the event, 72 ED visits were identified with K2 and location keywords in the chief complaint or triage notes. These 72 visits comprised 53 unique patients, with 12 patients returning to the ED 2–5 times over the two day period. Of 53 patients, 77% were male and the median age was 40 years (interquartile range 35–51 years). Surveillance findings were shared with partners in real time for situational awareness, and in a summary report on August 21. Conclusions Data from the EpiCenter system were consistent with reports from other data sources regarding this cluster of suspected drug overdoses. Next steps related to this event involve: monitoring data for reference to areas of concentrated substance use, enabling automated alerts to detect clusters of interest, and developing a plan to improve coordinate real-time communication with stakeholderswithin DPH and with external partners during events.

Roles of Health Literacy in Relation to Social Determinants of Health and Recommendations for Informatics-Based Interventions: Systematic Review

Abstract

Objective By systematically scoring algorithms and integrating outbreak data through statistical learning, evaluate and improve the performance of automated infectious-disease-outbreak detection. The improvements should be directly relevant to the epidemiological practice. A broader objective is to explore the usefulness of machine-learning approaches in epidemiology. Introduction Within the traditional surveillance of notifiable infectious diseases in Germany, not only are individual cases reported to the Robert Koch Institute, but also outbreaks themselves are recorded: A label is assigned by epidemiologists to each case, indicating whether it is part of an outbreak and of which. This expert knowledge represents, in the language of machine leaning, a \"ground truth\" for the algorithmic task of detecting outbreaks from a stream of surveillance data. The integration of this kind of information in the design and evaluation of algorithms is called supervised learning. Methods Reported cases were aggregated weekly and divided into two count time series, one for endemic (not part of an outbreak) and one for epidemic cases. Two new algorithms were developed for the analysis of such time series: farringtonOutbreak is an adaptation of the standard method farringtonFlexible as implemented in the surveillance R package: It trains on endemic case counts but detects anomalies on total case counts. The second algorithm is hmmOutbreak, which is based on a hidden Markov model (HMM): A binary hidden state indicates whether an outbreak was reported in a given week, the transition matrix for this state is learned from the outbreak data and this state is integrated as factor in a generalised linear model of the total case count. An explicit probability of being in a state of outbreak is then computed for each week (one-week ahead) and a signal is generated if it is higher than a user-defined threshold. To evaluate performance, we framed outbreak detection as a simple binary classification problem: Is there an outbreak in a given week, yes or no? Was a signal generated for this week, yes or no? One can thus count, for each time series, the true positives (outbreak data and signals agree), false positives, true negatives and false negatives. From those, classical performance scores can be computed, such as sensitivity, specificity, precision, F-score or area under the ROC curve (AUC). For the evaluation with real-word data we used time series of reported cases of salmonellosis and campylobacteriosis for each of the 412 German counties over 9 years. We also ran simple simulations with different parameter sets, generating count time series and outbreaks with the sim.pointSource function of the surveillance R package. Results We have developed a supervised-learning framework for outbreak detection based on reported infections and outbreaks, proposing two algorithms and an evaluation method. hmmOutbreak performs overall much better than the standard farringtonFlexible, with e.g. a 60% improvement in sensitivity (0.5 compared to 0.3) at a fixed specificity of 0.9. The results were confirmed by simulations. Furthermore, the computation of explicit outbreak probabilities allows a better and clearer interpretation of detection results than the usual testing of the null hypothesis \"is endemic\". Conclusions Methods of machine learning can be usefully applied in the context of infectious-disease surveillance. Already a simple HMM shows large improvements and better interpretability: More refined methods, in particular semi-supervised approaches, look thus very promising. The systematic integration of available expert knowledge, in this case the recording of outbreaks, allows an evaluation of algorithmic performance that is of direct relevance for the epidemiological practice, in contrast to the usual intrinsic statistical metrics. Beyond that, this knowledge can be readily used to improve that performance and, in the future, gain insights in outbreak dynamics. Moreover, other types of labels will be similarly integrated in automated surveillance analyses, e.g. user feedback on whether a signal was relevant (reinforcement learning) or messages on specialised internet platforms that were found to be useful warnings of international epidemic events.

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Abstract

Objective To discuss the process for developing and revising suspected drug overdose queries in syndromic surveillance (SyS) systems. Introduction State and local jurisdictions have been exploring the use of SyS data to monitor suspected drug overdose outbreaks in their communities. With the increasing awareness and use of SyS systems, staff from the Centers for Disease Control and Prevention (CDC) worked to develop several queries that jurisdictions could use to better capture suspected drug overdose visits. In 2017, CDC released their first two queries on heroin overdose and opioid overdose, followed in 2018 by stimulant and all drug overdose queries. Over time, and with the assistance from the SyS community and the CDC-funded Enhanced State Opioid Overdose Surveillance (ESOOS) state health departments, CDC has revised the queries to address suggestions from jurisdictions. However, it's not clear how often and in what way the syndrome definitions are updated over time. This is particularly true as new drugs emerge and the names of those drugs are integrated into syndrome definitions (e.g., recent "Spice" and "K2" synthetic cannabinoid outbreaks). Description This roundtable will provide a forum for national, state, and local users of SyS and drug overdose syndrome queries to discuss the process of query development, with an eye towards determining when a definition is "good enough." CDC staff will facilitate the discussion and present the current portfolio of drug-related overdose queries. Participants will be encouraged to provide feedback on the queries, share what has been/has not been working in their jurisdiction with regard to syndrome query development, and discuss the process for revising queries as the epidemic evolves. The focus of this roundtable will be on suspected drug overdose query development and revision with emergency department SyS data. How the Moderator Intends to Engage the Audience in Discussions on the TopicWith most jurisdictions grappling with the impact of the opioid epidemic, this roundtable is well suited for widespread audience participation. Though some jurisdictions have been using SyS to monitor suspected drug overdose outbreaks for some time, others are not using SyS in this way. Thus, opportunities for sharing of work, experiences, barriers, and facilitators will be useful for all SyS users

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Abstract

Objective To increase the availability and accessibility of standardized environmental health data for public health surveillance and decision-making. Introduction In 2002, the United States (US) Centers for Disease Control and Prevention (CDC) launched the National Environmental Public Health Tracking Program (Tracking Program) to address the challenges in environmental health surveillance described by the Pew Environmental Commission (1). The report cited gaps in our understanding of how the environment affects our health and attributed these gaps to a dearth of surveillance data for environmental hazards, human exposures, and health effects. The Tracking Program's mission is to provide information from a nationwide network of integrated health and environmental data that drives actions to improve the health of communities. Accomplishing this mission requires a range of expertise from environmental health scientists to programmers to communicators employing the best practices and latest technical advances of their disciplines. Critical to this mission, the Tracking Program must identify and prioritize what data are needed, address any gaps found, and integrate the data into the network for ongoing surveillance. Methods The Tracking Program identifies important environmental health topics with data challenges based on the recommendations in the Pew Commission report as well as input from federal, state, territorial, tribal, and local partners. For each topic, the first step is to formulate the key surveillance question, which includes identifying the decision-maker or end user. Next, available data are evaluated to determine if the data can answer the question and, if not, what enhancements or new data are needed. Standards are developed to establish data requirements and to ensure consistency and comparability. Standardized data are then integrated into the network at national, state, and local levels. Standardized measures are calculated to translate the data into the information needed. These measures are then publically disseminated via national, state, and local web-based portals. Data are updated annually or as they are available and new data are added regularly. All data undergo a multi-step validation process that is semi-automated, routinized, and reproducible. Results The first set of nationally consistent data and measures (NCDM) was released in 2008 and covered 8 environmental health topics. Since then the NCDM have grown to cover 14 topics. Additional standardized data and measures are integrated into the national network resulting in 23 topics with standardized 450 measures (Figure). On the national network, measures can be queried via the Data Explorer, viewed in the info-by-location application, or connected to via the network's Application Program Interface (API). On average, 15,000 and 3300 queries are run every month on the Data Explorer and the API respectfully. Additional locally relevant data are available on state and local tracking networks. Gaps in data have been addressed through standards for new data collections, models to extend available data, new methodologies for using existing data, and expansion of the utility of non-traditional public health data. For example, the program has collaborated with the Environmental Protection Agency to develop daily estimates of fine particulate matter and ozone for every county in the conterminous US and to develop the first national database of standardized radon testing data. The program also collaborated with the National Aeronautics and Space Administration and its academic partners to transform satellite data into data products for public health. The Tracking Program has analyzed the data to address important gaps in our understanding of the relationship between negative health outcomes and environmental hazards. Data have been used in epidemiologic studies to better quantify the association between fine particulate matter, ozone, wildfire smoke, and extreme heat on emergency department visits and hospitalizations. Results are translated into measures of health burden for public dissemination and can be used to inform regulatory standards and public health interventions. Conclusions The scope of the Tracking Program's mission and the volume of data within the network requires the program to merge traditional public health expertise and practices with current technical and scientific advances. Data integrated into the network can be used to (1) describe temporal and spatial trends in health outcomes and potential environmental exposures, (2) identify populations most affected, (3) generate hypotheses about associations between health and environmental exposures, and (4) develop, guide, and assess the environmental public health policies and interventions aimed at reducing or eliminating health outcomes associated with environmental factors. The program continues to expand the data within the network and the applications deployed for others to access the data. Current data challenges include the need for more temporally and spatially resolved data to better understand the complex relationships between environmental hazards, health outcomes, and risk factors at a local level. National standards are in development for systematically generating, analyzing, and disseminating small area data and real-time data that will allow for comparisons between different datasets over geography and time. References 1. Pew Environmental Health Tracking Project Team. America's Environmental Health Gap: Why the Country Needs a Nationwide Health Tracking Network. Johns Hopkins School of Hygiene and Public Health, Department of Health Policy and Management; 2000.

Roles of Health Literacy in Relation to Social Determinants of Health and Recommendations for Informatics-Based Interventions: Systematic Review

Abstract

Objective In order to meet local mental health surveillance needs, we created multiple mental health-related indicators using emergency department data from the Colorado North Central Region (CO-NCR) Early Notification of Community Based Epidemics (ESSENCE), a Syndromic Surveillance (SyS) platform. Introduction Mental health is a common and costly concern; it is estimated that nearly 20 percent of adults in the United States live with a mental illness[1] and that more money is spent on mental illness than any other medical condition.[2] One spillover effect of unmet mental health needs may be increasing emergency department utilization. National analysis by Healthcare Cost and Utilization Project (H-CUP) found a 55% increase in emergency department visits for depression, anxiety, and stress reactions between 2006-2013.[3] Local public health agencies (LPHAs) can play an important role in reducing costs and burden associated with mental illness. There is opportunity to use emergency department data at a local level to monitor trends and evaluate the effectiveness of local strategies. ESSENCE, available in 31 states, provides near-real time observation-level emergency department data, which can be analyzed and disseminated according to local needs. Using ESSENCE data from 6 local counties in Colorado, we developed methods to estimate the overall burden of mental health and specific mental health disorders seen in the emergency department. Methods Boulder County Public Health expanded on existing methods to develop multiple mental health queries in ESSENCE using data from the six Colorado counties that currently participate in the Colorado North Central Region (CO-NCR) SyS (i.e., Adams, Arapahoe, Boulder, Denver, Douglas, and Jefferson Counties). Our query was based solely off relevant International Classification of Disease version 10 Clinical Modification (ICD-10-CM) mental health codes: F20-F48, F99, R45.851, X71–X83, T14.91, and R45.851. We also included T36-T65 and T71 where intentional self-harm was specified. In addition to an overall mental health query we created 11 sub-queries for: anxiety disorder, conversion disorder, intentional self-harm/suicide attempt, mood disorder, obsessive compulsive disorder (OCD), dissociative disorder, schizophrenia, somatoform disorders, stress adjustment disorder, suicide ideation, and other mental health disorder). One observation could fall into multiple subcategories through inclusion of multiple discharge diagnosis (DD). One challenge of using the DD field in ESSENCE is that in Colorado, similar to other states, there can be excess of 40 unique ICD-10-CM codes listed in the DD field, and queries identify cases by searching all listed codes. For this project, that is problematic as codes may refer to historic and underlying health conditions, rather than acute cause of the ED visit. To handle this, we performed a secondary analysis to determine whether observations were "true mental health cases" based on order of codes listed in DD field, triage notes and chief complaint. We then calculated sensitivity, specificity, positive predictive value (PPV) and negative predictive value(NPV) of including observations where mental health was listed as the first (or primary) code, first or second, or first second or third code. Our analysis revealed that observations where mental health codes are listed later were less likely to be identifiable as true mental health cases, and led to our decision to only include observations with qualifying codes listed first or second. To assess the mental health burden, we developed code in SAS 9.4 that parsed ESSENCE output by discharge diagnosis, create aforementioned sub-queries, and calculated counts and age-adjusted rates (based on 2000 US Population) to summarize demographic and geographic trends. Results There were 22,451 observations with mental health discharge diagnosis codes for the six Colorado counties between January and June 2018. Of these codes, 13,331 had a mental health code as the first and/or second listed DD and were counted as true mental health visits. The age-adjusted rates of any mental health visit ranged from approximately 425 per 100,000 in Douglas County to 1,026 per 100,000 in Denver County. The most common reasons for mental health visits across the region were anxiety, mood disorder, and suicide ideation (Figure 1). There was a significant spike in mental health ED visits among the 15-24 age group, followed by decreasing rates in older age groups (Figure 2). Younger age groups most commonly had ED visits for mood disorder (all age groups under 24), while in the age groups 25-34, 35-44, 65-74 and 75+ the most common reason for ED visit was anxiety. Also of note, ED visits for suicide ideation and self- harm were highest for the 15-24 age group. Males and females had similar rates of ED visits for most diagnoses, which is notable given males generally utilize healthcare services at lower rates than females. Conclusions Syndromic surveillance is a valuable addition to available mental health surveillance. Our methods and results demonstrate the feasibility of tracking overall and specific mental health trends using the ESSENCE platform. Unlike other available mental health data, ESSENCE provides data that is local, observation level, and near-real time. Through continued collaboration with public health, medical and other stakeholders we hope this data can be pivotal in gauging disparities in mental health burden, monitoring trends, and prioritizing solutions.
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Roles of Health Literacy in Relation to Social Determinants of Health and Recommendations for Informatics-Based Interventions: Systematic Review

Abstract

Objective Link syndromic surveillance data for potential opioid-involved overdoses with hospital discharge data to assess positive predictive value of CDC Opioid Classifiers for conducting surveillance on acute drug overdoses. Introduction The opioid drug overdose crisis presents serious challenges to state-based public health surveillance programs, not the least of which is uncertainty in the detection of cases in existing data systems. New Jersey historically had slightly higher unintentional drug overdose death rates than the national average, but by 2001 dramatic increases in drug overdose deaths in states like West Virginia began to drive up the national rate (Figure 1). Although the rise in New Jersey's fatal overdose rates has mirrored the national rate since 1999, the rate has dramatically increased since 2011- from 9.7 per 100,000 (868 deaths) to 21.9 per 100,000 in 2016 (1,931 deaths), an increase of 125% in five years.1 The New Jersey Department of Health has been funded by the Centers for Disease Control and Prevention (CDC) to conduct surveillance of opioid-involved overdoses through the Enhanced Surveillance of Opioid-Involved Overdose in States (ESOOS) program, and to conduct syndromic surveillance through the National Syndromic Surveillance Program (NSSP); this has presented a collaboration opportunity for the Department's surveillance grantee programs to use existing resources to evaluate and refine New Jersey's drug overdose case definitions and develop new indicators to measure the burden of overdose throughout the state and to facilitate effective responses. Methods This work examined using probabilistic matching strategies to assess how accurately syndromic surveillance data identifies potential opioid-involved overdose patients by linking to hospital discharge records after subsequent treatment in an emergency department or inpatient setting for either a confirmed opioid-involved overdose or another condition(s). New Jersey syndromic surveillance data from NSSP's ESSENCE system from December 2016 with either CDC's CCDD Classifiers "CDC Opioid Overdose V1" or "CDC Heroin Overdose V3" were selected for inclusion ("NJ ESSENCE data"). NJ ESSENCE data were restructured to produce one record per patient visit, with each record assigned one or more overdose classifiers; these records were then matched to the universe of acute care hospital discharge billing records from the New Jersey Hospital Discharge Data System ("UB data") from the same time period. Confirmed drug overdoses were flagged in the UB data by using the CDC's baseline ESOOS case definition, which searches all diagnosis fields for ICD-10-CM codes indicating an unintentional or undetermined intent drug overdose, an opioid overdose, or a heroin overdose. Optionally, there are suggested codes for mental and behavioral health conditions that indicate opioid abuse or dependence with intoxication (Table 1). Using SAS® software and PROC SQL, data were matched using a three-round "blocking" strategy based on facility identifier and admission date, and combinations of date of birth, sex, patient ZIP code, and age. Concordance of ESSENCE opioid overdose classifiers with indicator categories used by CDC's ESOOS was evaluated. Suspected opioid overdoses from NJ ESSENCE that matched to UB records for mental health conditions that were not also acute overdoses were reviewed. Results There were 253 records in NJ ESSENCE data with either "CDC Opioid Overdose V1" or "CDC Heroin Overdose V3" CCDD classifiers; restructuring the data resulted in 149 unique records of potential opioid overdoses. Of these, 106 (71%) records from NJ ESSENCE were successfully matched to emergency department or inpatient records. Eighty (80) records (54%), were matched in the first round using facility identifier and date of admission, date of birth, sex, and patient's home ZIP code. Of the 43 unmatched NJ ESSENCE records, 33 (77%) were patients missing age and date of birth. Of the 106 matched records (Table 2): ● 74 opioid-involved overdoses in NJ ESSENCE matched to any drug overdose records in the UB data, for an overall PPV of 70%. ● 69 opioid-involved overdoses in NJ ESSENCE matched to opioid-involved overdose records, for an opioid-involved PPV of 65%. ● 54 heroin-involved overdoses in NJ ESSENCE matched to heroin-involved overdose records, for a heroin-involved PPV of 92%. 32 matched records were NJ ESSENCE positive for opioids and UB negative, and 24 (75%) were classified as potential heroin overdoses. ●18 records had at least one mental and behavioral health condition code as part of the final discharge record. ● 3 were flagged with the mental and behavioral health conditions with opioid intoxication indicator. Only one record appeared to be a possible false positive, with an NJ ESSENCE record indicating a "suspected heroin overdose or an overdose by unspecified drugs and of undetermined intent", but a discharge record indicated a primary diagnosis code of I46.9 (sudden cardiac arrest) and other systemic diagnoses but no poisoning or mental or behavioral health codes reported. Conclusions NJ ESSENCE data with CDC Opioid or Heroin Overdose Classifiers was able to correctly identify opioid-involved overdoses in matched records for patients experiencing an acute overdose better than 2 out of 3 times. For patients experiencing an acute heroin overdose the PPV was over 90%. Cases with discordance in classification matched to records that may have been possible undetected drug intoxications or other mental and behavioral health conditions. This work does not confirm that the CDC Opioid or Heroin Overdose Classifiers accurately capture all or even most drug overdoses treated in New Jersey hospitals reported to NSSP ESSENCE as of December 2016. A total of 1,461 discharges for acute drug overdoses were identified in UB data using the ESOOS case definition; 1,069 were treated and released from the emergency department, and 392 were admitted for further inpatient care. The 106 matched records only represent 7% of total overdose records identified in the UB data. Further suggested

work includes follow-up on possible data quality issues, pursuing a comprehensive project using all UB-identified overdoses matched to a broader selection of NJ ESSENCE data to examine what may be missed by the CDC's NSSP overdose classifiers, and using more recent data to test improvements made to the system since the original data pull. References 1. Centers for Disease Control and Prevention, National Center for Injury Prevention and Control. Web-based Injury Statistics Query and Reporting System (WISQARS) [online]. (2005) [2018 Oct 1]. Available from URL: http://www.cdc.gov/injury/wisqars

Roles of Health Literacy in Relation to Social Determinants of Health and Recommendations for Informatics-Based Interventions: Systematic Review

Abstract

Objectives To evaluate the use of a real-time surveillance tool to track a variety of occupationally-related emergency room visits through the state based syndromic surveillance system, EpiCenter. Introduction This study uses data from the New Jersey syndromic surveillance system (EpiCenter) as a data source to enhance surveillance of current non-fatal occupational injuries, illnesses, and poisonings. EpiCenter was originally developed for early detection and monitoring of the health of communities using chief complaints from people seeking acute care in hospital emergency rooms to identify health trends. Currently, syndromic surveillance has not been widely applied to identify occupational injuries and illnesses. Incorporating syndromic surveillance data from EpiCenter, along with hospital discharge data, will enhance the classification and capture of work-related non-fatal injuries with possible improved efforts at prevention. Methods EpiCenter Emergency Department data from January to December 2014 was evaluated, using work-related keywords and ICD-9 codes, to determine its ability to capture non-fatal work-related injuries. A collection of keywords and phrases specific to work-related injuries was developed by manually assessing the free text chief complaint data field's. Sensitivity, specificity, and positive predictive value (PPV), along with descriptive statistics was used to evaluate and summarize the occupational injuries identified in EpiCenter. Results Overall, 11,919 (0.3%) possible work-related injuries were identified via EpiCenter. Of these visits 956 (8%) indicated Workman's Compensation as payer. Events that resulted in the greatest number of ED visits were falls, slips, trips (1,679, 14%). Nature of injury included cuts, lacerations (1,041, 9%), burns (255, 2%), and sprains, strains, tears (185, 2). The part of the body most affected were the back (1,414, 12%). This work-related classifier achieved a sensitivity of 5.4%, a specificity of 99.8%, and a PPV of 2.8%. Conclusions Evaluating the ability and performance of a new and existing surveillance data source to capture work-related injuries can lead to enhancements in current data collection methods. This evaluation successfully demonstrated that the chief complaint reporting system can yield real-time knowledge of incidents and local conditions for use in identifying opportunities for prevention of work-related injuries.

Roles of Health Literacy in Relation to Social Determinants of Health and Recommendations for Informatics-Based Interventions: Systematic Review

Abstract

Objective Assess the validity of Florida (FL) Enhanced State Opioid Overdose Surveillance (ESOOS) non-fatal syndromic case definitions. Introduction In 2017, FL Department of Health (DOH) became one of thirty-two states plus Washington, D.C funded by the Center for Disease Control and Prevention (CDC) under the ESOOS program. One of the objectives of this funding was to increase the timeliness of reporting on non-fatal opioid overdoses through syndromic surveillance utilizing either the emergency department (ED) or Emergency Medical Services (EMS) data systems. Syndromic case validation is an essential requirement under ESOOS for non-fatal opioid-involved overdose (OIOD). FL's ESOOS program conducted OIOD validation and quality monitoring of EMS case definitions, using data from FL's Emergency Medical Services Tracking and Reporting System (EMSTARS). We examined measurement validity with OIOD cases identified from FL's statewide hospital billing database, FL Agency for Health Care Administration (AHCA). Methods From FL-EMSTARS, we extracted EMS data where the type of service requested was a 911 response, the patient was treated then transported by EMS to a hospital facility in Florida and was 11 years of age or older. Additionally, all incident-patient encounters excluded those who were dead at the scene. We included all responses with dispatch dates between January 1, 2016, and December 31, 2016. From FL-AHCA, we extracted ED and inpatient discharge information with admission dates and patient age covering the same ranges as our EMS encounters. We classified FL-EMSTARS cases based on combinations, like that of Rhode Island,1 using providers primary impression (PPI), providers secondary impression (PSI) and response to the administration of naloxone. FL-AHCA cases were defined by the following T and F codes from the International Classification of Diseases 10: T40.0-T40.4, T40.60, T40.69, F11.12, F11.120, F11.121, F11.122, F11.129, F11.22, F11.220, F11.221, F11.222, F11.229, F11.92, F11.920, F11.921, F11.922, F11.929. For all "T" codes, the 6th character was either a "1" or "4," because ESOOS is focused on unintentional and undetermined drug overdoses, ergo we excluded ED visits that are related to intentional self-harm (i.e., "2") or assault (i.e., "3"). Lastly, for all "T" codes, the 7th character we included was the initial ED encounter (i.e., "A") because the purpose of the system is to capture increases or decreases in acute overdoses. To improve our match rate, account for typographical errors, and account for the discriminatory power some values may contain, we employed probabilistic linkage using Link Plus software developed by the CDC Cancer Division. Blocking occurred among social security number (SSN), event date, patient age in years, and date of birth (DOB). Next, we matched both datasets on ten variables: event date, age, sex, DOB, ethnicity, facility code, hospital zip code, race, SSN, and patient's residence zip code. Further pruning was performed to ensure all matches were within a 24-hour time interval. Data management and statistical analyses were performed using SAS® statistical software, version 9.4 (SAS Institute Inc., Cary, NC, USA). We assessed EMS measurement validity by sensitivity, specificity, and positive predictive value (PPV). Next, risk factors were identified by stepwise multivariable logistic regression to improve the accuracy of the FL-ESOOS definition. Significant risk factors from the parsimonious multivariable model were used to simulate unique combinations to estimate the maximum sensitivity and PPV for OIOD. Results Prior to merging, FL-EMSTARS contained 1,308,825 unique incident-patient records, where FL-AHCA contained 8,862,566 unique incident-patient records. Of these, we conservatively linked 892,593 (68.2%) of the FL-EMSTARS dataset with FL-AHCA. Our probabilistic linkage represents an 18.2% linkage improvement over previous FL-DOH deterministic strategies (J Jiang, unpublished CSTE presentation, 2018). Among the matched pairs we estimated 8,526 OIOD, 0.96% prevalence, using the FL-AHCA case definition. Whereas the FL-ESOOS syndromic case definition estimated 6,188 OIOD, 0.69% prevalence. The FL-ESOOS OIOD syndromic case definition demonstrated 31.64% sensitivity, 99.61% specificity, and 43.60% PPV. Among false negatives, the response to administrated naloxone among OIOD was 39.37% "not known," 37.95% "unchanged," and 0.28% "worse." We altered the FL-ESOOS EMSTARS case definition for OIOD to include those who were administered naloxone regardless of their response to the medication. We observed 12.37% sensitivity increase to 44.01%, 0.56% specificity decrease to 99.05%, and 12.78% PPV decrease to 30.82%. Are final multivariable model is as follows: lnOdds(Opioid Overdose)= 12.66 − 0.5459(Med Albuterol) − 0.9568(Med Aspirin) − 0.5765(Med Midazolam Hydrochloride) − 0.8690(Med Morphine Sulfate) + 1.4103 (Med Naloxone) − 0.7694(Med Nitroglycerine) + 0.3622(Med Oxygen) − 0.3702(Med Phenergan) − 0.8820(Med Epinephrine 1:10000) − 0.7397(Med Fentanyl) − 0.6376(Med Sodium Bicarbonate) − 0.2725(Med Normal Saline) + 0.3935(Med Other-Not Listed) + 0.6300(PPI General Malaise) + 0.8476(PPI Other, Non-Traumatic Pain) + 0.8725(PPI Airway Obstruction) + 0.4808(PPI Allergic reaction) + 1.4948(PPI Altered level of consciousness) + 1.5481(PPI Behavioral/psychiatric disorder) + 1.3843(PPI Cardiac arrest) + 2.3913(PPI Poisoning/drug ingestion) + 2.2418(PPI Intentional Drug Use; Related Problems) + 0.2783(PPI Respiratory distress) + 2.0305(PPI Respiratory arrest) + 0.4292(PPI Stroke/CVA) + 0.5402(PPI Syncope/fainting) + 0.5219(PSI Other, Non-Traumatic Pain) + 0.9355(PSI Allergic reaction) + 0.3521(PSI Altered level of consciousness) + 0.9036(PSI Poisoning/drug ingestion) + 0.9661(PSI Intentional Drug Use; Related Problems) + 0.3766(PSI Respiratory Distress) + 1.1802(PSI Respiratory Arrest). We plotted the multivariable sensitivity and PPV by probaiblity

cutoff value to determine which would produce the best discrimination (see Figure 1). By incorporating a probability cutoff value ≥ 0.22, we can inprove both sensitivity and PPV. Specifically, we can achieve 45.48% sensitivity, 99.32% specificity, and 45.48% PPV. Conclusions The sensitivity of the FL-ESOOS surveillance system is not generally high but could still be useful if subsequent validation shows sensitivity stability. Regarding maximizing FL-ESOOS sensitivity and PPV, we deomonstrated that our mulitvariable model with an appropriate probability cutoff value performes better than the current case definition. This study contributes to the limited literature on Florida non-fatal opioid overdoses with a specific emphasis on validating EMS records. New unique indicator combinations are possible to increase sensitivity and PPV but should be thoroughly investigated to balance the tradeoffs to optimize the system's ability to detect non-fatal overdoses and to discriminate true cases. References 1. Rhode Island Department of Health. Rhode Island Enhanced State Opioid Overdose Surveillance (ESOOS) Case Definition For Emergency Medical Services (EMS).; 2017. 2. Jiang J, Mai A, Card K, Sturms J, McCoy S. EMS Naloxone Administration for Implication of Opioid Overdose. Presentation presented at the: 2018; CSTE Annual Conference.

Roles of Health Literacy in Relation to Social Determinants of Health and Recommendations for Informatics-Based Interventions: Systematic Review

Abstract

Objective Find practical ways to sort through statistical noise in syndromic data and make use of alerts most likely to have public health importance. Introduction The National Syndromic Surveillance Program's (NSSP) instance of ESSENCE* in the BioSense Platform generates about 35,000 statistical alerts each week. Local ESSENCE instances can generate as many as 5,000 statistical alerts each week. While some states have well-coordinated processes for delegating data and statistical alerts to local public health jurisdictions for review, many do not have adequate resources. By design, statistical alerts should indicate potential clusters that warrant a syndromic surveillance practitioner's time and focus. However, practitioners frequently ignore statistical alerts altogether because of the overwhelming volume of data and alerts. In 2008, staff in the Virginia Department of Health experimented with rules that could be used to rank the statistical output generated in ESSENCE alert lists. Results were shared with Johns Hopkins University Applied Physics Lab (JHU/APL), the developer of ESSENCE, and were early inputs into what is now known as "myAlerts," an ESSENCE function that syndromic surveillance practitioners can use to customize alerting and sort through statistical noise. NSSP–ESSENCE produces a shared alert list by syndrome, county, and age-group strata, which generates an unwieldy but rich data set that can be studied to learn more about the importance of these statistical alerts. Ultimately, guidance can be developed to help syndromic surveillance practitioners set up meaningful ESSENCE myAlerts effective in identifying clusters with public health importance. Methods The region/syndrome alert list generated from NSSP's instance of ESSENCE on the BioSense Platform was downloaded and ranked based on five criteria: 1. Observed count causing the alert 2. Expected count generated by ESSENCE 3. Total number of alerts for that syndrome in that county and number of prior alerts during that week for the same syndrome, county, and age group 4. Density of alerts during the prior week 5. Recency of the latest alert Alerts were then ranked based on: 1. Higher absolute counts (regardless of expected value) 2. Higher partial chi-square, $(Obs-Exp)^2 / Exp$ 3. Higher total alerts for a given county/syndrome 4. Higher number of earlier alerts for same county/syndrome/age group 5. Multiple alerts same day > alerts on consecutive days > alerts separated by days without alerts 6. Alerts present on more recent days The top 20 alerts with the highest scores were then reviewed and if anything unusual was noticed (i.e. problems unrelated to recent data quality problems or onboardings, seasonal trends, etc.) then there was follow-up with the site. The alert list rankings were then evaluated for differences among factors available in the ESSENCE myAlert function. We compared the top 5% of ranked alerts to the remaining 95% to determine if there were significant differences in the following factors: 1. Total number of alerts across six age groups (including all ages) within 8 days of each syndrome and county stratum; 2. Average alert frequency across six age groups (including all ages) within 8 days for each stratum; 3. Average count across the strata; 4. Average expected value across the strata; 5. Average of the difference between the count and expected values for each stratum; and 6. Average Level across the strata. Results Preliminary interactions with sites revealed important clusters – some already known and some not. For example, a cluster of healthcare workers exposed to Neisseria meningitides, and kids exposed to a bat at summer camp and presenting for prophylaxis were among the clusters identified. Additionally there were differences seen in the adjustable myAlert parameters when comparing the top 5% to the lower 95% of ranked alerts. Conclusions The differences seen and preliminary feedback suggests that this ranking method may be effective in identifying alerts representing true clusters of public health importance. Testing designed to evaluate myAlert parameters based on the differences seen in the top 5% of ranked alerts is underway in sites where more detailed data access is available. More study is needed; however, there are indications that cutoff values for these parameters may be a valuable way for syndromic surveillance practitioners to reduce the review burden and focus on the most important statistical clusters identified by ESSENCE statistical algorithms. References *ESSENCE stands for the Electronic Surveillance System for the Early Notification of Community-based Epidemics and is designed by Johns Hopkins University Applied Physics Laboratory.

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Roles of Health Literacy in Relation to Social Determinants of Health and Recommendations for Informatics-Based Interventions: Systematic Review

Abstract

Objective To propose a computationally simple, fast, and reliable temporal method for early event detection in multiple data streams Introduction Current biosurveillance systems run multiple univariate statistical process control (SPC) charts to detect increases in multiple data streams1. The method of using multiple univariate SPC charts is easy to implement and easy to interpret. By examining alarms from each control chart, it is easy to identify which data stream is causing the alarm. However, testing multiple data streams simultaneously can lead to multiple testing problems that inflate the combined false alarm probability. Although methods such as the Bonferroni correction can be applied to address the multiple testing problem by lowering the false alarm probability in each control chart, these approaches can be extremely conservative. Biosurveillance systems often make use of variations of popular univariate SPC charts such as the Shewart Chart, the cumulative sum chart (CUSUM), and the exponentially weighted moving average chart (EWMA). In these control charts an alarm is signaled when the charting statistic exceeds a pre-defined control limit. With the standard SPC charts, the false alarm rate is specified using the in-control average run length (ARL0). If multiple charts are used, the resulting multiple testing problem is often addressed using family-wise error rate (FWER) based methods – that are known to be conservative - for error control. A new temporal method is proposed for early event detection in multiple data streams. The proposed method uses p-values instead of the control limits that are commonly used with standard SPC charts. In addition, the proposed method uses false discovery rate (FDR) for error control over the standard ARL0 used with conventional SPC charts. With the use of FDR for error control, the proposed method makes use of more powerful and up-to-date procedures for handling the multiple testing problem than FWER-based methods. Methods The proposed method can be applied to multiple univariate CUSUM or EWMA control charts. It can also be applied to a variation of the Hotelling T2 chart which is a common multivariate process monitoring method. The Hotelling T2 chart is analogous to the Shewart chart. Montgomery et. al2 proposed a variation of the Hotelling T2 chart where the T2 statistic is decomposed into components that reflect the contribution of each data stream. First, a tolerable FDR level specified. Then, at each new time step disease counts from each of the m geographic regions Y1t, Y2t, … , Ymt are collected. These disease counts are used to calculate the charting statistics S1t, S2t, … , Smt for each region. Meanwhile by inspecting historical data from each region, a non-outbreak period is identified. Using data from the non-outbreak period, bootstrap samples are drawn with replacement from each region and charting statistics are calculated. Using the charting statistics, empirical non-outbreak distributions are generated for each region. With the empirical non-outbreak distributions and the current charting statistic for each region S1t, S2t, … , Smt , corresponding p-values p1t, p2t, … , pmt are calculated. The multiple testing problem that occurs in comparing multiple p-values simultaneously is handled using the Storey -Tibshirani multiple comparison procedure3 to signal alarms. Results As an illustration, all three methods – EWMA, CUSUM, and Hotelling T2 (components) - were applied to a data set consisting of weekly disease count data from 16 German federal sates gathered over a 11 year period from 2004-2014. The first two years of data from 2004-2005 were used to calibrate the model. Figure 1 shows the results for the state of Rhineland Palatinate. The three plots in Figure 1 show (a) the weekly disease counts for Rhineland Palatinate (b) the EWMA statistic (shown in red), the CUSUM statistic (shown in dark green) and (c) the component of the Hotelling T2 statistic corresponding to the illustrated state (shown in blue). The actual outbreak occurred on week 306 (shown by the orange line). Notice the two false alarms – alarms that occur before week 306 - with the Hotelling T2 statistic (dark green) on weeks 34 and 292; similarly, the CUSUM statistic signals a false alarm on week 57. However, the EWMA statistic does not signal any false alarms before the outbreak (red). Figure 2 zooms on the alarm statistics for the time period from weeks 280 – 330. The Hotelling T2 statistic misses the onset of actual outbreak on week 306. The CUSUM statistic detects the outbreak on week 307 – one week later. However, the EWMA statistic detects the outbreak right at the onset on week 306. Conclusions Extensive simulation studies were conducted to compare the performance of the three control charts. Performance was compared in terms of (i) speed of detection and (ii) false alarm rates. Simulation results provide convincing evidence that the EWMA and the CUSUM are considerably speedier in detecting outbreaks compared to Hotelling T2 statistic: compared to the CUSUM, the EWMA is relatively faster. Similarly, the false alarm rates are larger for Hotelling T2 statistic compared to the EWMA and the CUSUM: false alarms are rare with both the EWMA and the CUSUM statistics with EWMA statistic having a slight edge. Overall, EWMA has the best performance out of the three methods with the new algorithm. Thus, the new algorithm applied to the EWMA statistic provides a simple, fast, and a reliable method for early event detection in multiple data streams. References 1. Fricker RD. Introduction to Statistical Methods for Biosurveillance. 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Roles of Health Literacy in Relation to Social Determinants of Health and Recommendations for Informatics-Based Interventions: Systematic Review

Abstract

Objective To assess the relationship between seasonal increases in emergency department (ED) and urgent care center (UCC) visits for hand, foot, and mouth disease (HFMD) among children 0-4 years old and average dew point temperatures in Virginia. To determine if this relationship can be used to develop an early warning tool for high intensity seasons of HFMD, allowing for earlier targeted public health action and communication to the community and local childcare centers during these high intensity seasons. Introduction Hand, foot, and mouth disease is a highly infectious disease common among early childhood populations caused by human enteroviruses (Enterovirus genus).[1] The enteroviruses responsible for HFMD generally cause mild illness among children in the United States with symptoms of fever and rash/blisters, but have also been linked to small outbreaks of severe neurological disease such as meningitis, encephalitis, and acute flaccid myelitis.[2] Enteroviruses circulate year-round but increase in the summer-fall months across much of the United States.[3] The drivers of this seasonality are not fully understood, but research indicates climatic factors, rather than demographic ones, are most likely to drive the amplitude and timing of the seasonal peaks.[3] A recent CDC study on nonpolio enteroviruses identified dew point temperature as a strong predictor of local enterovirus seasonality, explaining around 30% of the variation in intensity of transmission across the United States.[3] Methods Syndromic surveillance data on ED and UCC visits among 0-4 year olds in Virginia were analyzed from January 1, 2012 to August 31, 2018. Visits for HFMD were identified using the following chief complaint and discharge diagnosis terms: hand, foot, and mouth; HFM; fever with rash, lesions, or blisters; ICD-10 code: B08.4; or SNOMED CT code: 266108008. Visits for HFMD among 0-4 year olds were aggregated by week and calculated as a proportion of all ED and UCC visits among this age group during the study period. Hourly dew point readings from the Richmond International Airport from January 1, 2012 to August 31, 2018 were obtained from the National Oceanic and Atmospheric Administration (NOAA), National Climatic Data Center (NCDC). NOAA readings were averaged by week to establish a mean dew point for each week during the study period. Correlation analyses were performed on weekly dew point temperatures and weekly percent of HFMD visits. Weekly dew point averages were used to determine low-activity weeks at which to measure baseline percentages of HFMD visits. A low-activity week was defined as periods of two or more consecutive weeks in which each week had an average dew point temperature of less than 55.4 degrees Fahrenheit.[3] To assess if HFMD seasons varied in intensity from year to year, a Kruskal-Wallis test was used to assess significant differences by year among the mean weekly percent of HFMD visits during high-activity weeks. An early warning threshold for a high intensity season was developed by calculating the mean percent of HFMD visits during low-activity weeks for the previous three years and adding two standard deviations. Threshold rates were calculated for years 2015 through 2018 and compared to the percentage of 0-4 year old HFMD visits during high-activity weeks. The week where percent of HFMD visits crossed the early warning threshold in 2018 was assessed to determine when public health notifications could have been made to alert the community about a high intensity (above threshold) HFMD season if this early warning tool had been utilized. Results Between January 1, 2012 and August 31, 2018, there were 27,181 visits for HFMD among children aged 0-4 years. Mean and median weekly percent of HFMD visits were 1.33% and 1.01% of total 0-4 year old visits, respectively, with a range from 0.18% to 5.32%. These visits were most prominent during the summer or fall each year, with annual peaks occurring between weeks 22-46. Weekly percent of HFMD visits and average weekly dew point temperatures were significantly correlated ($r=0.562$, $p<.0001$). The mean weekly dew point temperature for high-activity weeks was 67.2 degrees Fahrenheit, with a range between 49.3 and 73.5 degrees. A Kruskal-Wallis test showed a significant difference in the mean weekly percent of visits by year for high-activity weeks ($p<.0001$). Over the 4 years of data to which the threshold was applied, percent of HFMD visits crossed the threshold in 2016 and 2018, indicating both years experienced high intensity HFMD seasons (Fig. 1). Percent of HFMD visits never crossed the early warning threshold in 2015 nor 2017. In 2018, the threshold was met on Week 21 (week ending June 2, 2018) which was more than 3 weeks prior to when public health notifications were made using routine surveillance methods through ESSENCE. Conclusions Visits for HFMD among the young childhood population (0-4 year olds) in Virginia exhibit annual summer-fall seasonality with significant differences between the percent of visits from year to year. Seasons exhibiting a significantly higher percent of HFMD visits during high-activity weeks warrant a greater level of public health communication and outreach to educate parents, physicians and childcare centers about the disease and prevention measures. It can be difficult to differentiate high intensity seasons from low intensity seasons in the early weeks of increasing disease activity. Traditional syndromic surveillance methods using ESSENCE identify significant increases in HFMD visits from the previous 90 days, but do not readily alert on differences in seasonality from year to year. These results support the use of dew point temperature data to develop an early warning tool for high intensity seasons of HFMD. This early warning tool will allow for more efficient use of resources and targeted outreach during years with particularly high HFMD activity within the young childhood population. This early warning tool will be implemented by the Virginia Department of Health in 2019 to evaluate its effectiveness at

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Roles of Health Literacy in Relation to Social Determinants of Health and Recommendations for Informatics-Based Interventions: Systematic Review

Abstract

Objective To report on (i) the health care eco-system that produces data on AMR, and (ii) pattern of resistance in typhoidal Salmonellae isolates in the city of Ahmedabad in western India. Introduction India carries the highest burden of Enteric Fever in the world. This is further aggravated by the high prevalence of antimicrobial resistance (AMR) in typhoidal Salmonellae. The strategy to combat resistance has been to combine and cycle anti-microbials based on the regional AMR pattern of the organism. But this requires that resistance patterns and genetic mechanisms are mapped at a regional level and regularly recorded and disseminated by a national surveillance system. Methods Through municipality records and internet searches we identified 1696 private and 83 public labs. Our screening of these yielded 4 public medical colleges, 4 private healthcare-institution-attached labs, and 4 corporate labs which were probably performing culture and antibiotic sensitivity testing (AST). Only 2 public medical colleges and 1 corporate lab shared their data with us (Fig 1). There was considerable variation in culturing and sensitivity testing methodology across labs. Results Out of 51,260 blood cultures, Salmonellae isolates were detected in only 146 (0.28%); 67 (54%) of these were resistant. Multi-drug resistance was absent. The extremely low isolation rates in our three facilities may be indicative of lower referral rates of suspected patients for blood culture or, possibly, lower incidence of Salmonella infection in Ahmedabad. Anti-microbial susceptibility testing (AST) was conducted on 124 isolates, of which 67 (54%) were found resistant. Multi-drug resistance was absent, but ciprofloxacin resistance varied widely between the private and public sector labs. The minimal resistance to 3rd generation cephalosporins probably indicates initiation of resistance to this important group of antibiotics in the city"s typhoidal salmonella. Notably, isolates from the private sector lab showed complete resistance to azithromycin. Concurrent resistance to more than 1 antibiotic was very high, 88%, amongst the 67 resistant isolates. Although we were unable to estimate the true size of salmonella positivity against total blood cultures in our city, the difference in proportion of AMR isolates reported in our public and private samples, 30% vs 100%, is important because it may be indicative of high levels of AMR in the private. Notably, isolates from the public sector showed higher resistance to Ciprofloxacin and from private sector showed complete resistance to Azithromycin. The higher Ciprofloxacin resistance in the public sector may be indicative of more usage of the relatively cheaper ciprofloxacin among public hospital clientele. The 100% resistance to azithromycin seen in our private sample is a significant finding, and has also been reported in another recent study from Ahmedabad [1]. Out of approximately 1779 big and small facilities in Ahmedabad, we identified 12 (4 public and 8 private) laboratories which had the ability to report AMR in typhoidal salmonella. 2 public and 4 private refused to share data with us. Based on data shared by 3 medium-sized private facilities, we believe that salmonella isolation and testing in private health-institution-attached laboratories is negligible. Our data collection efforts over one year led to reasonable volume of data from only 2 publicly funded teaching hospitals and 1 private standalone lab. Although all facilities claimed to follow CLSI guidelines, the total number of antibiotics tested at each facility varied. Minimum inhibitory concentration to assess extent of resistance was not reported by any of the labs. The publicly-funded teaching hospitals in the city have the largest concentration of microbiologists and the motivation to test for AMR in indoor patients. But they did not consistently test all isolates against all antibiotics in their list. The proportion of private hospitals and laboratories that conduct ASTs in Ahmedabad is relatively small. For individual labs, both private and public, there is no inherent incentive to detect city-level AMR patterns or subsequent molecular level mechanisms of transmission of resistance. This lack of enthusiasm among microbiologists to further process their samples through more specialized lab testing and analysis is an issue in other parts of the world too [2]. Thus patchy performance of AST and incomparability of sensitivity across labs results in poor surveillance [3]. The antibiotic regimen currently recommended by ICMR for treatment of Enteric Fever in the entire country is based on 209 Salmonella isolates from only four public institutes [4]. Across India's cities and towns, there are several hundreds of public and private hospitals and laboratories undertaking ASTs, just like the ones in Ahmedabad presented in this study [5]. Unless practitioners are guided by regional data on resistance in endemic organisms, uninformed prescription practices will worsen existing microbial resistance. Drawing these varied facilities, or at least a representative sample of them into a cohesive network is essential for surveillance of antimicrobial resistance in all major bacterial pathogens; particularly so for typhoidal Salmonella which are endemic in our part of the world and are primarily exposed to antibiotics consumed by humans since they are obligate human parasites. Only a representative network of labs will provide the contextualized and stratified data necessary for development of the most accurate strategy to formulate regional prescription guidelines. However, this is an enormous challenge in our setting. Conclusions High resistance to Ciprofloxacin and Azithromycin in Ahmedabad may be due to increased use of these two antibiotics in the public and private sectors respectively. But they are in need of further molecular characterization. Clinical microbiological methods lack uniformity and laboratory referral networks are not developed even in large cities of India. Although some useful data is produced by a few individual labs, the crucial exercise of meaningful networking for effective surveillance remains. As we enter an era of internationally linked anti-microbial resistance surveillance systems, the biggest

challenge lies in selecting performing laboratories and inducing them to integrate with it. References 1) Jeeyani HN, Mod HK, Tolani JN. Current perspectives of enteric fever : a hospital based study of 185 culture positive cases from Ahmedabad , India. 2017;4: 4–9. 2) Petti CA, Polage CR, Quinn TC, Ronald AR, Sande MA. Laboratory Medicine in Africa : A Barrier to Effective Health Care. Clin Infect Dis. 2006;42: 377–382. 3) Masterton RG. Surveillance studies: how can they help the management of infection? J Antimicrob Chemother. 2000;46: 53–58. doi:10.1093/jac/46.suppl_2.53 4) ICMR. Treatment Guidelines for Antimicrobial Use in Common Syndromes Indian Council of Medical Research Department of Health Research New Delhi , India. 2017; 5) Gandra S, Merchant AT, Laxminarayan R. A role for private sector laboratories in public health surveillance of antimicrobial resistance. Future Microbiol. 2016;11: 709–712. doi:10.2217/fmb.16.17

Roles of Health Literacy in Relation to Social Determinants of Health and Recommendations for Informatics-Based Interventions: Systematic Review

Abstract

Objective To introduce SMS-based data collection into the Peruvian Navy's public health surveillance system for increased reporting rates and timeliness, particularly from remote areas, as well as improve capabilities for analysis of surveillance data by decision makers. Introduction In the past 15 years, public health surveillance has undergone a revolution driven by advances in information technology (IT) with vast improvements in the collection, analysis, visualization, and reporting of health data. Mobile technologies and open source software have played a key role in advancing surveillance techniques, particularly in resource-limited settings. Johns Hopkins University Applied Physics Laboratory (JHU/APL) is an internationally recognized leader in the area of electronic disease surveillance. In addition to the Electronic Surveillance System for the Early Notification of Community-based Epidemics (ESSENCE) used by several state and local jurisdictions and the CDC in the U.S., JHU/APL has also developed the Suite for Automated Global Electronic bioSurveillance (SAGES). SAGES is a collection of modular, open-source software tools designed to meet the challenges of electronic disease surveillance in resource-limited settings. JHU/APL is working with the Peruvian Navy health system to improve their electronic disease surveillance capabilities. The Peruvian Navy currently uses a SAGES-based system called Alerta DISAMAR that was implemented several years ago in an effort supported by the Armed Forces Health Surveillance Branch, and in collaboration with the Naval Medical Research Unit No. 6 (NAMRU-6). The system uses both web-based and IVR-based (interactive voice response) data collection from several Navy health facilities in Peru. For the present effort, JHU/APL is implementing a new SMS-based data collection capability for the Peruvian Navy. Methods JHU/APL is engaged with the Peruvian Navy Health System to upgrade the existing SAGES-based Alerta DISAMAR surveillance system which relies on remote data collection using IVR (interactive voice recording) technology, with a SAGES-based system that uses SMS (short message service) text messages for remote data collection. Based on Peruvian Navy requirements, JHU/APL created mobile data entry forms for Android smartphones using the SAGES mCollect application. SAGES mCollect is built using Open Data Kit open source tools along with added features such as 128-bit encryption and quality checks. The JHU/APL team engages closely with end users and other stakeholders to determine system requirements and to deploy the system, as well as to train end users and the system administrators who will need to maintain the system once it is deployed. The JHU/APL team, consisting of both information technology and public health expertise, conduct a country-level capabilities and needs assessment to address design considerations and operational end user requirements. This assessment takes into account the requirements and objectives of the Peruvian Navy, while keeping in mind infrastructure, cost, and personnel constraints. A pilot test of SMS-based data collection is currently underway with 10 health clinics within the Navy. Results Many challenges exist when implementing electronic disease surveillance tools in resource-limited settings, but using a tailored approach to implementation in which specific needs, constraints, and expectations are identified with stakeholders helps increase the overall adoption and sustainment of the system. JHU/APL believes SMS-based data collection will be more sustainable than IVR-based data collection for the Peruvian Navy. Conclusions JHU/APL is deploying a SAGES-based electronic disease surveillance system for the Peruvian Navy that has great potential to increase reporting rates from its health facilities as well as improve data quality and timeliness, thus resulting in greater awareness and enhanced public health decision making.

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Roles of Health Literacy in Relation to Social Determinants of Health and Recommendations for Informatics-Based Interventions: Systematic Review

Abstract

Objective This study aimed to explore the effects of El Niño and La Niña events on the timing of influenza A peak activity in European countries. Introduction Influenza causes a significant burden to the world every year. In the temperate zone, influenza usually prevalent in the winter season, however, it is hardly predictable when the influenza epidemic will begin and when the peak activity will come. Influenza has a peak in early winter sometimes and a peak in late winter in another year. However, it is not well known what determines these epidemics timing, and the global climate change is expected to influence the timing of influenza epidemics. Methods The weekly influenza surveillance data of 5 European countries (UK, Norway, Germany, Greece, and Italy) from January 2005 to July 2018 were retrieved from WHO FluNET database. UK and Norway are considered the northern part of Europe, otherwise Germany, Greece, and Italy are considered western southern part. The El Niño southern oscillation (ENSO) were retrieved from Korean Meteorological Administration. We used the definition of El Niño as the positive sea surface temperature anomalies (≥0.5 degree in Celcius), while La Niña events are negative anomalies (≤-0.5 degree) of 3 months moving average. The weeks with the highest activities of influenza A and B in each season were identified and coded as 1, 2, 3 if the peak appeared the 1st 2nd and 3rd week from the beginning of the year respectively. The influenza data of 2008/2009 and 2009/2010 were excluded from the analysis to eliminate the bias due to a pandemic influenza outbreak. We compared the means of these peak weeks according to the presence of the anomalies using the general linear model with Scheffe multiple comparison and Wilcoxon signed rank sum test. Results From January 2005 to July 2018, there were 3 El Niño and 5 La Niña events by the ENSO excluding 2009 El Niño. The influenza A peak activity was observed at 9th week (mean±SD, 8.7±4.8) from the beginning of the year in no anomaly event, but the peak appearance timing was significantly shortened to 6th week (6.2±2.7) and 5th week (5.1±3.9) when El Niño and La Niña events occurred, respectively (both p<0.05). Influenza A made the peak at usually 10th week (9.9±5.0) in northern 2 countries in no anomalies, but at 6th (6.4±3.9) week in any events of an anomaly in the surface sea temperature (p=0.072). In the southern 3 countries, influenza peaks were observed at 8th (7.9±4.8) week in usual without anomalies, but at 5th (5.0±3.3) week in El Niño or La Niña events (p=0.049). Conclusions Both El Niño and La Niña affect the timing of influenza A peak activity; the ENSO associated the early emergency of peak influenza activities in European countries. References Fisman DN, et al. Impact of El Niño Southern Oscillation on infectious disease hospitalization risk in the United States. Proc Natl Acad Sci U S A. 2016; 113(51):14589-14594. Oluwole OSA. Seasonal Influenza Epidemics and El Niños. Front. Public Health 3:250. Zaraket H, et al. Association of early annual peak influenza activity with El Niño southern oscillation in Japan. Influenza and Other Respiratory Viruses 2008; 2(4): 127–130.

Roles of Health Literacy in Relation to Social Determinants of Health and Recommendations for Informatics-Based Interventions: Systematic Review

Abstract

Objective To conduct a field-based assessment of the malaria outbreak surveillance system in Mashonaland East, Zimbabwe. Introduction Infectious disease outbreaks, such as the Ebola outbreak in West Africa, highlight the need for surveillance systems to quickly detect outbreaks and provide data to prevent future pandemics.1–3 The World Health Organization (WHO) developed the Joint External Evaluation (JEE) tool to conduct country-level assessments of surveillance capacity.4 However, considering that outbreaks begin and are first detected at the local level, national-level evaluations may fail to identify capacity improvements for outbreak detection. The gaps in local surveillance system processes illuminate a need for investment in on-the-ground surveillance improvements that may be lower cost than traditional surveillance improvement initiatives, such as enhanced training or strengthening data transfer mechanisms before building new laboratory facilities.5 To explore this premise, we developed a methodology for assessing surveillance systems with special attention to the local level and applied this methodology to the malaria outbreak surveillance system in Mashonaland East, Zimbabwe. Methods In a collaboration between the Zimbabwe Field Epidemiology Training Program and the University of Washington, an interview guide was developed based on the Centers for Disease Control and Prevention's (CDC) Updated Guidelines for Surveillance Evaluations and WHO's JEE tool.4,6 The guide was tailored in country with input from key stakeholders from the Ministry of Health and Child Care and National Malaria Control Program. Interview guides included questions focused on outbreak detection, response, and control procedures, and surveillance system attributes (preparedness, data quality, timeliness, stability) and functionality (usefulness). The team utilized the tool to evaluate surveillance capacity in eleven clinics across two malaria-burdened districts of Mashonaland East, Mudzi and Goromonzi. Twenty-one interviews were conducted with key informants from the provincial (n=2), district (n=7), and clinic (n=12) levels. Main themes present in interviews were captured using standard qualitative data analysis methods. Results The majority of key informants interviewed were nurses, nurse aids, or nurse officers (57%, 12/21). This evaluation identified clinic-level surveillance system barriers that may be driving malaria outbreak detection and response challenges. Clinics reported little opportunity for cross-training of staff, with 81% (17/21) mentioning that additional staff training support was needed. Only one clinic (10%, 1/11) had malaria emergency preparedness and response guidelines present, a resource recommended by the National Malaria Control Program for all clinics encountering malaria cases. A third of interviewees (33%, 7/21) reported having a standard protocol for validating malaria case data and 29% (6/21) reported challenges with data quality and validation, such as a duplication of case counts. While the surveillance system at all levels detects malaria outbreaks, clinics experience barriers to timely and reliable reporting of cases and outbreaks to the district level. Stability of resources, including transportation and staff capacity, presented barriers, with half (48%, 10/21) of interviewees reporting that their clinics were under-staffed. Additionally, the assessment revealed that the electronic case reporting system (a WHO-developed SMS application, Frontline) that is used to report malaria cases to the district was not functioning in either district, which was unknown at the provincial and national levels. To detect malaria outbreaks, clinics and districts use graphs showing weekly malaria case counts against threshold limit values (TLVs) based on historic five-year malaria case count averages; however, because TLVs are based on 5-year historic data, they are only relevant for clinics that have been in existence for at least five years. Only 30% (3/10) of interviewees asked about outbreak detection graphs reported that TLV graphs were up-to-date. Conclusions This surveillance assessment revealed several barriers to system performance at the clinic-level, including challenges with staff cross-training, data quality of malaria case counts, timeliness of updating outbreak detection graphs, stability of transportation, prevention, treatment, and human resources, and usefulness of TLVs for outbreak detection among new clinics. Strengthening these system barriers may improve staff readiness to detect and respond to malaria outbreaks, resulting in timelier outbreak response and decreased malaria mortality. This evaluation has some limitations. We interviewed key informants from a non-random sample covering 30% of all clinics in Mudzi and Goromonzi districts; thus, barriers identified may not be representative of all clinics in these districts. Secondly, evaluators did not interview individuals who may have been involved in outbreak detection and response but were not present at the clinic when interviews were conducted. Lastly, many of the evaluation indicators were based on self-reported information from key informants. Despite these limitations, convenience sampling is common to public health practice, and we reached a saturation of key informant themes with the 21 key informants included in this evaluation.7 By designing evaluation tools that focus on local-level knowledge and priorities, our assessment approach provides a framework for identifying and addressing gaps that may be overlooked when utilizing multi-national tools that evaluate surveillance capacity and improvement priorities at the national level. References 1. World Health Organzation. International Health Regulations - Third Edition. Vol Third. Geneva, Switzerland; 2005. doi:10.1017/CBO9781107415324.004. 2. Global Health Security Agenda. 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Roles of Health Literacy in Relation to Social Determinants of Health and Recommendations for Informatics-Based Interventions: Systematic Review

Abstract

Objective The objective is to share the progress and challenges in the implementation of the District Health Information Software Version 2 (DHIS 2) as an electronic disease surveillance system platform in Guinea, West Africa, to inform Global Health Security Agenda efforts to strengthen real-time surveillance in low-resource settings. Introduction The West Africa Ebola outbreak of 2014-2016 demonstrated the importance of strong disease surveillance systems and the severe consequences of weak capacity to detect and respond to cases quickly. Challenges in the transmission and management of surveillance data were one factor that contributed to the delay in detecting and confirming the Ebola outbreak1. To help address this challenge, we have collaborated with the U.S. Centers for Disease Control and Prevention (CDC), the Ministry of Health (MOH) in Guinea, the World Health Organization and various partners to strengthen the disease surveillance system through the implementation of an electronic reporting system using an open source software tool, the District Health Information Software Version 2 (DHIS 2). These efforts are part of the Global Health Security Agenda objective to strengthen real-time surveillance2. This online system enables prefecture health offices to enter aggregate weekly disease reports from health facilities and for that information to be immediately accessible to designated staff at prefecture, regional and national levels. Incorporating DHIS 2 includes several advantages for the surveillance system. For one, the data is available in real time and can be analyzed quickly using built-in data analysis tools within DHIS 2 or exported to other analysis tools. In contrast, the existing system of reporting using Excel spreadsheets requires the MOH to manually compile spreadsheets from all the 38 prefectures to have case counts for the national level. For the individual case notification system, DHIS 2 enables a similar accessibility of information that does not exist with the current paper-based reporting system. Once a case notification form is completed in DHIS 2, the case-patient information is immediately accessible to the laboratories receiving specimens and conducting testing for case confirmation. The system is designed so that laboratories enter the date and time that a specimen is received, and any test results. The results are then immediately accessible to the reporting district and to the stakeholders involved including the National Health Security Agency and the Expanded Program on Vaccination. In addition, DHIS 2 can generate email and short message service (SMS) messages to notify concerned parties at critical junctures in the process, for example, when a laboratory result is available for a given case. Methods This presentation is based on review of project experience and documentation for a Global Health Security project in Guinea from 2015-2018. In addition, this includes a 2017 evaluation of the DHIS 2 pilot phase in two regions each having five prefectures. Results The use of DHIS 2 for aggregate and individual case reports for disease surveillance was piloted in two regions in Guinea in 2017 for a period of six months. An evaluation of the pilot phase indicated strong capacity at the Prefecture Level to use the system for weekly aggregate disease reporting as evidenced by the high weekly reporting rates as well as an assessment of users' capacities. Challenges observed during the pilot phase included weak follow-up and ownership by the national level MOH, weak adherence by the laboratories to enter data on the receipt and test results of laboratory samples, and individual case reports not filed in all cases. In addition, the lack of uniformity of common data elements on the forms across different diseases made analysis and data quality more challenging. Following the evaluation of the pilot phase the MOH directed that the system should be used for aggregate weekly reporting, however that the individual case reporting in DHIS 2 should wait until improvements could be made in the case report forms. Prefectures have used DHIS 2 for weekly aggregate disease reporting starting in January 2018. In addition, the MOH plans to implement electronic individual case reporting in DHIS 2 starting in October 2018. Conclusions Progress to date includes nationwide use of DHIS 2 by all prefectures for the submission of weekly aggregate case reports. In addition, the new case report forms have been configured in DHIS 2 and a training of trainers has been conducted at the national level to begin the process of implementing the electronic case reporting nationwide. Challenges include the continuation of parallel weekly disease reporting in Excel for an extended period after adoption of DHIS 2 resulting in lower timeliness of weekly reports in DHIS 2 in some prefectures, weak use of the system for data analysis, building capacity within the Ministry of Health to maintain the system without outside assistance, sufficient resources to pay for internet access and power back-up (such as solar power) to enable the health offices to effectively use the system, weak data privacy and security procedures, and the need to strengthen management of the national DHIS 2 server. References 1. 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Roles of Health Literacy in Relation to Social Determinants of Health and Recommendations for Informatics-Based Interventions: Systematic Review

Abstract

Objeive The objective is to discuss capacity building for Integrated Disease Surveillance and Response in Guinea and synthesize lessons learned for implementing the Global Health Security Agenda in similar settings. Introduction The 2014-2016 Ebola outbreak in Guinea revealed systematic weaknesses in the existing disease surveillance system. The lack of public health workers adequately trained in Integrated Disease Surveillance and Response (IDSR) contributed to underreporting of cases and problems with data completeness, accuracy, and reliability. These data quality issues resulted in difficulty assessing the epidemic"s scale and distribution and hindered the control effort (McNamara, 2016; Bell, 2016). In 2015, the Guinean Ministry of Health (MoH) recognized the importance of the IDSR framework as a tool for improving disease surveillance and emphasized IDSR strengthening as a priority activity in the post-Ebola transition (MoH, 2015). To support this strategic objective, we engaged with the MoH, CDC, and key surveillance partners to strengthen surveillance capacity through a national initiative to improve IDSR tools, including assistance with developing Guinea-specific IDSR technical guidelines, simplified and standardized case notification forms, and supportive job aids to facilitate appropriate IDSR implementation by health workers at all levels of the system. Methods The Ebola outbreak highlighted the need for streamlined and standardized case reporting tools that promote accurate application of standard case definitions, adherence to IDSR technical guidelines, and integration of data from clinical and laboratory sources (McNamara, 2016). We partnered with the MoH and CDC to update case notification forms and create job aids for improved IDSR implementation at all health levels. Using a One Health approach, we helped organize and facilitate a series of workshops between the MoH, Ministries of Agriculture and Environment, CDC, national laboratory, and other surveillance partners to review and update the Guinea-specific IDSR priority diseases. This resulted in the identification of 14 priority diseases and events, which are the focus of weekly epidemiological surveillance. By bringing together the Ministries of Health, Agriculture, and Environment, the workshops resulted in improved tools for zoonotic disease detection, reporting, and responses. This included agreement on 3 new zoonotic diseases (anthrax, brucellosis, and rabies) for weekly reporting, as well as recommendations for enhancing surveillance of zoonotic diseases already included in weekly surveillance, such as influenza and Ebola. To further promote collaboration, we helped establish a technical working group and implemented a series of workshops for the Ministries and surveillance partners to review and revise case notification forms for the 14 priority diseases and events. Within the MoH, we also solicited feedback from health workers at the national, regional, and district levels to identify needs throughout the health system. As a result, each form now has an agreed-upon data collection structure that is consistent with IDSR guidelines. Standardized sections were applied across forms for case identification, notification, hospitalization, actions taken, and feedback tracking. The standardization improves data consistency across forms and establishes familiarity with common data elements, which leads to more complete data capture. Additionally, each form promotes accurate case classification by collecting disease-specific information on risk factors, signs and symptoms, and laboratory analysis and results. The revised forms also use a logical data collection flow that follows the patient's information from the site of identification, to higher levels of care (if required), laboratory, and the national level, thus improving data integration and completeness. The forms have been incorporated into the national DHIS2 electronic surveillance system, which allows data entry at the district, regional, national, and laboratory level and supports rapid and complete reporting. Results The development of revised case notification forms demonstrates an effective, collaborative, One Health approach to IDSR. All three ministries participated in the development and revision of the forms and subsequently, approved and adopted the forms for surveillance of priority diseases. This One Health approach has provided the Government of Guinea with a framework for identifying and strengthening surveillance of its five zoonotic diseases of greatest public health concern, which enables measurement of progress towards achieving the objectives of the GHSA Zoonotic Disease Action Package. We collaborated with the MoH to launch nationwide training of trainers for the new case notification forms, including the use of DHIS2 to manage, report, analyze, and present data. The training of trainers produced a cadre of 55 trainers, representing the participating ministries, national laboratory, and key surveillance partners such as WHO. By the end of 2018, IDSR training will cover health workers at all levels of the system in all 38 of Guinea's health districts. Incorporating DHIS2 as a platform for managing case data further demonstrates Guinea's capacity to conduct event-based surveillance and track the 14 priority diseases and events in real-time, an essential indicator of the GHSA Real-time Surveillance Action Package. Conclusions Guinea's IDSR strengthening activities are an important step towards achieving the GHSA objective of establishing a functional public health surveillance system capable of detecting events of significance for public health, animal health, and health security. The updated case notification forms, coupled with the use of DHIS2 for real-time reporting, provide critical tools to promote more complete, accurate, and timely data; however, successful implementation will rely on effectively training health workers throughout the system and providing on-going supportive supervision. The multi-sectoral approach to developing IDSR tools helped establish a foundation for future collaboration across ministries using a One Health approach to strengthen Guinea's national health

surveillance system. While the IDSR activities have focused heavily on building capacity for human disease surveillance, it is critical that similar attention is given to animal health. The MoH and surveillance partners should continue to work with the Ministries of Agriculture and Environment to build surveillance capacity for detecting and controlling zoonotic threats while they are still in animal populations and to develop compatible human and animal surveillance data fields for more efficient, integrated data systems. References 1. McNamara LA, Schafer IJ, Nolen LD, Gorina Y, Redd JT, Lo T, Ervin E, Henao O, Dahl BA, Morgan O, Hersey S, Knust B. Ebola surveillance – Guinea, Liberia, and Sierra Leone. MMWR Suppl. 2016; 65(3):35-43; http://dx.doi.org/ 10.15585/mmwr.su6503a6 2. Bell BP, Damon IK, Jernigan DB, et al. Overview, Control Strategies, and Lessons Learned in the CDC Response to the 2014–2016 Ebola Epidemic. MMWR Suppl. 2016;65(Suppl-3):4–11. DOI: http://dx.doi.org/10.15585/mmwr.su6503a2 3. Ministere de la Santé-République de Guinée, Direction Nationale de la Prevention et Santé Communautaire, Division Prevention et Lutte Contre la Maladie. Plan de Renforcement de la Surveillance des Maladies à Potentiel Epidémique en Guinée (2015-2017), August 2015.

Roles of Health Literacy in Relation to Social Determinants of Health and Recommendations for Informatics-Based Interventions: Systematic Review

Abstract

Objective To evaluate whether dried blood spot (DBS) testing improves diagnostic uptake in Vientiane Capital City province, Lao People"s Democratic Republic (PDR) compared to conventional diagnostic techniques (venous blood by venepuncture) during syndromic surveillance from 2016-17. To also explore reasons for low blood sampling uptake via quantitative results and qualitative responses from health care workers; in addition to the perceived acceptance of DBS compared to venepuncture. Introduction The Lao PDR is aiming for measles elimination despite ongoing outbreaks of the disease. Outbreak detection in the country relies on recognising cases meeting a set "fever and rash" case definition incorporated into the syndromic surveillance system run by the National Center for Laboratory and Epidemiology (NCLE). Suspected cases are passively identified by presentations at health care facilities, with information forwarded to the NCLE"s Early Alert and Response Network (EWARN) along with event-based reported data1. World Health Organization (WHO) measles surveillance guidelines require ≥80% of "fever and rash" cases be sampled for testing; currently only 20% sampling occurs in Laos2,3. Sampling using DBS has been proposed as an alternative to conventional venepuncture in facilitating suspected measles case detection. In this study, DBS was proposed to improve blood uptake of syndromic cases, by evaluating whether it increased ascertainment compared to conventional venepuncture. It also analysed reasons for poor diagnostic uptake among healthcare personnel involved in syndromic surveillance. Methods A mixed methods study involving a cross-sectional study and a qualitative survey was undertaken in Vientiane Capital City Province. Nine district and central hospitals were included to represent the general provincial population composition. Surveillance data were provided through routine surveillance staff review of hospital logbooks and community health centres together with case investigation forms forwarded to the NCLE"s EWARN. A sample size of 166 was calculated with 80% power to detect a 20% difference in uptake in syndromic surveillance between DBS and venepuncture. A 1:1 matching of venepuncture and DBS notifications was set. A randomly selected sample of 105 from a total of 204 notifications of "fever and rash" from June-September 2016 during routine venepuncture-based surveillance was compared with a preliminary 13 collected notifications from a proposed 100 in June-September 2017 following introduction of DBS to routine use. Resource limitations in 2017 restricted the DBS samples (n=13) analysed at this preliminary stage. Reasons for baseline poor sampling uptake using 2016 venepuncture data (n=204) were separately explored according to categories including demographics, hospital, provisional diagnosis and measles immunisation. Microsoft Excel 2007 and STATA v14.0 were used for descriptive, univariate and multivariate analyses of explanatory variables. Qualitative questionnaires were physically administered to personnel at each hospital according to their involvement in syndromic surveillance in July-September 2016-17. Given time constraints, a limited sample of surveillance personnel involved in the study (n=7) completed qualitative questionnaires. Questionnaires explored reasons for poor uptake using a framework analysis of five themes focused on demographics, aetiology of reasoning, venous and DBS acceptance, and sampling preference. Patterns were correlated with quantitative data. Results Baseline characteristics were similar across both study periods. A high frequency of "fever and rash" cases was detected among those 0-9 years (71.19%) in the study periods analysed. Blood samples were obtained from 25.77% of "fever and rash" notifications using conventional venepuncture, reflecting current poor diagnostic uptake. Direct comparison of 2016 and 2017 periods was underpowered at the time of analysis (n=105 vs n=13). But preliminary results indicated DBS had no difference in improving diagnostic uptake (23.07% vs 25.77%; OR 0.83; CI 0.14-3.41) compared to baseline venepuncture. Exploration of baseline 2016 venepuncture data (n=204) revealed only three "fever and rash" notifications were forwarded to the EWARN from hospitals involved in this study period. Hospitals also varied in blood sampling. Presenting at Nasaithong district hospital was less associated with uptake than not presenting there (OR 0.15; CI 0.003-0.99). Those presenting at Xaythany district (OR 4.53; CI 1.66-12.56) and Settathirath central (OR 3.09; CI 1.39-6.77) hospitals had greater odds of blood sampling than those who did not. Logistic regression indicated a borderline increased odds of 1.02 (CI 1.00-1.05) for having bloods taken with each year of increased age. With provisional diagnoses, there were six suspected measles cases, with only three suspected cases being tested. Measles diagnosis was not associated with blood uptake (OR 2.35; CI 0.69-7.55). Varicella diagnosis was less associated with uptake than not having varicella (OR 0.06; CI 0.001-0.39), even after multivariable analysis. Qualitative results described staff concerned with competing demands from clinical workloads and fulfilling syndromic surveillance reporting requirements. A common theme was in neglecting the syndromic case definition in lieu of the clinical case definition, fueling misunderstanding of reporting requirements. Patient cultural beliefs were identified as being associated with altered blood sampling rates. Respondents were equally split on patient preference between DBS and venepuncture techniques. Conclusions Results for DBS and venepuncture analysis were limited by data collection. However, this is one of the first studies to analyse the use of DBS in syndromic surveillance. Preliminary results revealed no difference in diagnostic uptake between DBS and venepuncture, indicating poor blood ascertainment regardless of technique. Collected data reflected current diagnostic uptake trends in the Lao PDR and was representative of Vientiane Capital City Province. Quantitative

and qualitative analyses of uptake indicate weaknesses in syndromic surveillance, varying by institution, cultural beliefs and understanding of case definitions. Completion of DBS data collection will be expected to corroborate current findings. Further studies exploring diagnostic uptake limitations and DBS viability in low resource settings may build on this data and inform syndromic surveillance opinion on using DBS. References 1. World Health Organization. Hidden varicella outbreak, Luang Prabang Province, the Lao People"s Democratic Republic, December 2014 to January 2015. Western Pacific Surveillance and Response Journal. 2016; 7(1):1-5. 2. World Health Organization. WHO-recommended standards for surveillance of selected vaccine-preventable diseases. In: Department of Vaccines and Biologicals. Geneva, Switzerland: World Health Organization. 2003; 1-59. 3. Musto J. Measles epidemiology in Lao People"s Democratic Republic. (Unpublished data). 2017.

Roles of Health Literacy in Relation to Social Determinants of Health and Recommendations for Informatics-Based Interventions: Systematic Review

Abstract

Objecive To assess challenges of establishing surveillance and research study systems and present strategies for rapid deployment in global health for the outbreak response. Introduction In response to the February 2016 Zika virus (ZIKV) outbreak, an inter-agency agreement between the U.S. Centers for Disease Control and Prevention (CDC) and U.S. Agency for International Development (USAID) commissioned further research on the epidemiology, transmission, diagnosis, and birth defects associated with ZIKV. The surveillance and research activities conducted included ecology studies focusing on the transmission dynamics; pregnancy and infant cohort studies to look for birth defects, developmental outcomes and risk factors associated with ZIKV infection; and laboratory studies evaluating the usefulness of multiple Zika diagnostic platforms. These studies were established by either setting up new systems, or leveraging on existing surveillance systems to include ZIKV research specific data elements. Conducted using country-specific protocols, these research systems included key data elements for cross-site analysis. Challenges faced included collection of non-standardized data, differing functional requirements, varying security and confidentiality protocols and limitations of informatics infrastructure. These challenges highlight an opportunity to evaluate and present the informatics-based components necessary to rapidly deploy surveillance and research study activities during a global health emergency situation. We highlight the key challenges and presents strategies for setting up rapid surveillance and research study activities. Additional areas of focus also include system architecture, global partnerships, and workforce development. Methods Information systems used in the ZIKV ecology, pregnancy and diagnostic studies were evaluated in 12 countries in Asia, Africa and the Americas. The research data collection and enrolment for the studies started at different time points (between Feb 2017 and Aug 2017). A baseline survey (structured questionnaire) was administered to the 12 data points of contacts (POCs) in each country to identify existing or selected information systems for use, functional requirements (for data collection, hosting, analytics and integration), existing informatics and infrastructural capacity. Recommendations were made on the selection and configuration of information technology (IT) systems gaps identified in the baseline; with follow up visits to 5 selected sites for intervention implementation as part of CDC's technical assistance. 6 key informant interviews were conducted with subject matter experts on the 6 proprietary(commercial/custom) and 12 semi-structured follow up interviews with data POCs to assess the implementation of the recommendations and interventions. Technical assistance impact was measured by averaging the number of informatics technical assistance requests monthly from the countries over approximately a one year period (Mar 2017- Apr-2018). The Delone and Mclean information system success model was used to measure success . Information quality was scored using completeness, format and timeliness; system quality was scored using availability, adaptability, integration and ease of use; and service quality was measured using reliability and user satisfaction ratings. Results 13 (5 open source, 8 proprietary or custom systems) health information systems were identified; 9 exclusively for data collection while 4 had extended functionalities to include extract transform and load (ETL); and, analytics. Selection of these systems was based on awareness and popularity of information technologies in country. Open source systems included REDCap, EpiInfo, DHIS2, Kobo Toolbox, CommCare; while proprietary include University of Virginia's Multi-Schema Information Capture (MuSIC), MS Access, SAMS (CDC's Secure Access Management System) and 3 custom in-house systems. Two (2) Pregnancy study sites (Kenya and Guatemala) used REDCap to enroll and follow up over 1700, and 436 pregnant women respectively while 1 site(Thailand) used a custom web-based Visual Basic system for collecting data on 1000 pregnant women; Ecology studies in 3 sites(Brazil, Colombia and Peru) used smartphones installed with CommCare to collect data on 560 non-human subjects; diagnostic studies in 10 sites used existing Acute Febrile Illness (AFI) platforms running custom software, DHIS2, Kobo toolbox, Epi Info, REDCap and Ms Access systems data. Technical assistance (TA) requests were grouped into eight (8) core functional areas with systems design (21.9%), data transmission and synchronization (18.5%) and network configuration and diagnostics (13.2%) identified as key the top 3 areas of TA (n=820). TA requests to CDC ranged between an average of 4(mean=4, s.d =0.23) currently and 11(mean=11.25, s.d=0.16) requests per country per month at the beginning of the pregnancy cohort studies (n=3) in Kenya, Guatemala and Thailand. Diagnostic studies (n=10) ranged from 26.8 (s.d=14.6) to 7.5(s.d=4.3) while ecology averaged at 1.7 (N=3, s.d=1.5) requests per country per month. Mean scores of information quality, system quality and service quality were significantly different between sites, as well as between types of information systems (P<0.05). Total mean scores of information quality, system quality and service quality for were 68.6, 59.8 and 61.4, respectively. Conclusions Robust open source systems exist but their functioalities are not fully exploited. With rapidly changing contexts and outbreak type scenarios, surveillance and research systems must be flexible to rapidly adapt their functional requirements. With appropriate information systems selection guidelines and deliberate informatics technical capacity building we could greatly improve the ability to rapidly deploy systems for outbreak response and global health surveillance and research. Informatics capacity to incorporate design thinking and standardization in surveillance system design and implementation could help realize their potential to provide fast and accurate data for action especially in multi-site contexts.

Data exchange and security policies across disparate systems in global health,need to be re-aligned with disease surveillance systems' functional requirements.

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Abstract

Objective Define analytic areas at a sub-regional level to better meet the needs of local decision-makers. Introduction Since 1 January 2016, the Auvergne and Rhône-Alpes regions have merged as part of the territorial reform. The new region is composed of 12 departments and accounts for more than 8 million inhabitants. Its territory is heterogeneous in population density with very urban areas (Clermont-Ferrand, Grenoble, Lyon and Saint-Etienne) and important mountainous areas (Arc Alpin, Massif Central). In France since 2004, the syndromic surveillance system SurSaUD® [1] coordinated by the French Public Health Agency (Santé publique France) collects morbidity data on a daily basis from two data sources: the emergency departments (ED) network Oscour® and the emergency general practitioners SOS Médecins associations. In Auvergne-Rhône-Alpes, the number of structures participating in the scheme has gradually increased from 2006 to today; as of 1 September 2018, all emergency services (N = 84) and all SOS Médecins associations (N = 7) transmit their data on a daily basis. Both data sources collect medical diagnoses, using ICD10 codes in the ED network and specific medical thesaurus in SOS Médecins Associations. These data are routinely analyzed to detect and follow-up various expected or unusual public health events all over the territory [2]. A reflection on the analysis of monitoring data at the sub-regional level was conducted in the region in order to refine the analyses carried out and better meet the expectations of local partners. Methods The SurSaUD® system has been progressively upgraded in recent years reaching its regional completeness in 2018. At the same time, the quality of the data also improved, making it possible to work on finer spatial levels. Three infra-regional partitioning scenarios were studied: the Territorial Hospital Groups (GHT) created in 2016. Although they represents 15 groupings in our region, the 12 departments and the 3 emergency physicians networks, we wondered about the possibility of carrying out analyzes on this scale to answer to local needs. The former Rhône-Alpes region had the particularity of being endowed with three networks of emergency physicians rooted in the region for more than 10 years. These networks are: - The RENAU network (North Alpine Emergency Network) which covers the Savoie, Haute-Savoie, and part of Isère regions (including Grenoble University Hospital); - The RESUVAL network (emergency network of the Rhone Valley) which covers the Ain, the Rhône (including the University Hospital of Lyon), the Drôme, the Ardèche (except the northern part) and the rest of the Isère regions; - The REULIAN network (Loire and northern Ardèche emergency network) which covers the Loire (including the University Hospital of Saint-Etienne) and the northern part of Ardèche (Annonay). These networks were created to structure the sectors and the organization of health care provision in emergency medicine. Results A breakdown into departments seemed of little relevance due to the large number of departments within the region and the significant heterogeneity in terms of activity, data transmission and quality. At this departmental scale, the volume of activity in the number of emergency reports transmitted varies from 51,300 to 608,400 annual visits depending on the department. Similarly, the coding of diagnoses varies between 19% and 81%, depending on the department. For the 15 GHTs, very recent in the region, the organization is not yet homogeneous in terms of healthcare provision and business software. Indeed, GHTs represent between 53,000 and 514,000 annual emergency visits. In addition, the quality of the data provided varies from 10 to 94% of coded diagnoses. This breakdown was thus not finally retained. In order to have coherent territories of relatively homogeneous weight, three sectors were defined: the first two sectors relied on the networks of emergency physicians in the east and center of the region (RENAU and RésuVal). For the west, the territory of the REULIAN network was merged with the former Auvergne region, which was also consistent with medical practices. Consequently, these three networks make it possible to have a logic of organization of health care and present relatively balanced sectors. These sectors comprise between 21 and 34 emergency services, and account for one to three SOS Médecins associations. This represents between 545,000 and 1,028,000 annual visits to emergency services, and between 93,000 and 109,000 annual consultations with SOS Médecins. The transmission quality of emergency visits data at D + 1 varies between 51% and 73%. A breakdown into 3 sectors (West, Center, and East) was finally retained. To illustrate the situation, a study on the characteristics and sub-regional spatio-temporal diffusion of respiratory syncytial virus (RSV) bronchiolitis epidemics in children under 2 years in the Auvergne-Rhône-Alpes region did not show any major differences between sectors to identify the start of the outbreak (+/- 1 or 2 weeks). However, the identification of the start of the outbreak in 1 or 2 sectors only did not seem to trigger outbreak onset at regional level. There is therefore a delay in informing the start of the outbreak for the sector (and the facilities) concerned, which may also delay the possibility to adapt health care provision with respect to the epidemic peak. Another use of these sectors was performed during the surveillance of allergies in the region. In the spring, the pollens are different from one week to another and depending on the territory. Also, thanks to these three sectors, it is possible to refine the observations to allow a prevention closer to the field. In the spring of 2018, in the East sector, a peak higher than in previous years was observed, while in the other two sectors, this dynamics was relatively similar to the one observed over the last two years. Conclusions The 3 networks of emergency physicians in the former Rhône-Alpes region, which have been active for more than 10 years, show that there is a real logic of health care provision between facilities belonging to the same network

(common health problems, geographical characteristics, etc.). It was therefore relevant to rely on these networks to propose a sub-regional breakdown. In order to balance the sectors (in terms of the number of reports of emergency visits, number of facilities, population), it was decided to group within the Western sector the REULIAN territory and the territory of the former Auvergne The results of the study on bronchiolitis show that the analysis of the spread of RSV-related bronchiolitis outbreaks at the sub-regional level could allow a better anticipation of outbreak onset, and therefore of the epidemic peak which constitutes the main stake for the organization of health care provision. The interest of this surveillance in sectors will also have to be evaluated for other seasonal disease. References [1] Caserio-Schönemann C, Bousquet V, Fouillet A, Henry V. Le système de surveillance syndromique SurSaUD (R). Bull Epidémiol Hebd 2014;3-4:38-44. [2] Josseran L, Nicolau J, Caillère N, Astagneau P, Brücker G. Syndromic surveillance based on emergency department activity and crude mortality: two examples. Euro Surveill 2006;11:225-9.

Roles of Health Literacy in Relation to Social Determinants of Health and Recommendations for Informatics-Based Interventions: Systematic Review

Abstract

Objective To support streamlining of VPD surveillance into integrated diseases surveillance and response (IDSR) system in Tanzania Introduction Tanzania adopted IDSR as the platform for all disease surveillance activities. Today, Tanzania's IDSR guidelines include surveillance and response protocols for 34 diseases and conditions of public health importance, outlining in detail necessary recording and reporting procedures and activities to be taken at all levels. A total of 15 disease-specific programs/sections in the Ministry of Health, Community Development, Gender, Elderly and Children (MOHCDGEC) are linked to the IDSR, though the extent to which each program uses IDSR data varies. Over the years, IDSR procedures and the structures that support them have received significant government and external resources to maintain and strengthen detection, notification, reporting and analysis of surveillance information. However, with the imminent phasing out of programs (such as the Polio eradication program) that have supported IDSR strengthening and maintenance in the past, resources for surveillance will become more limited and the government will need to identify additional resources to sustain the country's essential surveillance functions. Maternal and Child Survival Program (MCSP), a USAID Funded Program supported MOHCDGEC managing active and passive surveillance systems in improving coordination and strengthen the system taking into consideration declining resources as well as transitioning to polio end game where most of the financial resources were derived from to support vaccine preventable diseases surveillance. The support complements other Global health security agenda (GHSA) on the key thematic areas (Prevent, Detect and Report) support to the MOHCDGEC and working with the newly formed Emergency Operations Center (EOC) to improve response. Methods Between February and November 2018, the MOHCDGEC and MCSP undertook activities to generate information for future plans to strengthen Tanzania's disease surveillance system to address the Global Health Security Agenda (GHSA): 1) desk review of country's disease surveillance 2) meetings with stakeholders involved in surveillance; 3) workshop where stakeholders discussed and developed strategies for streamlining disease surveillance; 4) asset mapping to identify assets (human, financial, physical 5) stakeholders meeting to further discuss and agree on future strategies, activities. Results The Disease surveillance system review found the functions for surveillance being implemented at different levels (Figure 1). These include identifying cases; reporting suspected cases, conditions, or events; investigating and confirming suspected cases, outbreaks and events. To facilitate decision making at different levels, it was found that analysing and response are done at all levels. A total of 15 disease-specific programs/sections in the MOHCDGEC are linked to the IDSR, though the extent to which each program uses IDSR data varies. Key strengths and opportunities The government's adoption of the IDSR platform and the fact that the MOHCDGEC has a dedicated department to monitor IDSR performance has been a great achievement of the program. The system is fully adaptable to support all disease surveillance with clear supervisory structures in place at regional and council levels. At the operational level there is presence of full-time, competent and dedicated government employees and exhibiting awareness of their responsibilities, and resourcefulness. The entire surveillance program benefits from government and external funding for disease-specific surveillance-related programs (e.g. funds for polio eradication and malaria program). Despite the achievements, there are notable challenges faced by the program including disease-specific programs often requiring additional information and opting to set up parallel surveillance systems rather than integrating with the IDSR; surveillance activities often not being considered high priority at council level relative to curative service and/or surveillance not being a line item in budgets; electronic data transmission platforms not being able to support transmission of all e-IDSR data with the result that health facility data (including diseases for immediate notification) may not get reported in weekly transmissions; high turnover of surveillance staff and unsystematic orientation of newly-deployed staff; discrepancies in reported HMIS, IDSR, and disease-specific program data indicating data quality issues. Asset mapping: At the time of the review, the number of staff available varied widely between programs, with the national laboratory and the National AIDS Control program (NACP) reporting the highest number at council level and Immunization and Vaccine Development (IVD) having significant number of persons supporting vaccine preventable disease surveillance. At the time of the review, most of the funds were allocated in capacity building through training and supportive supervision compared to core surveillance function. Key inteventions to streamlining and harmonizing of surveillance Supported the roll out of electronic IDSR to ensure real time surveillance through DHIS2 Supported proceedures to establishment of surveillance expert working group (EWG); Development of Term of reference for EWG to guide implementation of IDSR activities Development of transition plan highlighting key stakeholders and the support they provide to strengthening surveillance in the country; Development of workplan to guide implementation of agreed recommendations which includes; 1. Coordinating activities of all stakeholders involved in surveillance, 2. Developing or advocating for an interoperable and harmonized reporting system through DHIS2 that will accommodate the needs of the various disease- and event-surveillance programs, 3. Promoting synergies at national level so that active surveillance is expanded as appropriate to other diseases and supports case based surveillance, 4. Building capacity of RHMTs/CHMTs in leadership and management to manage human and financial resources

and prioritize surveillance; 5. Coordinating and strengthening disease and event-surveillance at community level by having at least one trained focal person at the community for all disease surveillance. Conclusions Streamlining and strengthening of the surveillance system could be achieved by existing coordination structures within MOHCDGEC. Strengthening IDSR by implementing an interoperable of reporting systems including integration of laboratory data will achieve harmonization, consistency in data and appropriate response. At the Regional and council level, priority activities identified include strengthening coordination, orientation and training for financial and human resources management for surveillance aimed at strengthening surveillance and response teams. The IDSR should strengthen active surveillance to adopt case based surveillance as deemed appropriate for more diseases. A proposed plan for implementing key activities to achieve integration and streamlining of disease surveillance has been developed and it is hoped that resources will be made available for immediate implementation.

Roles of Health Literacy in Relation to Social Determinants of Health and Recommendations for Informatics-Based Interventions: Systematic Review

Abstract

Objective To highlight the new science of population and urban metabolism metrology, for characterizing human exposures to biological agents, narcotics, antimicrobials and other contaminants of emerging concern using community wastewater as a diagnostic matrix. Introduction Sewerage systems of villages, townships, cities and megacities convey the urine, stool, blood, and sputum of community members, enabling through analysis of community wastewater, a near real-time assessment of population health status and of emerging public health threats. Signature compounds and biomarkers targeted analytically for surveillance may include chemical and biological threat agents, transformation products of the same, human metabolites, biomarkers of exposure and other markers of interest. Additional information can be gleaned by analyzing, in a similar fashion, municipal sewage sludge resulting from wastewater treatment, a material that during treatment becomes enriched in persistent, hydrophobic and potentially bioaccumulative pollutants, while more biodegradable compounds are converted to methane mostly. When taken together, these multi-dimensional data sources promise to yield critical information on the health status, sustainability and resilience of rural and urban human populations in a new scientific approach termed population metabolism metrology, or for city environments, urban metabolism metrology. Methods Starting in 2001, samples of wastewater and municipal sludge were collected from cities across the United States and from around the world. Obtained samples were logged, archived and split samples analyzed for chemical and biological markers of human health concern. Sampling and analyses are ongoing. The sample archive is a shared resource available to the international research community. Results Over the course of 15+ years, wastewater and municipal sludges from over 300 cities around the world have been collected (see Figure below). The resultant expansive specimen archive today is known as the Human Health Observatory (HHO) at Arizona State University. It constitutes the largest repository of wastewater process flow samples in the world. The municipal sludge samples contained in the Human Health Observatory constitute the U.S. National Sewage Sludge Repository (NSSR) and international Sewage Sludge Repository (iSSR). Archived samples have been analyzed for over 300 chemical and biological threat agents, resulting in U.S. national inventories of dozens of harmful chemicals, time- and space-resolved insights into human exposure to pesticides and substances of abuse, the identification of chemical threats fostering drug resistance and antibiotic cross-resistance, and the discovery of hundreds of novel viruses of potential human health importance. Public health and policy events informed by the HHO and NSSR include the U.S. federal ban of antimicrobials in personal care products regulated by the U.S Food and Drug Administration, and the Florence Statement of Triclosan and Triclocarban, a global call for elimination of unnecessary and ineffective antimicrobials from consumer products. Conclusions The analysis of wastewater and municipal sewage sludges collected at centralized wastewater treatment facilities around the world represents an effective, inexpensive and rapid approach for public health assessment and threat detection. Among the notable success stories thus far are the 2017 US FDA ban of multiple antimicrobials whose overuse has been linked to the emergence of drug resistance and cross-resistance of human pathogens to antibiotics used in human medicine. References Magee, H. Y.; Maurer, M. M.; Cobos, A.; Pycke, B. F. G.; Venkatesan, A. K.; Magee, D.; Scotch, M.; Halden, R. U., US nationwide reconnaissance of ten infrequentlymonitored antibiotics in municipal biosolids. Sci Total Environ 2018, 643, 460-467. Halden, R. U. Invited Plenary Talk: Urban metabolism metrology: a new discipline elucidating the human condition in cities around the world, 252nd American Chemical Society's National Meeting, Philadelphia, PA, August 21-25, 2016. Venkatesan, A. K.; Done, H. Y.; Halden, R. U., United States National Sewage Sludge Repository at Arizona State University-a new resource and research tool for environmental scientists, engineers, and epidemiologists. Environ Sci Pollut R 2015, 22, (3), 1577-1586. Venkatesan, A. K.; Halden, R. U., Wastewater Treatment Plants as Chemical Observatories to Forecast Ecological and Human Health Risks of Manmade Chemicals. Sci Rep-Uk 2014, 4. Muhire, B. M.; Varsani, A.; Martin, D. P., SDT: A Virus Classification Tool Based on Pairwise Sequence Alignment and Identity Calculation. Plos One 2014, 9, (9). Cheung, K. H.; Yip, K. Y.; Townsend, J. P.; Scotch, M., HCLS 2.0/3.0: Health care and life sciences data mashup using Web 2.0/3.0. J Biomed Inform 2008, 41, (5), 694-705.

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Roles of Health Literacy in Relation to Social Determinants of Health and Recommendations for Informatics-Based Interventions: Systematic Review

Abstract

Objective The Louisiana Early Event Detection System (LEEDS), Louisiana's syndromic surveillance system, was used to monitor uncharacteristically low temperatures during the 2017-2018 winter season and determine the impact of these temperatures on the number of weather related personal injuries in emergency departments throughout Louisiana. Introduction The Infectious Disease Epidemiology Section (IDEpi) in the Louisiana Office of Public Health (OPH) has several applications for syndromic surveillance including situational awareness during unusual and/or high profile events, such as the uncharacteristic winter weather Louisiana experienced during the 2017-2018 winter season. December 8th, 2017 saw freezing temperatures with some parts of the state experiencing snow, and January 16 – 18, 2018 saw record breaking freezing temperatures throughout the state. Both weather events led to many state office, school and business closures. The freezing temperatures from January 16th – 18th led to office closures that lasted longer than the freezing temperatures due to the infrastructure damage the freezing temperatures caused. For example, Orleans parish experienced low water pressure throughout its water systems due to broken pipes following the freeze, leading to boil water advisories. Many people throughout Louisiana had broken pipes at their homes, resulting in flooding and further contributing to low water pressure in some areas. IDEpi used syndromic surveillance to monitor the impacts of the severe winter weather and its aftermath on weather related personal injuries throughout the state. Methods LEEDS was queried to obtain the number of cold weather related emergency department visits. This was done by querying for records that mentioned "cold exposure," "fell on ice," "freeze," "hypothermia," "ice," "slipped on ice," or "snow" in the chief complaint or admit reason. Records were excluded if they mentioned "antifreeze," "device," "jaundice," "lice," "notice," "office," "orifice," "police," "practice," "septicemia," "twice," or "voice" in the chief complaint or admit reason. A record review was done to determine if the returned visits were in fact cold weather related, and the number of visits were grouped by triage date. The daily cold weather related ED visit counts were plotted against weather data taken from ESSENCE, the National Syndromic Surveillance Program's syndromic surveillance application. The data obtained from ESSENCE was used to calculate the daily average minimum temperature throughout Louisiana from December 1, 2017 through February 29, 2018. This was done by selecting all of the fourteen Louisiana weather stations in ESSENCE and calculating the daily average minimum temperature across all stations. The number of cold weather related ED visits were then plotted against the daily minimum temperature in Louisiana. The initial active surveillance took place during the extreme cold weather that occurred from January 15, 2018 – January 20, 2018. Data starting on December 1, 2017 was pulled to provide a baseline. Additional data through February 28, 2018 was pulled retrospectively to analyze the overall trend of cold weather related ED visits throughout winter season. Results Cold weather related ED visits and daily average minimum temperatures were analyzed for the time period of December 1, 2017 to February 28, 2018. The average number of cold weather ED visits for this time period was 1.8 visits with a standard deviation of +/- 4.4 visits, and the average minimum temperature was 40.9 °F. The number of cold weather related ED visits went above 6.1 visits on the following occasions: December 9th had 7 visits and an average minimum temperature of 25.9 °F and January 17th-18th had 37 and 18 visits, respectively, with respective average minimum temperatures of 12.5 °F and 16.1 °F. The 2017 - 2018 Winter Weather Surveillance in Louisiana graph also reflects these results. Of the cold weather related ED visits that took place on either December 9th or January 17th-18th, 81% indicated an ice or snow related personal injury, 14% indicated hypothermia, and 5% indicated cold exposure. Conclusions The three coldest days, January 16th -18th, corresponded with the largest spikes in cold weather related ED visits. The spike in visits on December 9, 2017 did not correspond to very low temperatures, but areas of Louisiana did experience snowfall on December 8th, which led to ice formation. A record review of all visits that fit the inclusion criteria of a cold weather related ED visit showed that many of the visits that took place from January 19th-21st were also personal injuries that had either just taken place from slipping on ice or had occurred several days prior and remained unresolved. Ultimately, syndromic surveillance was instrumental in maintaining situational awareness during the uncharacteristic winter weather experienced in Louisiana. The results of this winter weather surveillance were published in the Louisiana Morbidity Report. IDEpi will continue to use syndromic surveillance during periods of uncharacteristic winter weather to maintain situational awareness, which may be used in public safety messaging to reduce the number of cold weather related personal injuries in the population that is not accustomed to such conditions.

Roles of Health Literacy in Relation to Social Determinants of Health and Recommendations for Informatics-Based Interventions: Systematic Review

Abstract

Objective Given the evolving opioid overdose epidemic, we examined the interrelationships between nonmedical use of prescription opioids and illicit opioid use in adolescents. Introduction The number of overdose deaths involving illicit opioids such as heroin and illicitly-manufactured fentanyl (IMF) is now higher than deaths involving prescription opioids. Adolescents misusing prescription opioids are more likely to use heroin. Although nonmedical use of prescription opioids (NUPO) among adolescents is decreasing, there is still relatively high prevalence of this behavior. Such high prevalence, along with the evolving epidemiology of the drug overdose epidemic as well as the association between NUPO and heroin use, signal that NUPO in adolescents is still an important issue. Understanding the interrelationships between NUPO and illicit opioid use in adolescents can inform prevention efforts. The purpose of this study is to: 1) present the magnitude of the drug overdose problem in adolescents, 2) compare the prevalence of heroin use and injection drug use (IDU) between students reporting NUPO and those not reporting NUPO, and 3) determine whether a dose-response relationship exists between these behaviors among adolescents. This information will be beneficial when focusing on adolescents at risk for heroin use by helping to determine whether any NUPO is associated with heroin use or if such risk is only noted at a higher frequency of NUPO behavior. Methods We analyzed data from two surveillance sources to capture adolescent overdose mortality and behavioral risk factors. Overdose death data for decedents aged 15 to 19 years were obtained for 2010 and 2016 from CDC WONDER, an online database with national mortality data based on death certificates for U.S. residents. We identified deaths involving prescription and illicit opioids using International Classification of Disease, 10th revision (ICD-10) codes for drug overdose deaths. Each death is assigned one underlying cause of death code and the following identified overdoses: X40-44 (unintentional), X60-64 (intentional), X85 (homicide), or Y10-14 (undetermined intent). Additionally, for overdose deaths attributed to specific drugs or drug categories, ICD-10 multiple cause of death codes were used to determine the number of deaths involving any opioid, either prescription or illicit (T40.1-T40.4 and T40.6), prescription opioids (T40.2 or T40.3), heroin (T40.1), and heroin and/or synthetic opioids (e.g., fentanyl) excluding methadone (T40.1 or T40.4). We compared the proportion of overdose deaths involving prescription opioids that also involved heroin or synthetic opioids in 2010 and 2016. The second data source, the 2017 national Youth Risk Behavior Survey (YRBS), a nationally representative cross-sectional survey of high school students, was analyzed to look at behavioral risk factors. We assessed lifetime NUPO (LNUPO) and calculated frequency of LNUPO by heroin use, injection drug use (IDU), and heroin/IDU using logistic regression models to generate adjusted prevalence ratios (aPR) and corresponding 95% confidence intervals (CI). We used linear contrast analysis to determine dose-response relationships between frequency of LNUPO and heroin use, IDU and heroin/IDU. Results The number of adolescents aged 15 to 19 years who died of drug overdose increased from 831 in 2010 (3.8 per 100,000) to 873 in 2016 (4.1 per 100,000). While the proportion of overdose deaths involving prescription opioids declined during this time period, the proportion involving heroin and/or synthetic opioids, such as fentanyl increased. In 2016, two-thirds of overdose deaths among decedents aged 15 to 19 years involved either a prescription or illicit opioid. The percent of deaths involving prescription opioids that also involved heroin and/or synthetic opioids, such as fentanyl increased from 5% in 2010 to 25% in 2016. Using the 2017 YRBS sample, we estimate that 14% of high school students nationwide have ever used prescription opioids nonmedically in their lifetime. Compared to students reporting no LNUPO, students reporting LNUPO were more likely to report heroin use (9.2% vs. 0.4%), IDU (7.8% vs. 0.4%), and heroin/ IDU (10.1% vs. 0.7%). We observed a positive dose-response relationship with frequency of LNUPO. Adjusted prevalence ratios for heroin, IDU and heroin/IDU increased with increasing frequency of LNUPO and were even significantly higher among those reporting just one or two occasions of LNUPO than among those reporting no LNUPO. Conclusions Our findings on opioid-involved drug overdose mortality and opioid use patterns confirm NUPO is still a concern for adolescents. We report a five-fold increase, from 2010 to 2016, in the percent of adolescent overdose deaths involving prescription opioids that also involved illicit opioids such as heroin and/or IMF. This may reflect deliberate polysubstance use among adolescents using prescription opioids nonmedically, but should also be considered in the context of stable prevalence of reported heroin use in YRBS and the National Survey on Drug Use and Health. In addition to issues with self-report bias, adolescents may not self-identify as a person who uses heroin, for example, if they unknowingly use counterfeit prescription pills that contain heroin or IMF. Health risk behaviors established in adolescence often continue into young adulthood and understanding associations between opioid initiation, misuse, and overdose is critical for prevention efforts. Although we found a dose-response relationship between the frequency of LNUPO and the prevalence of heroin and IDU, we also report significantly higher heroin use and IDU among students reporting just one or two occasions of LNUPO compared to students reporting no LNUPO. This underscores the importance of prevention efforts aimed at all adolescents who use prescription opioids nonmedically, with particular emphasis on those frequently misusing them. Clinical, community, and school-based efforts can address NUPO, noting these associations.

Roles of Health Literacy in Relation to Social Determinants of Health and Recommendations for Informatics-Based Interventions: Systematic Review

Abstract

Objective To assess the data sources used to monitor overdose events in Marion County and improve community overdose surveillance. Introduction Mirroring public health response to infectious disease outbreaks, many public health departments are taking an outbreak management approach to respond to drug overdose surges 1-3. The Marion County Public Health Department (MCPHD) has developed an overdose response plan (ORP) integrating drug overdose surveillance and community stakeholder response strategies. Effective drug overdose surveillance requires accurate and reliable data streams. This work assessed data sources utilized for county overdose surveillance and provided recommendations to improve overdose surveillance. Methods Data sources utilized as of September 2018 for opioid overdose surveillance in Marion County were assessed on utilization history by epidemiologists. General recommendations to improve overdose surveillance were created based on the findings. The three primary sources were emergency department data, ambulance run data, and death certificate data. Secondary sources included Indiana Poison Center (IPC) and toxicology data. General recommendations were generated based on challenges/solutions encountered and good practices observed from other health departments 4,5. Results The assessment of data sources and utilization showed variation of data entry at the hospital level, limited identifiers in some cases, and varying timeliness ranges which may limit combined use of many data sources. The emergency department data source showed particular variation in data entry, limited unique identifier information), and no incident location information which impedes geographical surveillance. Periodic data checks by the ambulance service data holder appears to drastically increase data quality. Intermittent data feed drops from specific emergency departments also interfered with effective surveillance. Recommendations were generated based on lessons learned during successful partnerships with Indianapolis Emergency Medical Services, IPC, and emergency departments and challenges encountered during overdose surveillance work (Figure 1). In application of the strategy, the MCPHD is interested in linking data and looking for other ways to improve our overdose response to get a fuller picture of what is happening with overdoses, so we applied the steps in figure one to find areas of improvement. We found that limited identifiers and incomplete fields are our biggest challenge to linking datasets, so to combat these gaps we identified sources that have the necessary fields of interest and have been working with others to improve the data quality. Additionally, data sources will be evaluated on experiences with three categories: completeness in data fields, timeliness of data delivery, and consistency of data feed. Data quality measures were developed for completeness by fields present per record, timeliness by lag time from time added to time of event, and consistency by record counts per facility over time. We also recognized that meeting with partners is necessary to share how we are using the data and additional datasets that we might use in the future. Additionally we have been meeting with academic researchers so that we can expand our analyses to identify other issues related to overdoses. Finally, in order to make a difference in Marion County we are applying our findings to our outreach and interventions to hopefully prevent more overdoses and deaths. Future plans include data partnerships include police drug arrest data, fire department naloxone administration data, prescription drug monitoring data, Medicaid claims data, and health information exchange overdose data. Future research partnerships will consider a solutions based framework 6. Conclusions The results of our work demonstrate the value in surveillance assessment to summarize limitations of the many data sources utilized at a local level to conduct overdose surveillance. Our evaluation approach provides a path to improve and fill in surveillance gaps with new processes. Other health departments interested in optimizing overdose surveillance may seek a similar evaluation approach. Periodic data linkages have not been implemented which presents an opportunity to glean valuable insights on longitudinal patterns of drug use in the population. Future collaboration with researchers presents an opportunity to improve MCPHD ORP, Safe Syringe Access and Support Program, and Substance Use Outreach Services interventions. References [1] Moore K, Boulet M, Lew J, Papadomanolakis-Pakis N. A public health outbreak management framework applied to surges in opioid overdoses. Journal of opioid management. 2017;13(5):273-81. [2] Rudd RA. 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Abstract

Objective To characterize the appropriateness of naloxone administration, causes of death, and history of Indianapolis Emergency Medical Services (I-EMS) service utilization among the drug overdose population in Marion County, Indiana between 2011 to 2017. Introduction Drug overdoses are now the leading cause of accidental death in the United States, with an estimated 60,000 deaths in 2016 1. Nationally, EMS overdose responses with naloxone administration have nearly doubled from 2012 to 2016 from 573.6 to 1004.4 per 100,000 EMS events 2. Resuscitation using the opioid antagonist, naloxone is recommended in cases of suspected opioid ODs, and has been increasingly used by EMS agencies, law enforcement, healthcare providers, and Good Samaritans 3. While naloxone can save lives, it is not clear how often its use is appropriate; delivering the right care to the right patient at the right time. It has been suggested that community paramedic programs teamed with recovery services may help link OD patients to recovery and rehabilitation services and establish mechanisms for follow-up care 4. Prior to implementing community EMS programs, it is important to understand the EMS utilization patterns of the OD population. I-EMS interactions may present an opportunity for behavioral intervention and linkage to services to prevent future OD and death in the opioid-using population. Accurately documenting substances involved in drug overdose deaths has been of increasing interest to Marion County and Indiana with a recent law requiring toxicology testing 5,6. This project linked individual-level data across public health information systems to assess the appropriateness of naloxone administration, the frequency of I-EMS service utilization until final death outcome among the I-EMS OD deceased cohort, and underlying causes of death among the cohort. Methods The study setting is Marion County, Indiana, in which the state capital, Indianapolis is located. The population size at the 2010 census was 903,393. We performed individual-level data linkage between I-EMS overdose run data from January 1, 2011 to December 17, 2017, Marion County coroner toxicology data from 2011 to 2017, and Marion County death certificate data from 2011 to 2017. Observations were linked according to first name, last name, and date of birth. The appropriateness of naloxone administration was assessed by quantifying the following: the probability of naloxone administration given opioid positive toxicology (sensitivity); and probability of opioid toxicology given naloxone administration (positive predictive value). Primary exposure of history of OD (via I-EMS) and the outcomes of all-cause mortality, non-OD, and OD mortality were assessed. The following ICD10 drug overdose coding was utilized: X40-X44, X60-X64, X85, Y10-Y14 to identify mortality type. Standardized mortality ratios (SMR) were calculated for the cohort based on Marion County census population-level estimates and Marion County death data with sex and age adjustment on exposure. Additionally, we investigated repeat OD frequencies and time to death among the cohort. Results Of 8,384 individuals who utilized I-EMS for drug overdose, 6,590 (78.6%) individuals were administered naloxone on least one I-EMS run, 850 (10.1%) died, and 260 (3.1%) of the deceased had a toxicology report conducted after death from 2011 to 2017. Among the 260 individuals who had a toxicology report, 92% were administered naloxone given they tested positive for opioid and 87.7% tested positive for opioids given they were administered naloxone (Table 1). Additionally, 82.8% of individuals were administered naloxone given they tested negative for opioids. Thus, up to 8% of opioid ODs patients were not provided naloxone when potentially necessary and 17% were provided naloxone when potentially unnecessary. One-hundred-fifteen (13.5%) died on the same day of their last EMS overdose run, yet only 61 (53%) of these individuals had a toxicology report, with a 90.7% administered naloxone given they tested positive for opioids and 87.5% tested positive for opioids given they were administered naloxone (Table 1). Of 850 individuals that died, 13.5% died on the same day of their last EMS run, 5.6% died next day, 12.4% died within 2 to 7 days, 9.8% within 8 to 30 days, 18.5% within 31 to 181 days, and 10.8% within 181 to 365 days, 29.4% greater than 365 days. Based on ICD10 drug overdose coding 293 (34.5%) individuals had drug overdose deaths, with 161 (18.9%) having X44 (accidental poisoning by other and unspecified drugs) and 112 (13.2%) having X42 (accidental poisoning by narcotics and psychodysleptics). Five-hundred-fifty-seven (65.5%) individuals had non-drug overdose deaths. After accidental poisoning due to drugs, heart, lung, and brain complications related to drug use appeared as common underlying causes of death. Of 850 deceased individuals, 86.4% only had one overdose EMS run, 13.7% had two or more EMS runs, and 759 (89.3%) had at least one EMS run where naloxone was administered. The SMR for drug-related utilizers of EMS was 4.04 compared to the general Marion County population, after adjustment for sex and age. Conclusions This work looked at deceased individuals with I-EMS overdose interactions during the period 2011 through 2017. Our results described two important features of EMS naloxone administration, providing the right care at the right time and maximizing available resources. For deceased individuals with known toxicology and same-day I-EMS interaction, the sensitivity of I-EMS naloxone administration was 90.7%. Of the deceased I-EMS overdose cohort, 70.6% died within one year of their last I-EMS overdose interaction and 13.7% had two or more ambulance runs for drug overdose. Although the most common cause of death in the I-EMS overdose cohort was related to drug poisoning, we observed over 65% died from other causes. References Opioid Overdose [Internet]. Centers for Disease Control and Prevention. Centers for Disease Control and Prevention; 2017 [cited 2018 Oct 8]. Available from:

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Roles of Health Literacy in Relation to Social Determinants of Health and Recommendations for Informatics-Based Interventions: Systematic Review

Abstract

Objective To describe the characteristics of emergency department (ED) visits for motor vehicle injuries in Utah using 2016 syndromic surveillance data. Introduction Motor vehicle injury is the leading cause of death in injury category in the United States. In 2016, motor vehicle crashes were one of the main causes of death resulting from injury (8.8 per 100,000 population) in Utah. Motor vehicle crashes can lead to physical and economic consequences that impact the lives of individuals and their families. In addition, the treatment of injuries places an enormous burden on hospital Emergency Departments (EDs). Currently; there are no data sources other than syndromic data in the Utah Department of Health to monitor ED visits due to motor vehicle injuries in real time. Methods Utah participates in the National Syndromic Surveillance Program (NSSP) to which all hospitals in the state submit ED visit data via the Electronic Surveillance System for the Early Notification of Community-based Epidemics (ESSENCE). ESSENCE was used to analyze 2016 ED visit data. Total population data were obtained from Utah population estimates. Data from 2017 was not included due to major system changes at a major healthcare system that interrupted data feeds resulting in lower than expected data volume. Motor vehicle injury is defined by existing subsyndrome definition in the Centers for Disease Control and Prevention ESSENCE system. All ED visit data were analyzed by querying key terms in the chief complaint field including any mention of: vehicle, wheeler, motorcycle, motor scooter, motor cycle, motor cross, truck, motorbike etc. Exclusion terms included any mention of: car dealership, hit head and car door. Ages were divided into seven groups for data distribution and comparison: 0–17, 18–24, 25–34, 35–44, 45–54, 55–64 and ≥ 65 years. Results In 2016, a total of 28,472 ED visits (2% of total visits) were identified using the motor vehicle injury query. The ED visit rate for motor vehicle injuries was highest among persons aged 18–24 years (1,682 per 100,000 population). Rates continued to decline with increasing age after 18–24 years. The rate of females visiting the ED was higher than males (1,040 versus 826 per 100,000 population respectively; p < 0.01) (Figure 1). The majority of injuries (11722(52%)) were reported between 10:00 a.m. and 5:59 p.m. Injuries were highest August-September (5913(22%)). Conclusions Syndromic data is a robust source of data for analyzing ED visits due to motor vehicle injuries in real time, and providing information to injury prevention programs for targeting interventions. Our data suggest an increased risk of visiting an ED due to motor vehicle injuries by age group (18-24 year olds), sex (females), month (August-September), and time (10:00 a.m. to 5:59 p.m.). These results do not include visits with incomplete or incorrectly coded chief complaints or discharge codes, patients of motor vehicle injuries who do not present to the ED, or not classified as 'emergency' patient class.

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Abstract

Objective In a partnership between the Public Health Division of the Oregon Health Authority (OHA) and the Johns Hopkins Applied Physics Laboratory (APL), our objective was develop an analytic fusion tool using streaming data and report-based evidence to improve the targeting and timing of evidence-based interventions in the ongoing opioid overdose epidemic. The tool is intended to enable practical situational awareness in the ESSENCE biosurveillance system to target response programs at the county and state levels. Threats to be monitored include emerging events and gradual trends of overdoses in three categories: all prescription and illicit opioids, heroin, and especially high-mortality synthetic drugs such as fentanyl and its analogues. Traditional sources included emergency department (ED) visits and emergency management services (EMS) call records. Novel sources included poison center calls, death records, and report-based information such as bad batch warnings on social media. Using available data and requirements analyses thus far, we applied and compared Bayesian networks, decision trees, and other machine learning approaches to derive robust tools to reveal emerging overdose threats and identify at-risk subpopulations. Introduction Unlike other health threats of recent concern for which widespread mortality was hypothetical, the high fatality burden of opioid overdose crisis is present, steadily growing, and affecting young and old, rural and urban, military and civilian subpopulations. While the background of many public health monitors is mainly infectious disease surveillance, these epidemiologists seek to collaborate with behavioral health and injury prevention programs and with law enforcement and emergency medical services to combat the opioid crisis. Recent efforts have produced key terms and phrases in available data sources and numerous user-friendly dashboards allowing inspection of hundreds of plots. The current effort seeks to distill and present combined fusion alerts of greatest concern from numerous stratified data outputs. Near-term plans are to implement best-performing fusion methods as an ESSENCE module for the benefit of OHA staff and other user groups. Methods By analyzing historical OHA data, we formed features to monitor in each data source to adapt diagnosis codes and text strings suggested by CDC's injury prevention division, published EMS criteria [Reference 1], and generic product codes from CDC toxicologists, with guidance from OHA Emergency Services Director David Lehrfeld and from Oregon Poison Center Director Sandy Giffen. These features included general and specific opioid abuse indicators such as daily counts of records labelled with the "poisoning" subcategory and containing "fentanyl" or other keywords in the free-text. Matrices of corresponding time series were formed for each of 36 counties and the entire state as inputs to region-specific fusion algorithms. To obtain truth data for detection, the OHA staff provided guidance and design help to generate plausible overdose threat scenarios that were quantified as realistic data distributions of monitored features accounting for time delays and historical distributions of counts in each data source. We sampled these distributions to create 1000 target sets for detection based on the event duration and affected counties for each event scenario. We used these target datasets to compare the detection performance of fusion detection algorithms. Tested algorithms included Bayesian Networks formed with the R package gRain, and also random forest, logistic regression, and support vector machine models implemented with the Python scikit-learn package using default settings. The first 800 days of the data were used for model training, and the last 400 days for testing. Model results were evaluated with the metrics: Sensitivity = (number of target event days signaled) / (all event days) and Positive predictive value (PPV) = (number of target event days signaled) / (all days signaled). These metrics were combined with specificity regarded as the expected fusion alert rate calculated from the historical dataset with no simulated cases injected. Results The left half of Figure 1 illustrates a threat scenario along Oregon's I5 corridor in which string of fentanyl overdoses with a few fatalities affects the monitored data streams in three counties over a seven-day period. The right half of the figure charts the performance metrics for random forest and Bayesian network machine learning methods applied to both training and test datasets assuming total case counts of 50, 20, and 10 overdoses. Sensitivity values were encouraging, especially for the Bayesian networks and even for the 10-case scenario. Computed PPV levels suggested a manageable public health investigation burden. Conclusions The detection results were promising for a threat scenario of particular concern to OHA based on a data scenario deemed plausible and realistic based on historical data. Trust and acceptance from public health surveillance of outputs from supervised machine learning methods beyond traditional statistical methods will require user experience and similar evaluation with additional threat scenarios and authentic event data. Credible truth data can be generated for testing and evaluation of analytic fusion methods with the advantages of several years of historical data from multiple sources and the expertise of experienced monitors. The collaborative generation process may be standardized and extended to other threat types and data environments. Next steps include the addition to the analytic fusion capability of report-based data that can influence data interpretation, including mainstream and social media reports, events in neighboring regions, and law enforcement data. References 1. Rhode Island Enhanced State Opioid Overdose Surveillance (ESOOS) Case Definition for Emergency Medical Services (EMS), http://www.health.ri.gov/publications/guidelines/ESOOSCaseDefinitionForEMS.pdf, last accessed: Sept. 9, 2018.

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Roles of Health Literacy in Relation to Social Determinants of Health and Recommendations for Informatics-Based Interventions: Systematic Review

Abstract

Objective Implement a novel surveillance system for recreational substance use, including toxicology testing, to enable situational awareness and more accurately assess the health care burden related to recreational substance use. Introduction Drug overdose deaths are increasing nationally and in Minnesota (MN). This is only a fraction of the overall burden that recreational drug use exacts on emergency departments (ED) and hospitals. In addition to opioids and other drugs, three outbreaks of synthetic cannabinoids and cathinones have occurred in MN recently. ICD codes do not adequately identify patients treated for drug use. Also, toxicology data for these patients are limited: routine toxicology testing is not performed at hospitals as results are not timely enough to be useful for clinical care. Even when such testing is performed, hospital laboratories are unable to detect newer synthetic drugs. In order to more quickly respond to clusters of substance use, identify substances causing atypical symptoms or severe illness, and understand the burden of overdoses and substance use in MN, the MN Department of Health (MDH) developed the MN Drug Overdose and Substance Abuse Pilot Surveillance System (MNDOSA). MNDOSA data collection began in November 2017 and includes two pilot sites in Northeastern MN, and one in the Twin Cities Metropolitan Area. Methods All patients who present to a participating ED where the principal diagnosis is attributed to the recreational use of drugs or other substances (excluding alcohol alone and suicide attempts) are included. Reports are sent to MDH daily with a few key data variables. Specimens for a subset of "Patients of Special Interest" (PSI) are sent to the MDH Public Health Laboratory to be tested for a wide range of substances. PSI include patients who die in the ED, are hospitalized, have an unusual clinical presentation, and/or are part of a cluster. Medical records of the PSI are reviewed, and a standardized data abstraction form is completed. Results Through August 24, 2018, 963 ED visits were reported to MNDOSA. The median age was 34 years for males, 33 for females. The majority of cases were male (68%) (Table 1). Among all patients reported to MNDOSA through August 24, 2018, 23% were hospitalized. A slightly higher percentage of females were hospitalized compared to males (27% vs. 22%; p=0.054). Opioids were one of the substances most frequently suspected by clinicians to be related to the health care encounter (28% of all reports for males and 37% for females). Heroin was more frequently suspected for females than males (27% for females, 19% males, p=0.012). Methamphetamine (27% of all reports for males and 28% for females) and synthetic cannabinoids and cathinones (24% for males and 6% females, p < 0.001) were also commonly suspected. Female patients were significantly more likely to have non-benzodiazepine prescription medication suspected (10% for females, 4% males, p < 0.001). Forty-one urine specimens from MNDOSA cases have been analyzed thus far (Table 2). One of the most frequently detected substances was methamphetamine, which was found in 26 samples (63%); however, only 20 (49%) were suspected by clinicians to have methamphetamine on board. Specimens of seven patients suspected to have been exposed to heroin were tested, yet only two tested positive for the major metabolite of heroin, while six were positive for fentanyl and two for acetyl fentanyl. With the exception of synthetic cannabinoids and cathinones, all substances were detected more frequently in toxicology testing than were suspected by the healthcare providers who made the MNDOSA report. Conclusions MNDOSA is unique as it collects real-time data rather than relying on data sources with long delays in reporting. This allows for a near real-time response and notification of key stakeholders, such as the Poison Center, clinicians, local public health, and the public, when a new or concerning substance or cluster is identified. This innovative surveillance system has the potential to improve population health through describing patterns of drug overdose and substance use in MN communities, identifying clusters of drug overdoses in near-real time, identifying the specific substances causing severe illness and/or death, and describing at-risk populations to guide prevention efforts. Most importantly, MNDOSA can better estimate the overall health care burden related to recreational substance use, beyond the typical enumeration of overdose deaths. Toxicology lab results indicate that patients have substances such as methamphetamine, opioids, marijuana and cocaine on board more frequently than the attending provider suspects. Additionally, the number of substances detected in these specimens indicates that polysubstance use is highly prevalent among these cases. Having a better understanding of the substances that may be involved in a patient's ED visit or hospitalization can help improve patient care. Improved toxicology testing of non-fatal cases would allow us to better describe the current landscape of substances used in our communities and provide situational awareness to public health professionals. This pilot is identifying surveillance challenges, determining feasibility, and establishing best methods for expansion to other sites. Lessons learned thus far include that active identification and reporting of MNDOSA patients are burdensome to ED staff; thus, an informatics-based approach to passively identify and report MNDOSA patients is vital to continued surveillance. Laboratory methods must be robust enough to resolve an ever-growing number of drugs and metabolites over a wide range of potential blood and urine concentrations. As the number of drugs, metabolites, and adulterants continues to grow, the toxicology panels used for testing need to continue expanding. MNDOSA next steps include incorporating an informatics-based approach to surveillance, expanding MNDOSA to other hospitals, evaluating the surveillance system against other data sources, and incorporating non-targeted toxicology testing to improve the ability to detect emerging and novel substances.

Roles of Health Literacy in Relation to Social Determinants of Health and Recommendations for Informatics-Based Interventions: Systematic Review

Abstract

Objective 1. To determine the prevalence and pattern of unintentional injuries among children 2. To study the physical environment of house for various risk factors leading to unintentional injuries. Introduction Injury and violence are public health problems now-a-days all over the world. Over 950000 children less than 18 years of age die as a result of injuries, 95% of which occur in low and middle income countries (LMIC) including India. Unintentional injuries account for 90% of these cases. The death rate due to unintentional injuries is almost double in LMIC as compared to developed countries. It is seen that most of childhood unintentional injuries occur in and around the home of children. India, with a population of app 1.25 billion, had about 40% children. India is passing through a major socio-economic, epidemiological and technological transition. Migration and rapid urbanization is contributing towards the development and growth. Mechanization is changing the traditional lifestyle and thereby resulting an increase in injuries in India. Despite efforts to understand the burden of injuries, the magnitude in terms of morbidity and mortality is still not clear as injury information did not receive much importance in the health sector. Few small studies have reported the prevalence and causes of childhood unintentional injuries. However, there is lack of proper surveillance data on burden of unintentional injuries among children Methods We conducted a surveillance study in 30 villages of Ludhiana district of Punjab, India. A total of 900 houses having at least one child below the age of 19 years formed the sample of study. The data pertaining to socio demographic profile, physical environment of house and injury details (in last 5 years) were recorded on the pre designed performa. The data were statistically analyzed using SPSS version 20.0. Results In the 900 houses, there were 1910 children below the age of 19 years. Of these houses, unintentional injuries to their children was observed in 386(42.9%) houses during the last 5 years. The prevalence of unintentional injuries among children was 20.6%. There were 60.1% children below the age of 5 years who suffered injuries. 67% of injuries occurred among male children. Majority of injuries (63.5%) occurred during evening time, of which 87.2% occurred while the child was playing in and around the home. Fall was the most common (64.5%) mode of injury followed by 12.3% cut injuries due to chopper/fodder cutter or old instruments/machinery lying the courtyard. There were 16 injuries due electric current, 6 cases of dog bite, 4 cases of drowning and 4 cases of unintentional ingestion of poisonous substance. 48.3% of injuries were severe, 35.9% minor, 9.4% trivial and 5.9% very severe. There were 2 fatal death also. Conclusions The burden of unintentional childhood injuries in India is substantial but it a neglected health problem. There is a strong need for continuous surveillance of childhood injuries in India using systematic techniques so as to plan for timely intervention.

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Roles of Health Literacy in Relation to Social Determinants of Health and Recommendations for Informatics-Based Interventions: Systematic Review

Abstract

Objective To understand trends in race-specific mortality rates between blacks and whites to discover any racial inequalities that might exist for drug overdose deaths. To delve into the types of drugs that are prominently involved in black drug overdose deaths from 2013-2017 in the state of Indiana. Introduction Black Hoosiers, the largest minority population in Indiana, make up almost 10% of the state's population, and accounted for 8% of the total resident drug overdose deaths from 2013-2017 compared to whites at 91%. However, a closer look at race-specific mortality rates might reveal racial inequalities. Therefore, the purpose of this project was to analyze drug overdose morality rates among white and black Hoosiers to discover possible racial inequalities and to discover trends in drug involvement in overdose deaths among blacks. Methods Drug overdose deaths that occurred in Indiana between 2013 and 2017 were identified using the underlying and contributing cause of death ICD-10 codes and abstracted from the Indiana State Department of Health's annual finalized mortality dataset. Race-specific drug overdose death rates were calculated and compared among racial groups. Drug overdose deaths in blacks were examined for trends over time and by the types of drugs involved. Results Between 2013 and 2017, drug overdose mortality rates for whites increased from 17.05 to 27.28 per 100,000. Blacks saw a higher rate increase during this same time frame: from 10.74 to 30.62 per 100,000, surpassing the mortality rate of whites by the end of 2017. Drug overdose deaths in blacks increased 197% from 2013-2017 and drug specific mortality rate increases were seen across all drug category's. Opioids, which were involved in 61% of the 2017 drug overdose deaths among blacks, had a rate increase from 3.05 to 18.62 per 100,000 between 2013 and 2017. Drug specific overdose mortality rate increases were also seen for overdoses involving cocaine (1.76 to 10.62 per 100,000), benzodiazepines (0.32 to 3.08 per 100,000), and psychostimulants other than cocaine (0.16 to 1.69 per 100,000) such as amphetamines. Conclusions While white Hoosiers had higher drug overdose mortality rates between 2013 and 2016, black Hoosiers had a greater mortality rate increase and surpassed the mortality rate in whites in 2017. Opioids, the most frequently involved substance in overdose deaths among blacks from 2013-2017, showed increasing rates during this time period. However, increases in drug specific overdose mortality rates for cocaine, benzodiazepines, and psychostimulants other than cocaine also call for public health attention. These results promote the inclusion of minority health experts in drug overdose prevention efforts and issue a call for future prevention efforts to be targeted toward the state's largest minority population.

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Abstract

Objective The aim of this project was to explore changing patterns in patient refusal to transport by emergency medical services for classified heroin overdoses and possible implications on heroin overdose surveillance in Kentucky. Introduction As a Centers for Disease Control and Prevention Enhanced State Opioid Overdose Surveillance (ESOOS) funded state, Kentucky started utilizing Emergency Medical Services (EMS) data to increase timeliness of state data on drug overdose events in late 2016. Using developed definitions of heroin overdose for EMS emergency runs, Kentucky analyzed the patterns of refused/transported EMS runs for both statewide and local jurisdictions. Changes in EMS transportation patterns of heroin overdoses can have a dramatic impact on other surveillance systems, such as emergency department (ED) claims data or syndromic surveillance (SyS) data. Methods As part of the ESOOS grant, Kentucky receives all emergency-only EMS runs monthly from Kentucky Board for Emergency Medical Services, Kentucky State Ambulance Reporting System data. Heroin cases were classified based on text and medications (Narcan) administered, with comparisons to historic data discussed elsewhere (Rock & Singleton, 2018). Transportation classifications are based on EMS standard elements defining treatment with transportation vs refusal to transport to hospital and canceled runs were excluded. Initial analysis included trend analysis at state and local levels, as well as demographic comparisons of refusal vs transported heroin overdose encounters. Results Statewide trends in EMS heroin overdoses with refusal transport significantly increased from 5% (n=42) in 2016 quarter three to 22% (n=290) in 2018 quarter two (Fig 1). Initial demographic analysis does not show any significant difference between refusals/transported for age, gender, or race. However, there are significant differences among geographic regions in Kentucky with heroin encounter refusal proportion ranging from 3%-48% in 2018 quarter two. Specifically, one urban area (Fig 2) shows the change in proportion of refusal increasing from 15% (n=23) in 2016 quarter three to 47% (n=110) in 2018 quarter two. In this geographic area, combined refused/transported EMS heroin overdoses compared to traditional ED data demonstrates opposing heroin overdose patterns for the same local with EMS showing and increasing trend overtime and ED showing a decreasing trend (Fig 3). Conclusions Traditional public health surveillance for heroin overdose has historically relied on ED billing data, though agencies are starting to use syndromic surveillance, too (Vivolo-Kantor et al., 2016). These systems share similar underlying ED data, albeit with different components, quality, and limitations. However, in terms of the overdose epidemic, both are limited to only heroin overdoses that result in ED hospital encounters. The recent drastic increase in refused transport can have significant impacts on heroin surveillance. Jurisdictions relying on SyS or ED data for monitoring overdose patterns and/or evaluating interventions may be significantly underestimating acute overdose occurrence in the population. This analysis highlights the importance of this preclinical data source in surveillance of the heroin epidemic. References Rock, P. J., & Singleton, M. D. (2018). Assessing Definitions of Heroin Overdose in ED & EMS Data Using Hospital Billing Data, 10(1), 2579. Vivolo-Kantor, A. M., Seth, P., Gladden, ; R Matthew, Mattson, C. L., Baldwin, G. T., Kite-Powell, A., & Coletta, M. A. (2016). Morbidity and Mortality Weekly Report Vital Signs: Trends in Emergency Department Visits for Suspected Opioid Overdoses — United States, 67(9), 279–285. Retrieved from https://www.cdc.gov/mmwr/volumes/67/wr/pdfs/mm6709e1-H.pdf

Roles of Health Literacy in Relation to Social Determinants of Health and Recommendations for Informatics-Based Interventions: Systematic Review

Abstract

Objective To track and monitor nonfatal emergency department opioid overdoses in California for use in the statewide response in the opioid epidemic. Introduction The opioid epidemic is a multifaceted public health issue that requires a coordinated and dynamic response to address the ongoing changes in the trends of opioid overdoses. Access to timely and accurate data allows more targeted and effective programs and policies to prevent and reduce fatal and nonfatal drug overdoses in California. As a part of a Centers for Disease Control and Prevention Enhanced State Opioid Overdose Surveillance grant, the goals of this surveillance are to more rapidly identify changes in trends of nonfatal drug overdose, opioid overdose, and heroin overdose emergency department visits; identify demographic groups or areas within California that are experiencing these changes; and to provide these data and trends to state and local partners addressing the opioid crisis throughout California. Emergency department (ED) visit data are analyzed on an ongoing quarterly basis to monitor the proportion of all ED visits that are attributed to nonfatal drug, opioid, and heroin overdoses as a portion of the statewide opioid overdose surveillance. Methods California emergency department data were obtained from the California Office of Statewide Health Planning and Development. Data were (and continue to be) analyzed by quarter as the data become available, starting in quarter 1 (Q1) 2016 through Q1 2018. Quarters were defined as standard calendar quarters; January-March (Q1), April-June (Q2), July-September (Q3), and October-December (Q4). Counts of nonfatal ED visits for all drug overdoses, all opioid overdoses, and heroin overdoses were defined by the following ICD-10 codes in the principle diagnosis or external cause of injury fields respectively; T36X-T50X (all drug), T40.0X-T40.4X T40.6 and T40.69 (all opioid), and T40.1X (heroin). Eligible ED visits were limited to CA residents, patients greater than 10 years of age, initial encounters, and were classified as unintentional overdoses or overdoses of undetermined intent. Overdose ED visits are described by quarter, drug, sex, and age for Q1 2016 – Q1 2018. Results On average, 6,450 emergency department visits in California are attributed to drug overdose every quarter. Between Q1 2016 and Q1 2018, on average 1,785 (range: 1,559-2,011 ED visits) of those visits were due to opioid overdoses and a further 924 (52%) of those ED visits were due to heroin overdoses. About 26-30% of all drug overdose ED visits were for opioid overdoses in California during Q1 2016 – Q1 2018. Quarterly, that is around 6.00-7.64 opioid overdose ED visits for every 10,000 ED visits (Table 1), with about half those (3.09-4.30 ED visits) being heroin overdose ED visits. Males accounted for approximately 52% of all drug overdose ED visits, 65% of all opioid overdose ED visits, and 76% of all heroin overdose ED visits per quarter. Across all quarters, 25-34 year olds had the highest proportion of emergency department visits attributed to opioid and heroin overdose compared to all other age groups. However, 11-24 year olds had the highest proportion of emergency department visits attributed to all drug overdoses compared to all other age groups for all quarters except one. Between Q1 2016 and Q1 2018, the proportion of emergency department visits attributed to all drug overdoses increased by 1.8%, all opioid overdoses increased 3.1%, and heroin overdoses increased by 13.5%. Conclusions Overall trends for the proportion of all emergency department visits for all drug overdoses and all opioid overdoses are relatively stable over this time period, however the proportion of heroin overdose ED visits shows a more substantial increase between Q1 2016 and Q1 2018. In addition, heroin overdose ED visits account for over half of all opioid overdose ED visits during this time in California. Ongoing surveillance of drug, opioid, and heroin overdose ED visits is a crucial component of assessing and responding to the opioid overdose crisis in California and helps to better understand the demographics of those who could be at risk of a future fatal opioid overdose. Timely data such as these (in addition to prescribing, hospitalization, and death data) can inform local and statewide efforts to reduce opioid overdoses and deaths.

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Abstract

Objective To improve Texas Syndromic Surveillance by integrating data from the Texas Poison Center and Emergency Medical Services for opioid overdose surveillance. Introduction In recent years, the number of deaths from illicit and prescription opioids has increased significantly resulting in a national and local public health crisis. According to the Texas Center for Health Statistics, there were 1340 opioid related deaths in 2015.1 In 2005, by comparison, there were 913 opioid related deaths. Syndromic surveillance can be used to monitor overdose trends in near real-time and provide much needed information to public health officials. Texas Syndromic Surveillance (TxS2) is the statewide syndromic surveillance system hosted by the Texas Department of State Health Services (DSHS). To enhance the capabilities of TxS2 and to better understand the opioid epidemic, DSHS is integrating both Texas Poison Center (TPC) data and Emergency Medical Services (EMS) data into the system. Much of the data collected at public health organizations can be several years old by the time it is released for public use. As a result, there have been major efforts to integrate more real-time data sources for a variety of surveillance needs and during emergency response activities. Methods Guided by the Oregon Public Health Division's successful integration of poison data into Oregon ESSENCE, DSHS has followed a similar path.2 DSHS already receives TPC data from the Commission on State Emergency Communication (CSEC), hence copying and routing that data into TxS2 requires a Memorandum of Understanding (MOU) with CSEC, which is charged with administering the implementation of the Texas Poison Control Network. EMS records are currently received by the DSHS Office of Injury Prevention (OIP) via file upload and extracted from web services as an XML file. Regional and Local Health Operations, the division where the syndromic surveillance program is located, and OIP, are both sections within DSHS. Therefore, it is not necessary to have a formal MOU in place. Both parties would operate under the rules and regulations that are established for data under the Community Health Improvement Division. CSEC and EMS will push data extracts to a DSHS SFTP folder location for polling by Rhapsody in Amazon Web Services. The message data will be extracted and transformed into the ESSENCE database format. Data are received at least once every 24 hours. Results TxS2 will now include TPC and EMS data, giving system users the ability to analyze and overlay real-time data for opioid overdose surveillance in one application. The integration of these data sources in TxS2 can be used for both routine surveillance and for unexpected public health events. This effort has led to discussions on how different sections within DSHS can collaborate by using syndromic surveillance data, and has generated interest in incorporating additional data streams into TxS2 in the future. Conclusions While this venture is still a work in progress, it is anticipated that adding TPC and EMS data to TxS2 will be beneficial in surveilling not just opioid overdoses but other conditions and illnesses, as well as capturing disaster related injuries. References 1. Texas Health Data, Center for Health Statistics [Internet]. Austin (TX): Department of State Health Services. Available from: http://healthdata.dshs.texas.gov/Opioids/Deaths 2. Laing R, Powell M. Integrating Poison Center Data into Oregon ESSENCE using a Low-Cost Solution. OJPHI. 2017 May 1; 9(1).

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Roles of Health Literacy in Relation to Social Determinants of Health and Recommendations for Informatics-Based Interventions: Systematic Review

Abstract

Objective This project evaluated and compared two ESSENCE syndromic surveillance definitions for emergency department (ED) visits related to injuries associated with falls in icy weather using 2016-2017 data from two hospitals in Douglas County, Nebraska. The project determined the validity of the syndromic surveillance definition as applied to chief complaint and triage notes and compared the chief complaint data alone to chief complaint plus triage notes definitions to find the most reliable definition for ED visits resulting from fall-related injuries. Introduction Icy weather events increase the risk for injury from falls on untreated or inadequately treated surfaces. These events often result in ED visits, which represents a significant public health and economic impact1. The goal of this project was to start the process toward an evaluation of the public health impact and the economic impact of falls associated to icy weather in Douglas County, NE for the ultimate purpose of designing and implementing injury prevention related public health protection measures. Additionally, the validated definition will be used by NE DHHS Occupational Health Surveillance Program to identify work related ice-related fall injuries that were covered by workers compensation. To achieve the goal, the first step was to identify a valid and reliable syndromic surveillance. Specifically, this project looked at the applicability of the ESSENCE syndromic surveillance definitions related to injuries associated with falls. Two syndromic surveillance definitions were compared, one that includes triage note and chief complaint search terms, and another that only includes chief complaint. The hypothesis was that the ESSENCE syndromic surveillance definition that includes triage note and chief complaint search terms, rather than the syndromic surveillance definition that only includes chief complaint, would be more effective at identifying ED visits resulting from fall-related injuries. Methods This project included 751 EDs visits from two hospitals located in Douglas County Nebraska, during ice events on December 16-18, 2016, January 10-12, 2017, and January 15-18, 2017. Two ESSENCE syndromic surveillance definitions, "Chief Complaint or Triage Note" and "Chief Complaint Only," were used to identify fall-related ED visits from two participating EDs in Douglas County, NE. In the chief complaint and the triage note fields, the keywords selected were: fall, fell, or slip. In that the ESSENCE time series analysis indicated the increase in the number of falls were associated with ice events from baseline, an assumption was made that the increase was a result of the weather. Then, the Syndromic Surveillance Event Detection of Nebraska database was used to find the patient and visit identification numbers. These two identification numbers were used to identify the EHRs needed for a gold standard review. Chart data was used to evaluate the reliability and validity of the two syndromic surveillance definitions for the detection of falls on the study dates. This analysis was used to find the sensitivity, specificity and predictive value. Results The sensitivity, specificity and positive predictive value for the "Chief Complaint Only" definition yielded 71.7%, 100%, and 100% respectively. The "Chief Complaint or Triage Note" definition results were 90.9%, 98.8%, and 95.5% for these analyses. Negative predictive value for both definitions was 97.5%. Conclusions The sensitivity indicates both definitions are unlikely to give false positives, and the positive predictive value indicates both definitions successfully identify most of the true positives found in the visits. However, the "Chief Complaint Only" definition resulted in a minimally higher specificity and positive predictive value. Therefore, the results indicate that although both definitions have similar specificity and positive predictive value, the "Chief Complaint or Triage Note" definition is more likely than the "Chief Complaint Only" definition to correctly identify ED visits related to falls in icy weather. References 1. Beynon C, Wyke S, Jarman I, Robinson M, Mason J, Murphy K, Bellis MA, Perkins C. The cost of emergency hospital admissions for falls on snow and ice in England during winter 2009/10: a cross sectional analysis. Environmental Health 2011;10(60).

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Roles of Health Literacy in Relation to Social Determinants of Health and Recommendations for Informatics-Based Interventions: Systematic Review

Abstract

Objective To evaluate four ICD-10-CM based case definitions designed to capture pedestrian and bicycle crash-related emergency department (ED) visits in North Carolina's statewide syndromic surveillance system, NC DETECT. Introduction Over the last few decades, the United States has made considerable progress in decreasing the incidence of motor vehicle occupants injured and killed in traffic collisions.1 However, there is still a need for continued motor vehicle crash (MVC) injury surveillance, particularly for vulnerable road users, such as pedestrians and bicyclists. In NC, the average annual number of pedestrian-motor vehicle crashes increased by 13.5 percent during the period 2011-2015, as compared to 2006-2010.2 Therefore, the Carolina Center for Health Informatics (CCHI), as part of a NC Governor's Highway Safety Program-funded project to improve statewide MVC injury surveillance, developed and evaluated four ICD-10-CM based case definitions for use with NC DETECT, NC's statewide syndromic surveillance system. Methods We created four pedestrian/bicycle crash injury case definitions based on ICD-10-CM transportation codes ("V-codes"): Traffic-Related Pedestrian Crashes, Traffic/Non-Traffic-Related Pedestrian Crashes, Traffic-Related Bicycle Crashes, and Traffic/Non-Traffic-Related Bicycle Crashes. These definitions were based on the Centers for Disease Control and Prevention (CDC) "ICD-10-CM External Cause of Injury Codes".3 We then applied these pedestrian/bicycle crash case definitions to 2016-2017 NC DETECT ED visit data and data obtained from a single NC Level I Trauma Center. Next, we linked the two data sources using the variables date of visit, time of visit, and medical record number. Since trauma center data are collected and verified by a designated trauma registrar, we considered the data obtained from the Level I Trauma Center to be the "gold standard". Results The linkage between the two data sources was successful, with 99.5% of all Level I Trauma Center records linking to ED visits in NC DETECT. However, we found discrepancies in the assignment of codes between the ED visit and Trauma Center data. For example, 47.5% of NC DETECT ED visits that linked to a pedestrian/bicycle crash record in the Trauma Center data, were missing an ICD-10-CM injury mechanism code of any category. Historically, the proportion of injury-related ED visits that were missing corresponding injury mechanism codes was low (<15%). However, the transition from ICD-9-CM to ICD-10-CM increased the proportion of injury-related visits missing injury mechanism codes.4 Among the 92 NC DETECT ED visits missing injury mechanism codes, 35.9% contained a pedestrian/bicycle crash-related keyword in the Chief Complaint or Triage Note. Among the 100 linked records with valid ICD-10-CM injury mechanism codes, the percent agreement between the two data sources on whether the ED visit was a "pedestrian" or "bicycle" crash was 54.4% and 71.9%, respectively. Percent agreement decreased for "traffic" and "non-traffic" designations, however. The most common V-code assigned to misclassified pedestrian/bicycle crashes in the NC DETECT ED visit data was "V87.7XXA-Person injured in a collision between other specified motor vehicles (traffic)". Although the linkage study used data obtained from only a single Level I Trauma Center and primarily a single facility in NC DETECT, we felt that the results of this limited linkage study were generalizable to statewide NC DETECT ED visit data. For example, many facilities in NC DETECT underreport injury mechanism codes. Therefore, we added pedestrian/bicycle crash injury-related keywords to the Traffic/Non-Traffic Pedestrian/Bicycle Crash Injury case definitions (Table 1). After inclusion of these keywords, the number of identified pedestrian and bicycle crash injury-related ED visits identified in NC DETECT increased by 16.9% and 57.9% from January-June 2018, respectively (Figure 1). Conclusions Pedestrian and bicycle crashes represent a major cause of MVC injury morbidity and mortality. Therefore, the development and evaluation of case definitions is key for the successful surveillance of these types of injuries. The inclusion of keywords can help account for some of the injury mechanism data missingness common to ED surveillance systems. References 1.NHTSA. Traffic Safety Facts 2015. DOT HS 812 384. Washington, DC: US Department of Transportation; 2017. https://crashstats.nhtsa.dot.gov/Api/Public/ViewPublication/812384. Accessed Sept 12, 2018. 2.Thomas L, Vann, M, Levitt D. North Carolina Pedestrian Crash Trends and Facts 2011-2015. RP 2017-42. Chapel Hill, NC: University of North Carolina Highway Safety Research Center; 2018. http://www.pedbikeinfo.org/pbcat_nc/pdf/summary_ped_facts11-15.pdf. Accessed Sept 12, 2018. 3.NCIPC. Help and Tools for Injury Data; Atlanta, GA: CDC 2018. https://www.cdc.gov/injury/wisqars/dataandstats.html. 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Abstract

Objective Link emergency department (ED) with death certificate mortality data in order to examine the prior medical history of opioid overdose victims leading up to their death. Introduction In 2017, 951 Missouri residents died from an opioid overdose—a record number for the state.1 This continues the trend from 2016, which saw an increase of over 30% in opioid overdose deaths compared to 2015. The Missouri Department of Health and Senior Services (MDHSS) manages several public health surveillance data sources that can be used to inform about the opioid epidemic. Opioid overdose deaths are identified through death certificates which are collected through the vital records system. MDHSS also manages the Patient Abstract System (PAS), which contains ED and inpatient hospitalization data from approximately 132 non-federal Missouri hospitals. PAS contains about 130 variables, which include demographic data, diagnoses codes, procedures codes, and other visit information. Records can have up to 23 diagnosis fields, which are coded using ICD-10-CM (International Classification of Diseases, Clinically Modified). The first diagnosis field is the primary reason for a visit. Methods Linkage and analysis of the data was performed using SAS Enterprise Guide 6.1. Opioid overdose deaths were identified through ICD-10 analysis looking for drug poisoning underlying cause of death codes and opioid-specific codes found in the multiple cause (contributing cause) of death fields. Table 1, below, summarizes the ICD-10 codes used. Mortality data from the 951 decedents were linked to ED data from 2016 and 2017. Records were linked using multiple passes over the ED records. Records were first linked on social security number. Following this linkage, ED records with no initial match went through a second pass and linked on name and date of birth. Finally, a third pass for records still without a match was conducted using date of birth, census tract, and sex. After these passes, the linkages were reviewed to identify any false positives. The 23 diagnosis fields contained in PAS were analyzed to look for patterns in diagnosis coding. ICD-10-CM codes were too broad so CCS (Clinical Classifications Software) categories were utilized. Results In total, 3,500 ED records were linked to the 951 decedents. After removing false positives, the total number of ED records was 3,357. Approximately 70% (687) of decedents were linked to at least one ED record. One hundred and eighty-eight visits were due to drug overdose (153 opioid overdoses). The most common primary diagnosis CCS categories (category numbers in parentheses) were: substance-related disorders (661), Spondylosis; intervertebral disc disorders; other back problems (205), abdominal pain (251), and other nervous system disorders (95). Collectively, these four categories represented over 20% of all primary diagnoses. Across all 23 diagnosis fields there were similar results. The most common CCS categories were as follows: substance-related disorders (661), other aftercare (257), essential hypertension (98), and mood disorders (657). Pie charts (Fig. 1 and 2) below show proportions of CCS categories across all diagnoses fields and primary diagnosis broken into three major categories: pain/injury, substance abuse/mental health, and other. In order to reduce the impact of CCS categories with small numbers, these graphics represent only CCS categories that made up 1% or more of the total collection of diagnoses codes. Of the 687 decedents that were matched successfully to ED records, 96% had at least one pain/injury or one substance abuse/mental health ICD-CM code in at least one record, and 68% had both. Conclusions These findings suggest that many overdose decedents visited the ED in the years prior to death. Many of these visits were not due to an overdose; however, they could be indicative of a problem with opioids (i.e. pain, drug-seeking, substance use-related). ED staff and public health professionals could utilize these opportunities to refer patients to recovery services and recommend they heed caution when using opioids. References 1. Missouri Department of Health and Senior Services. (2018). Missouri Resident Overdose Deaths by Opioid Type. Retrieved September 27, 2018 from https://health.mo.gov/data/opioids/pdf/opioid-dashboard-slide-9.pdf.

Roles of Health Literacy in Relation to Social Determinants of Health and Recommendations for Informatics-Based Interventions: Systematic Review

Abstract

Objective To identify potential emergency department (ED) visits prior to suicide deaths in North Carolina (NC) and describe pre-suicide care-seeking in EDs. Introduction Suicide is a leading cause of mortality in the United States, causing about 45,000 deaths annually1. Research suggests that universal screening in health care settings may be beneficial for prevention, but few studies have combined detailed suicide circumstances with ED encounter data to better understand care-seeking behavior prior to death. Methods This project used data from the NC Violent Death Reporting System (NC-VDRS), a repository of all violent deaths in North Carolina, and the NC Disease Event Tracking and Epidemiologic Collection Tool (NC DETECT), which includes all visits to 24/7, acute-care, civilian, hospital-affiliated EDs in NC. We identified all suicide deaths recorded in the NC-VDRS between 1/1/2014 – 9/30/2015, and all NC DETECT ED visits between 1/1/2013 – 9/30/2015. Descriptive analyses were conducted for each data source, separately. For all NC-VDRS suicides, we identified ED visits likely made by the same individual within the 48 hours prior to death. We identified these ED visits based on the variables arrival date, sex, date of birth (DOB), county of residence, and a chief complaint consistent with self-harm/suicide; we refer to these as suicide-related ED visits. For the subset of NC-VDRS suicides with a suicide-related ED visit, made within 48 hours of death, we identified all ED visits associated with the decedent made to the same facility or healthcare system in the year prior to death. We then categorized the pre-suicide ED visits according to the primary reason healthcare was sought by the patient (e.g. mental health problem, substance abuse/overdose, pain, etc.). Results From 1/1/2014-9/30/2015, there were 2,953 suicide deaths captured in NC-VDRS data; 2,435 (82%) of these included DOB. Between 1/1/2013 – 9/30/2015, there were 13,463,345 ED visits captured by NC DETECT; 12,884,596 (96%) included DOB. For 961 suicides (32.5%), no ED visit was found with the same DOB, sex and county of residence. For the remaining 1,474 suicides, at least one ED visit was found for a patient with the same DOB, sex and county of residence and occurring on or before the date of death. For 406 suicides, a suicide-related ED visit was identified; 122 of these patients had at least one additional ED visit in the year prior to death. A total of 516 ED visits were identified for these 122 suicides, including the suicide-related ED visit, with an average of 3.2 (range: 1-25) visits. Conclusions For nearly a third of NC-VDRS suicides, no indication of any ED visit by a patient with the same DOB, sex, and county of residence was found. While it is likely we were unable to identify all ED visits prior to suicide, the findings from this pilot study suggest many suicide victims did not seek NC ED care in the year prior to death. Overall, a suicide-related ED visit was found for only 13.7% of NC suicides in the study period, indicating that most people who self-inflict fatal injury do not make it to an ED for care prior to death. ED visits in the year prior to death by suicide indicated a variety of diagnoses, but rarely depression or suicidality; this suggests that universal screening at ED visits would have been necessary to identify any suicide risk present. Limitations of this study include that we were unable to directly link suicide deaths and ED visits using patient identifiers. Additionally, we relied solely on secondary data used for public health surveillance and, therefore, had no access to medical record information that may have documented depression or suicidal ideation that was not coded as such. Findings from this pilot study can inform future work to identify ED visits prior to suicide. References 1National Center for Injury Prevention and Control. Suicide Rising Across the US. Vital Signs, June 2018; Atlanta, GA: Centers for Disease Control and Prevention 2018. https://www.cdc.gov/vitalsigns/suicide/. Accessed Sept 25, 2018.

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Roles of Health Literacy in Relation to Social Determinants of Health and Recommendations for Informatics-Based Interventions: Systematic Review

Abstract

Objective Determine risk factors and risk populations for heat-related illnesses in Pinal County, AZ by improving HRI case identification and assessment. Introduction Extreme heat and related illnesses are a critical concern in Arizona from May to September each year. From 2008 to 2016, Arizona medical facilities had an average of 1,790 emergency visits and 442 hospital admissions for heat-related illnesses (HRI) during the summer months. In 2016 alone, Arizona Emergency Departments (EDs) received a total of 2,484 visits for HRI and 527 of these cases were admitted as inpatients1. Pinal County, which has an estimated population of 430,237 individuals2, contributes to the number of HRI visits to Arizona Emergency Departments that occur each year. In order to determine the burden of HRIs within the county, Pinal County Public Health Services District (PCPHSD) began to conduct heat-related illness surveillance in 2017 and found that 149 HRI cases had been reported that year3. PCPHSD continued to conduct HRI surveillance through summer 2018 to build on surveillance activities from 2017 and meet the following goals: ●Improve HRI case identification and assessment through enhanced HRI surveillance and interview processes, ●Determine risk factors and risk populations for HRIs in Pinal County, and ●Recommend and implement practical interventions to prevent HRIs among Pinal residents. Methods The process to improve identification and assessment of HRI cases among Pinal residents included the use of the National Syndromic Surveillance Program's (NSSP) ESSENCE for case identification, and Qualtrics survey software to collect additional information from confirmed cases regarding their heat exposure. First, cases were identified using ESSENCE syndromic surveillance system, which identifies cases based on specific queries and definitions. PCPHSD used the definition for Heat Illness version 1 to identify cases who's Chief Complaint (CC) and/or hospital Discharge Diagnosis (DD) included key HRI terms. Next, PCPHSD utilized two ESSENCE queries to search cases by "patient location" and "facility location." These two queries were used to ensure that all HRI cases among Pinal County residents were identified regardless of case address or the facility visited. The second step in the process included de-duplication of cases identified in each query and adding them to a line list for further assessment. PCPHSD then conducted a thorough medical chart review for each case to determine if they met the HRI case definition. Confirmed cases met the following criteria: ●Identification in ESSENCE as an HRI, ●Medical records compatible with HRI clinical symptoms, ●Symptom onset within 24 hours of heat exposure, ●HRI visit to an ED between May 1st and September 30th, 2018, and ●Resident of Pinal County. ●Exclusion: heat exposure not related to environmental/natural heat. Step three of the process included the conduction of HRI case interviews using Qualtrics survey software. Interview questions were designed to obtain information not included in case medical records, and to collect information regarding risk factors, risk populations, and potential areas of intervention. Interviews were completed within 7-10 minutes, included a maximum of three call attempts to each case, and included a follow-up text message. Cases were sent an information packet if they expressed interest in receiving additional information at the conclusion of their interview. The information packet included a thank you letter, heat safety tips, local resources for homelessness and utility assistance, and heat relief options available through the Pinal County Heat Relief Network. The final step of the process included data analysis to determine areas and modes of intervention to prevent HRIs among Pinal residents. Results ESSENCE identified 168 HRI cases from May 1st to August 31st, 2018. Of these cases, 103 were confirmed. (Note that 48 cases from August and two from July are still under chart review). Preliminary findings for confirmed cases from May 1st to July 31st show that the majority of HRI cases in Pinal County are Non-Hispanic White (61.2%), male (75.7%), and range in age from 20-59 years (71.8%). Nearly one-third of reported HRI cases occurred among Casa Grande Residents (33 cases). This was followed by San Tan Valley with 20 cases, and Apache Junction with 16 cases. With regard to hospital visits, 86.4% of cases visited an ED within Pinal County. Other county ED visits were to Maricopa (10.7%), Pima (1.9%), and Coconino (1%). The most frequently visited hospitals within Pinal County were Banner Casa Grande Medical Center (50.5%) and Banner Goldfield Medical Center (12.6%). Assessment of cases by month shows that July had the greatest number of cases overall (51 cases) and the greatest number of cases in one day (5 cases). This was followed by the month of June with 41 cases total and a maximum of 3 cases in one day. Maximum temperatures in June and July reached 111oF and 116oF, respectively. With regard to response rate, 53.2% of confirmed cases completed an interview. Interview data are currently being assessed to determine risk factors and risk populations for HRI. Final results will include May to September HRI data, an analysis of risk factors (e.g. occupation, recreation, homelessness, access to heat-safety resources), an updated response rate, and the percentage of cases who requested an information packet. Final data analyses will be completed by December 2018. Conclusions Improvements to the process for HRI surveillance and case interviews has helped PCPHSD to more effectively identify and assess HRI cases. Utilizing two ESSENCE queries assisted with HRI case identification, and improvements to the case contact protocol and interview questionnaire increased response rate from 25% in 20173 to 53.2% in 2018. Other improvements included the use of follow-up text messaging and Spanish text/interview options. Preliminary results indicate that non-Hispanic white males between the ages of 20-59 years have a greater risk of getting an HRI than other demographic

groups. Interventions should therefore be geared toward this population. Also, with HRIs occurring in multiple cities throughout Pinal County, it is recommended that the Pinal County Heat Relief Network expand outreach activities to recruit additional organizations to participate as heat relief stations. Final analysis of interview data will take place to determine if HRIs among Pinal residents are related to occupation, recreation, socioeconomic status, or a combination of these. PCPHSD will use final results to provide targeted heat-safety information and resources to the most appropriate groups. It is the hope of PCPHSD that this project will benefit at-risk Pinal County residents and reduce the burden of HRIs during future summers. References 1. Centers for Disease Control and Prevention. Environmental Public Health Tracking Network, State Emergency Department Visits data. [Internet]. 2018. Available from: www.cdc.gov/ephtracking. Accessed on 10/12/2018. 2. United States Census Bureau. Quick Facts: Pinal County, AZ. [Internet]. 2017 Jul 1. Available from: https://www.census.gov/quickfacts/fact/table/pinalcountyarizona/PST045217#viewtop. 3. Kent DC, Garcia RZ, Packard S, Briggs G, Hill C, Griffin S, Bedrick E, Collier K, Roach M. Enhanced Surveillance of heat-related illness in Pinal County. Online J Public Health Inform. 2018 May 30; 10(1): e111.

Roles of Health Literacy in Relation to Social Determinants of Health and Recommendations for Informatics-Based Interventions: Systematic Review

Abstract

Objective To examine specific drugs present based on postmortem toxicology for prescription opioid, heroin, and fentanyl overdoses classified based on ICD-10 coding. To compare drugs identified from postmortem toxicology with those listed on the death certificate for opioid overdoses. Introduction Using death certificates alone to identify contributing substances in drug overdose deaths may result in misclassification and underestimation of the burden of illicit and prescription opioids and other drugs in drug-related deaths. To enable timely and targeted prevention in Tennessee (TN), the identification and monitoring of new drugs and trends in use should utilize toxicology and medicolegal death investigation data directly, as recommended by others 1-3. These data can inform mortality outcome definitions for improved surveillance and risk factor identification 4-7. To our knowledge, this is the first analysis to use statewide linked toxicology and death certificate data in TN. Methods We identified 615 opioid involved overdose deaths in TN of unintentional (underlying ICD-10 codes: X40-X44) or undetermined (underlying ICD-10 codes: Y10-Y14) intent during June 1st to December 31st 2017. Utilizing the Interim Medical Examiner Database (I-MED), we identified postmortem toxicology reports for 454 cases, which were from one of three national laboratories used by a state Regional Forensic Center. Toxicology data were abstracted and independently verified by two co-authors and linked to the TN death statistical file that included cause of death information (literal text and ICD-10 codes) and demographics. The analysis focuses on cases with an available toxicology report. Results We identified 171 prescription opioid overdoses, 221 fentanyl overdoses, and 113 heroin overdoses. Table 1 displays postmortem toxicology profiles for major drugs/classes. For prescription opioid deaths (excluding fentanyl and heroin), positive toxicology results for prescription opioids were as follows: methadone (11%), buprenorphine (14%), hydrocodone (14%), oxycodone (36%) and oxymorphone (also a metabolite, 47%). Benzodiazepines were present in close to 58% of prescription opioid overdoses; stimulants (cocaine, amphetamines, methamphetamines) in about 25%. For fentanyl and heroin deaths, prescription opioids were detected in about 26% and 34%, respectively; stimulants in about 57.9% and 52.2%, respectively, and benzodiazepines 36-37%. Fentanyl was present on toxicology in about half of heroin overdoses, and 6–monoacetylmorphine in 72.6%. Conclusions Using medical examiners' data, including toxicology data, improves estimation of contributing drugs involved in opioid deaths. This analysis provides jurisdiction-specific data on drugs that can help with monitoring trends and informs risk factor identification. Future work includes adding information on prescribed opioid and benzodiazepines using TN's Prescription Drug Monitoring Database and evaluating demographic variation in contributing drugs between toxicology and DC data to identify susceptible populations. References 1. Slavova S, O"Brien DB, Creppage K, Dao D, Fondario A, Haile E, Hume B, Largo TW, Nguyen C, Sabel JC, Wright D, Council of S, Territorial Epidemiologists Overdose S. Drug Overdose Deaths: Let"s Get Specific. Public Health Rep. 2. Horon IL, Singal P, Fowler DR, Sharfstein JM. Standard Death Certificates Versus Enhanced Surveillance to Identify Heroin Overdose-Related Deaths. Am J Public Health. 2018;108(6):777-81. 3. Mertz KJ, Janssen JK, Williams KE. Underrepresentation of heroin involvement in unintentional drug overdose deaths in Allegheny County, PA. J Forensic Sci. 2014;59(6):1583-5. 4. Landen MG, Castle S, Nolte KB, Gonzales M, Escobedo LG, Chatterjee BF, Johnson K, Sewell CM. Methodological issues in the surveillance of poisoning, illicit drug overdose, and heroin overdose deaths in new Mexico. Am J Epidemiol. 2003;157(3):273-8. 5. Davis GG, National Association of Medical E, American College of Medical Toxicology Expert Panel on E, Reporting Opioid D. Complete republication: National Association of Medical Examiners position paper: Recommendations for the investigation, diagnosis, and certification of deaths related to opioid drugs. J Med Toxicol. 2014;10(1):100-6. 6. Slavova S, Bunn TL, Hargrove SL, Corey T. Linking Death Certificates, Postmortem Toxicology, and Prescription History Data for Better Identification of Populations at Increased Risk for Drug Intoxication Deaths. Pharmaceutical Medicine. 2017;31(3):155-65. 7. Hurstak E, Rowe C, Turner C, Behar E, Cabugao R, Lemos NP, Burke C, Coffin P. Using medical examiner case narratives to improve opioid overdose surveillance. Int J Drug Policy. 2018;54:35-42.

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Roles of Health Literacy in Relation to Social Determinants of Health and Recommendations for Informatics-Based Interventions: Systematic Review

Abstract

Objective To describe characteristics of sexual violence emergency department visits in Washington State. Introduction Although sexual violence is a pressing public health and safety issue, it has historically been challenging to monitor population trends with precision. Approximately 31% of incidents of sexual violence are reported to law enforcement and only 5% lead to an arrest1, making the use of law enforcement data challenging. Syndromic surveillance data from emergency departments provides an opportunity to use care-seeking to more accurately surveil sexual violence without introducing additional burdens on either patients or healthcare providers. Methods Using the National Syndromic Surveillance Program (NSSP) Electronic Surveillance System for Early Notification of Community-based Epidemics (ESSENCE) platform, staff from the Rapid Health Information Network (RHINO) program at the Washington State Department of Health created a syndrome definition for sexual violence in emergency department data using a combination of ICD-10 diagnostic codes and chief complaint terms likely to be used for sexual violence visits. Staff executed the query using both the Chief Complaint Query Validation and Facility Location (Full Details) data sources in the NSSP ESSENCE platform. Validation occurred by examining visits from 2017 using the Original Chief Complaint, Diagnosis Combo, and Original Triage Notes fields in the data details output to determine if a visit was a true positive for sexual violence. Staff then used the R Studio platform to create n-grams to analyze commonly occurring terms in the data. RHINO staff collaborated with colleagues in the agency"s Injury and Violence Prevention Section to better understand the trends observed in the data and the utility of using syndromic surveillance to inform public health practice. Results The query identified 1,550 visits for sexual violence in 2017. Female patients were disproportionately represented (87.16%), with female patients aged 10-29 years making up 47.03% of captured visits. Overall, patients 10-29 years of age represented 52.90% of all identified visits. Older patients, particularly older men were less represented. Among the captured visits, staff analyzed a sample of 347 visits and found that 88.76% were correctly identified as being related to sexual violence. Although triage notes are an optional field for Washington State syndromic reporting and only present in approximately 40% of records, analysis of the triage notes also provided contextual details on the time (36.89%) and place (18.44%) of the incident, and the identity of the assailant (17.29%). Among patients 10-29 years old, several increases in the percentage of emergency department visits for sexual violence were observed in conjunction with secondary and post-secondary school term breaks, as well as at the beginning of Autumn and end of Spring terms at most Washington State universities. The trend was present in both patients 10-19 years and 20-29 years, with a stronger signal in the 10-19 year age group. The pattern was not present in either older or younger patients. Conclusions The seasonal trend associated with the academic calendar in patients 10-29 years of age is consistent with other data on teen and campus dating violence2,3 and provides another piece of information to validate and inform the work of social service groups serving adolescents and young adults.Syndromic data is particularly well suited to translating surveillance into actionable public health—having additional data to support the hypotheses of state Rape Prevention and Education programs has the potential to encourage greater participation from universities and other academic institutions to improve consent and sexual violence response programs. Regardless of whether patients are affiliated with a specific institution, the overall safety of the communities where students live is of importance to academic institutions. Similarly, yearly increases in visits during annual mass gatherings may be of use in communicating with event organizers strategies for reducing incidents of violence during that period. Indexing the query for sexual violence within the NSSP ESSENCE platform allows surveillance practitioners to quickly and easily monitor emergency department visits for sexual violence using a standardized methodology. As a national platform, NSSP ESSENCE facilitates collaboration across borders between local, state, Tribal and Urban Indian, and national public health agencies. This improved availability and performance of the query. Additionally, the point-and-click nature of the ESSENCE platform makes using syndromic data more accessible for local health and social service staff who are not trained in epidemiology. The ease of collaboration between partners using the platform also makes it well suited to work which span state, local, and Tribal, and Urban Indian health needs. Data and query sharing increases the likelihood that the data will be actionable and therefore positively influence public health. References 1. The Criminal Justice System: Statistics | RAINN. https://www.rainn.org/statistics/criminal-justice-system. Accessed September 13, 2018. 2. Big Problem on Campus. RAINN | The nation"s largest anti-sexual violence organization. https://www.rainn.org/news/big-problem-campus. Accessed September 13, 2018. 3. Campus Sexual Violence: Statistics. RAINN | The nation"s largest anti-sexual violence organization. https://www.rainn.org/statistics/campus-sexual-violence. Accessed September 13, 2018.

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Roles of Health Literacy in Relation to Social Determinants of Health and Recommendations for Informatics-Based Interventions: Systematic Review

Abstract

Objective To describe epidemiological characteristics of emergency department (ED) visits related to suicidal ideation (SI) or suicidal attempt (SA) using syndromic surveillance data. Introduction Suicide is a growing public health problem in the United States.1 From 2001 to 2016, ED visit rates for nonfatal self-harm, a common risk factor for suicide, increased 42%.2–4 To improve public health surveillance of suicide-related problems, including SI and SA, the Data and Surveillance Task Force within the National Action Alliance for Suicide Prevention recommended the use of real-time data from hospital ED visits.5 The collection and use of real-time ED visit data on SI and SA could support a more targeted and timely public health response to prevent suicide.5 Therefore, this investigation aimed to monitor ED visits for SI or SA and to identify temporal, demographic, and geographic patterns using data from CDC's National Syndromic Surveillance Program (NSSP). Methods CDC's NSSP data were used to monitor ED visits related to SI or SA among individuals aged 10 years and older from January 1, 2016 through July 31, 2018. A syndrome definition for SI or SA, developed by the International Society for Disease Surveillance's syndrome definition committee in collaboration with CDC, was used to assess SI or SA-related ED visits. The syndrome definition was based on querying the chief complaint history, discharge diagnosis, and admission reason code and description fields for a combination of symptoms and Boolean operators (for example, hang, laceration, or overdose), as well as ICD-9-CM, ICD-10-CM, and SNOMED diagnostic codes associated with SI or SA. The definition was also developed to include common misspellings of self-harm-related terms and to exclude ED visits in which a patient "denied SI or SA." The percentage of ED visits involving SI or SA were analyzed by month and stratified by sex, age group, and U.S. region. This was calculated by dividing the number of SI or SA-related ED visits by the total number of ED visits in each month. The average monthly percentage change of SI or SA overall and for each U.S. region was also calculated using the Joinpoint regression software (Surveillance Research Program, National Cancer Institute).6 Results Among approximately 259 million ED visits assessed in NSSP from January 2016 to July 2018, a total of 2,301,215 SI or SA-related visits were identified. Over this period, males accounted for 51.2% of ED visits related to SI or SA, and approximately 42.1% of SI or SA-related visits were comprised of patients who were 20-39 years, followed by 40-59 years (29.7%), 10-19 years (20.5%), and ≥60 years (7.7%). During this period, the average monthly percentage of ED visits involving SI or SA significantly increased 1.1%. As shown in Figure 1, all U.S. regions, except for the Southwest region, experienced significant increases in SI or SA ED visits from January 2016 to July 2018. The average monthly increase of SI or SA-related ED visits was 1.9% for the Midwest, 1.5% for the West (1.5%), 1.1% for the Northeast, 0.9% for the Southeast, and 0.5% for the Southwest. Conclusions ED visits for SI or SA increased from January 2016 to June 2018 and varied by U.S. region. In contrast to previous findings reporting data from the National Electronic Injury Surveillance Program – All-Injury Program, we observed different trends in SI or SA by sex, where more ED visits were comprised of patients who were male in our investigation.2 Syndromic surveillance data can fill an existing gap in the national surveillance of suicide-related problems by providing close to real-time information on SI or SA-related ED visits.5 However, our investigation is subject to some limitations. NSSP data is not nationally representative and therefore, these findings are not generalizable to areas not participating in NSSP. The syndrome definition may under-or over-estimate SI or SA based on coding differences and differences in chief complaint or discharge diagnosis data between jurisdictions. Finally, hospital participation in NSSP can vary across months, which could potentially contribute to trends observed in NSSP data. Despite these limitations, states and communities could use this type of surveillance data to detect abnormal patterns at more detailed geographic levels and facilitate rapid response efforts. States and communities can also use resources such as CDC's Preventing Suicide: A Technical Package of Policy, Programs, and Practices to guide prevention decision-making and implement comprehensive suicide prevention approaches based on the best available evidence.7 References 1. Stone DM, Simon TR, Fowler KA, et al. 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Roles of Health Literacy in Relation to Social Determinants of Health and Recommendations for Informatics-Based Interventions: Systematic Review

Abstract

Objective To evaluate the relationship between heroin and non-heroin opioid seizures reported by law enforcement and the number of ER visits due to heroin and non-heroin opioid poisoning in selected counties in Missouri. Introduction In 2016, there were approximately 63,000 deaths nationally due to drug overdose. This trend continues to increase with the provisional number of US deaths for 2017 being approximately 72,000 (1). This increase in overdose deaths is fueled largely by the opioid class of drugs. The opioid epidemic began in the 1990s with a steady rise in prescription opioid overdoses. However, after 2010 a rise in heroin overdose deaths also began to occur. In addition to the heroin deaths increasing, there was a sharp rise in overdose deaths due to synthetic opioids including illicitly manufactured fentanyl beginning in 2013 (2). In Missouri, ER visits follow similar trends with heroin overdose visits greatly increasing after 2011. While PDMPs help function as data sources that provide information on the licit drug supply, they cannot give much knowledge on the illicit supply. Because of this, drug seizure data from law enforcement can provide a much-needed tool in understanding the supply of illicit substances and their impact on a county's morbidity. Methods Data sources used in this analysis include the El Paso Intelligence Center (EPIC) drug seizure database thanks to cooperation by the Midwest HIDTA (High Intensity Drug Trafficking Area) office and Missouri Highway Patrol. ER Visit Data was retrieved from the Missouri Patient Abstract System, which includes ER visits for non-federal hospitals. Data was aggregated on a quarterly basis from 2014-2016 resulting in 12 observations (n) for every county observed. A subset of counties were selected and reviewed based on both high counts and high rates of ED visits for opioid overdoses (3). The counties reviewed were Franklin, Greene, Jefferson, St. Francois, St. Louis City and St. Louis County. The majority of these counties were located in the greater St. Louis Are with Greene and St. Francois counties being notable exceptions. Greene County contains the city of Springfield and is located in southwest Missouri. St. Francois is the most rural county in our subset and is located south of the St. Louis area. For each county, the number of ER Visits were compared to the number of drug seizures reported by law enforcement facilities in EPIC. Numbers were compared for both heroin and non-heroin opioids. Records were identified as a heroin overdose or non-heroin opioid overdose based on CDC drug poisoning guidance (4). If an ER discharge record contained codes for both heroin and a non-heroin opioid, the record was counted in the heroin column only. This method avoided counting records twice. The Spearman correlation coefficient was calculated in SAS to determine if there was a possible relationship between seizures and ED visits at the county level due to the relatively few data points, the presence of outlier observations in the seizure numbers, as well as violations of statistical normality among the county seizure data. The Spearman Correlation Coefficient is a better alternative in this case to the commonly used Pearson Correlation Coefficient due to its ability to handle skewed data and outliers (5). As with the Pearson Correlation Coefficient, a score of 0 is read as the variables have no discernable relationships, and scores of 1 or -1 denote a perfect linear relationship between the observed variables (positive and negative respectively). Results Initial results showed correlational effects between ED visits and seizures to be generally moderate or weak on the county level. The strongest relationships observed were found in St. Louis City for both heroin (R=-0.455) and non-heroin opioids (R=-0.51) as well as Jefferson County for both heroin (R=0.536) and non-heroin (R=0.50). St. Louis County also had a notable relationship for heroin seizures and heroin ED visits with R=-0.55. P values were also calculated to test if correlation values differed significantly from the null hypothesis of R=0 (i.e. no correlation). In all examined cases, there was no p value that was less than the standard cutoff of 0.05 which indicates none of the results are markedly different given the null hypothesis of R=0 is true (6). Of particular interest is the contrast in results between St. Louis City and Jefferson County. St. Louis City had a moderate negative relationship with seizures and ED visits with ED Visits tending to decrease as drug seizures increased. Whereas, Jefferson County had a moderate positive relationship with ED Visits increasing alongside drug seizures. Due to their close geographic proximity, it is likely that both counties influence one another. Further evaluation is required to gauge regional effects. Conclusions Due to the complexity of the opioid epidemic, the value of having varied data sources cannot be understated. While the correlational effects observed here are not indicative of a strong relationship between ED visits and drug seizures, further evaluation and research of both data sources is highly recommended. As additional data is gathered in the future, stronger analyses than the Spearman Correlation Coefficient may be used to further explore the relationship between drug overdose morbidity and law enforcement seizure data. Other relationships may also be explored such as drug seizures in relation to drug overdose mortality. References
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Roles of Health Literacy in Relation to Social Determinants of Health and Recommendations for Informatics-Based Interventions: Systematic Review

Abstract

Objective To develop a risk assessment tool to assess the public health and environmental risks associated with religious mass gathering events of Tamil Nadu, a state in the southern part of India Introduction In spite of the fact that mass gatherings are an undeniably regular element of our society attended by huge crowds yet such occasions are not very well understood. Even though such gatherings are accumulations of \"well people\", vast number of people associated with mass gatherings can put a serious strain on the entire health care system1.The public health implications of mass gathering events include a potential increased risk for disease transmission because of the variability and mobility of those attending the event and increased media attention. Risk assessment for mass gathering events is crucial to identify the potential health hazards which aids in planning and response activities specific to the event2. Preparing for mass gatherings offer an opportunity to improve health service delivery, enhance health promotion and strengthen public health systems3. In India, many of the religious festivals are observed with mass gatherings and prayers. Large crowd participate in such festivals as participants to observe the unique rituals and also as spectators. Literature indicates that in India, we might be well equipped for response activities but the scientific concept of risk assessment i.e., to understand the existing risks, identify the risks, characterize the risks and plan for risk reduction strategies accordingly are at an infant stage .The little that has been done in the field of mass gatherings has generally focused on description of preparedness activities of single event, crowd control, prevention of stampedes with little attention to public health preparedness. The present project is an attempt to systemize the process of risk assessment by developing a risk assessment tool consisting of characteristics peculiar to planned religious mass gatherings of Indian context. Methods Qualitative approach was followed to identify the risks associated with mass gathering events and to identify the domains and items to be included in the risk assessment tool. Firstly, an extensive review of literature about the risks associated with the mass gathering events was done. Secondly, Key Informants (n=20) involved in planning and management of religious mass gathering events in the State of Tamil Nadu, India were purposively identified and interviewed using a semi structured interview guide. Principle of redundancy was followed. Content/Thematic analysis was done using Atlas.ti software. Currently, the project is in the phase of obtaining content validity of the developed tool. Followed by this, a mobile application based upon the validated tool will be developed which will be further field tested for feasibility in a selected mass gathering event in Tamil Nadu. Using a self administered content validity questionnaire, the experts will be asked to assess the relevance of the items of the tool. Agreement proportions between the experts will be calculated. S-CVI (Scale Content Validity Index), index for inter-rater agreement (agreement proportion) and Kappa agreement coefficient will be calculated. Results A sum total of 48 unique health risks have been identified. Stampedes, fire accidents, structural collapse, drowning, outbreak of communicable diseases, exacerbation of existing medical illnesses (like cardiac diseases, asthma etc) etc are the some of the health risks identified. Six domains (characteristics related to event, participant, environment, disaster preparedness, medical service preparedness and pre event planning activities) and 21 items have been generated from the content analysis of key informant interviews and literature review. Conclusions Some special events and unforeseen events occur in places of mass gatherings besides fixed places of worshipping .Such events cause more damage to human beings and property. Special events like idol procession, chariot pulling, fire walking, animal sacrificing happen pulling larger crowds within the mass gatherings. In order to inform all planning and delivery activities it is essential to understand the mass gathering context and risk assessments. This tool can be used by public health managers to identify key public health and environmental risks at the planning stage before the event takes off. At the planning stage, use of this tool will help in putting the required measures in place in order to address the potential risks identified. The tool can be used as a guiding instrument during and after the event as well. The investigators further plan to develop a mobile based app from this risk assessment tool and test it out in a selected mass gathering event of the state of Tamil Nadu located in southern part of India. Feedback from public health managers about the mobile based risk assessment tool can be instrumental in further modifying the tool. By contributing to public health preparedness activities during mass gathering events in a country with poor resources like India, this research activity is an initiative that is expected to lead to health systems strengthening. References 1. Arbon P. The development of conceptual models for mass-gathering health. Prehospital and Disaster Medicine. 2004 Sep;19(3):208-12. 2. World Health Organization. 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Roles of Health Literacy in Relation to Social Determinants of Health and Recommendations for Informatics-Based Interventions: Systematic Review

Abstract

Objective To assess the prevalence of non-opioid substance use—including cocaine, methamphetamine and "spice"—within Marion County, Indiana and propose response recommendations utilizing a current opioid response plan. Introduction Cocaine, methamphetamine, and "spice" are addictive, non-opioid substances that negatively impact a person's health through direct and indirect means. Direct health concerns of non-opioid substance use include anxiety, paranoia, seizure, heart attack, stroke, and potentially death while indirect health concerns include the acquisition of disease and infections, particularly sexually transmitted infections (STIs). Substance users experience an increased risk of acquiring STIs since they may exchange sex for substances, use substances within a social setting that may lead to sexual activity, or engage in risky sexual behavior as a result of impaired judgement associated with substance use. The current study evaluated the use of multiple data sources to monitor changes in the rate of cocaine, methamphetamine, and "spice" related emergency department visits as well as cocaine- and methamphetamine-related death rates, within Marion County, Indiana between 2013 and 2017. Methods Two data sources were used in this study. First, prevalence rates of non-opioid substance related emergency department (ED) visits were calculated using Marion County (IN) ED data from Electronic Surveillance System for the Early Notification of Community-Based Epidemics (ESSENCE) between 2013 and 2017. Second, cocaine and methamphetamine death rates were calculated using coroner toxicology data related to Marion County deaths between 2013 and 2017. Cocaine and methamphetamine deaths were defined as any death in which cocaine and methamphetamine was found in the toxicology results, respectively. All rates were calculated per 100,000 and age-adjusted to the 2000 U.S. Census using SAS Enterprise Guide v7.1. Results Non-opioid substance related ED visits have persistently risen between 2013 and 2017 (Figure 1). Methamphetamine and "spice" related ED visits exhibited similar prevalence patterns, increasing from 0.99 (0.72, 1.58) to 5.32 (4.67, 6.21) and 0.46 (0.28, 1.00) to 4.13 (3.57, 4.94) per 100,000, respectively, between 2013 and 2016. Cocaine-related ED visits consistently exhibited the highest prevalence rates, ranging from 3.72 (3.17, 4.44) to 23.56 (22.16, 25.11) per 100,000 in 2013 and 2016, respectively. In 2017, all non-opioid substance related ED visits drastically increased to 47.78 (45.79, 49.91), 48.48 (46.48, 50.67), and 42.08 (40.23, 44.13) per 100,000 for cocaine, methamphetamine, and "spice," respectively. Further, we looked at cocaine- and methamphetamine-related death rates using coroner toxicology results. We found that between 2013 and 2017, the cocaine-related death rate nearly tripled, from 4.82 (4.20, 5.64) per 100,000 in 2013 to 13.01 (11.97, 14.23) per 100,000 in 2017 (Figure 2). Similarly, methamphetamine-related death rates increased from 1.31 (0.99, 1.92) per 100,000 in 2013 to 10.15 (9.25, 11.28) per 100,000 in 2017 (Figure 2). We did not calculate death rates of those who were found to have "spice" in their system at the time of death due to low prevalence. Conclusions The increase of non-opioid substance related ED visits in Marion County may indicate that non-opioid substance use—particularly cocaine, methamphetamine, and "spice"—may be an emerging public health issue in Marion County. This growing concern is further supported by the consistent increase in cocaine- and methamphetamine-related death rates. A limitation to our study is the inconsistent reporting of the substance in ED chief complaints and missing fields for discharge diagnoses and triage notes. As such, this inconsistency may have led to an underestimation of the prevalence rates of non-opioid substance related ED visits. The addition of triage notes and more reliable discharge diagnoses in 2017 ultimately culminated in a sharp increase in non-opioid substance related ED visits in 2017. Certain aspects of Marion County Public Health Department's established opioid response plan may be used to address the growing concern of non-opioid substance use. These aspects include, but are not limited to, engaging community partners, creating a task force, establishing focus groups, and providing resources. While these aspects are critical to effectively respond to non-opioid substance use epidemics, establishing the various components prior to an outbreak enable communities to reduce the impact of such epidemics, if not prevent them from occurring. Additionally, it is important to incorporate participatory aspects into a non-opioid substance response plan such that community members are the driving force to provide context for the impact that non-opioid substance use is having on the community while also offering insight into which interventions would be most effective.

Roles of Health Literacy in Relation to Social Determinants of Health and Recommendations for Informatics-Based Interventions: Systematic Review

Abstract

Objective This study aimed to describe RTC characteristics and trends in Nigeria and determine progress towards halving RTC-related deaths/injuries by 2020 [i.e., Sustainable Development Goal (SDG) Target 3.6]. Introduction Globally, road traffic crashes (RTCs) annually kill 1.3 million people and injure 20-50 million others. Nigeria accounts for an estimated 15% of RTC deaths in the WHO African Region. Methods We abstracted, cleaned, and analyzed RTC surveillance data routinely collected from crash scenes from 2013-2016. Federal Road Safety Corps (FRSC) is the lead agency for RTC surveillance and regularly collates data from the 6 geopolitical zones (which contain the 36 Nigerian States and the Federal Capital Territory). We defined road traffic injury as a fatal or non-fatal injury incurred from collision on a public road involving ≥1 moving vehicle(s). We calculated descriptive statistics, frequencies, and proportions to describe RTC characteristics and trends. Results From 2013-2016, 283,949 persons were involved in 42,813 RTCs, resulting in 23,412 deaths and 127,264 injuries. Twenty-eight percent of RTCs involved ≥1 fatality. Ninety percent of persons involved in RTCs were ≥18 years old, with a male-female ratio of 3:1. The same proportion was also found for RTC deaths and for injuries. Despite containing only 15% of the country's population, the North-Central geopolitical zone accounted for 37% of RTCs. The most common cause of RTCs was speed violations (26%). From 2013-2016, there were reductions of 30% for RTCs, 22% for number of fatalities, and 25% for number of injuries. Conclusions Nigeria reduced RTC deaths/injuries and achieved modest progress toward SDG Target 3.6. To further progress, FRSC can help by enhancing enforcement of speed violations and by educating road users about road safety practices. Also, they could investigate why certain geographical areas had disproportionate amounts of RTCs, deaths, and injuries.

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Roles of Health Literacy in Relation to Social Determinants of Health and Recommendations for Informatics-Based Interventions: Systematic Review

Abstract

Objective Describe the development of an individual-level tracking system for community-based naloxone dispensing as part of New York City's (NYC) comprehensive plan to reduce overdose deaths. We present data from the first year of the initiative to illustrate results of the tracking system and describe the potential impact on naloxone dispensing program. Introduction The number of unintentional overdose deaths in New York City (NYC) has increased for seven consecutive years. In 2017, there were 1,487 unintentional drug overdose deaths in NYC. Over 80% of these deaths involved an opioid, including heroin, fentanyl, and prescription pain relievers.1 As part of a comprehensive strategy to reduce overdose mortality in NYC, the NYC Department of Health and Mental Hygiene's (DOHMH) Overdose Education and Naloxone Distribution (OEND) Program makes naloxone kits available to laypeople free-of-charge through registered Opioid Overdose Prevention Programs (OOPPs). Naloxone kits contain two doses of naloxone and educational materials. The OEND Program distributes kits to registered OOPPs, which then dispense kits to individuals via community-based trainings. In this context, distribution refers to kits shipped to programs, whereas dispensing refers to kits given to individuals. Increased NYC funding has enabled recruitment of more OOPPs—including syringe exchange programs, public safety agencies, shelters, drug treatment programs, health care facilities, and other community-based programs—and greater dispensing of naloxone kits to laypeople. Naloxone distribution has undergone a dramatic expansion, from 2,500 kits in 2009 to 61,706 kits in 2017.2 In 2018, DOHMH aims to distribute more than 100,000 kits to OOPPs. In order to target naloxone dispensing to neighborhoods in NYC with the highest overdose burden, we developed a tracking system able to capture individual-level geographic data about naloxone kit recipients. Prior to the development of the tracking system, DOHMH collected quarterly, aggregate-level naloxone dispensing data from OOPPs. These data included only the OOPPs' ZIP Codes but not recipient residence. OOPP ZIP Code was used as a proxy for kits dispensed to individuals. Without individual-level geographic information, however, we could not determine whether naloxone kit dispensing reached people in neighborhoods with high overdose mortality rates. To overcome these barriers, DOHMH developed a comprehensive but flexible individual-level data collection method. Methods To both capture individual-level data from each naloxone recipient in NYC and meet the needs of OOPPs' varying capacities, dispensing settings, and any existing organizational data requirements, DOHMH devised a two-pronged data collection system. The Naloxone Recipient Form (NRF) system, launched January 1, 2018, primarily employs a short paper form (or NRF) to collect dispensing data. The NRF is a one-page document designed with the OpenText™ TeleForm processing application. It captures individual data and OOPP information. Individual data include: reason for obtaining a kit, whether first-time receipt of a kit, age, and ZIP Code of residence. OOPP information includes: program name and ZIP Code of dispensing location. Forms are completed by OOPPs and recipients at OEND trainings, compiled by the OOPP, then scanned back to DOHMH. We then import forms into TeleForm, which reads the NRF data directly into a database without need for manual data entry and only moderate need for data verification. The second component of the NRF system allows larger organizations and dispensers in clinical settings with electronic health records to submit data extracts to DOHMH that are pulled directly from organizations' data systems. Together with these organizations, we customized these data extracts for direct importation into the master NRF database. To demonstrate improvements in our tracking of naloxone dispensing after the development of the NRF system, we mapped the geographic spread of naloxone kits in NYC during the first three months of 2018 (Q1 2018) by recipients' ZIP Code of residence and OOPPs' ZIP Codes. Results A total of 138 OOPPs2 reported any dispensing from January to June, 2018, of which 107 reported individual-level data using the NRF system, accounting for 27,899 kits dispensed to 23,610 individual recipients.3 Logistical barriers to implementing the NRF system varied among OOPPs, thus the data underestimate citywide dispensing during this time period. Some OOPPs experienced delays in reporting recipient-level data until a more-tailored data collection strategy was devised. Visual inspection of OOPP-level distribution and individual-level dispensing maps using Q1 2018 data (See Figures 1 and 2) demonstrate the difference between OOPP-level distribution data and individual-level dispensing data. Mapping data indicate that the largest numbers of naloxone kits were dispensed to people in neighborhoods with the highest burden of overdose in NYC. Conclusions The NRF system provides DOHMH, as well as OOPPs in NYC, with individual-level data to more accurately track naloxone dispensing citywide. The simplicity and flexibility of the NRF system allows for timely and geographically precise data collection from dozens of organizations across NYC with little or no additional cost to OOPPs. As new organizations have registered as OOPPs, particularly large health care or human services systems, DOHMH has developed new methods for incorporating dispensing data into the NRF system. Ongoing communication with OOPPs of all types and an iterative data collection improvement process have ensured that the system remains comprehensive while also being responsive to individual program's capacities and data needs. References 1. Nolan ML, Tuazon E, Blachman-Forshay J, Paone D. 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Mental Hygiene: Epi Data Brief (104); September 2018. 2. NYC DOHMH Opioid Overdose Prevention Program (OOPP) Database. All data is provisional. 3. NYC DOHMH Naloxone Recipient Form (NRF) Database. All data is provisional.

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Roles of Health Literacy in Relation to Social Determinants of Health and Recommendations for Informatics-Based Interventions: Systematic Review

Abstract

Objective This presentation will provide insight into how the extensive spread of illicitly-manufactured fentanyl impacted opioid overdose rates throughout the Midwest and neighboring states. Introduction Recent reporting using data from CDC's National Syndromic Surveillance Program indicates that rates of emergency department (ED) visits involving suspected opioid overdoses increased by 70% in the Midwest from the third quarter (Q3) 2016 (July–September) to the Q3 2017. Large increases in the use and distribution of illicitly-manufactured fentanyl (IMF) and fentanyl analogs, are a key factor driving increased opioid overdose rates in the Midwest and east of the Mississippi River. Fentanyl is a synthetic opioid 50–100 times more potent than morphine. A better understanding of the distribution of changes in opioid overdose rate from Q3 2016 to Q3 2017 within states needed to inform response and prevention efforts. Methods The CDC's Enhanced State Opioid Overdose Surveillance Program currently funds 32 states and Washington DC to increase timeliness of opioid overdose reporting and detect rapid changes in trends. Data from nine states (IL, MD, MO, NC, OH, PA, VA, WI, WV) were analyzed. Midwest states sharing subregional data with CDC were selected to better understand geographic and temporal patterns driving previously reported increases in ED visits involving suspected opioid overdoses from Q3 2016 through Q3 2017. Bordering states (MD, NC, PA, VA, WV) sharing subregional data with CDC were also included to determine trends in states contiguous to the Midwest. State subregions were defined using publicly available state government sources in consultation with state public health departments and were mainly divided by public health districts. . Fifty of 56 possible state subregions across 9 states met two inclusion criteria: 1) reported 25 opioid overdose ED visits per quarter and 2) did not report a change of 50% between any two quarters. Opioid overdoses were defined according to jurisdictional and national definitions that included searches of chief complaint text (e.g., searching for words "opioid" and "overdose") and ICD-10-CM diagnostic/billing codes. State subregional rates were defined as number of opioid overdoses divided by the total number of ED visits in the state subregion, multiplied by 10,000. Quarterly and yearly percent change in opioid overdose ED visits from Q3 2016 to Q3 2017 were described with a focus on high burden subregions reporting large yearly increases of 25% from Q3 2016 to Q3 2017. We categorized a subregion as having an opioid overdose outbreak when at least one quarterly rate increase in opioid overdoses of 50% occurred. Results Over 7 million ED visits were reported each quarter. Average subregional opioid overdose rates increased at a consistent quarterly rate of between 16% - 19% during Q3 2016 to Q2 2017. From Q2 2017 to Q3 2017, opioid overdose rates only increased 1%. Overall, subregions reported a mean yearly increase in opioid overdose rates of 51% from Q3 2016 to Q3 2017. This yearly increase in opioid overdose from Q3 2016 to Q3 2017 was unequally distributed across subregions with 9 (18%) of subregions reporting an increase in opioid overdose rates of 100%, 13 (26%) reporting an increase of 50% - <100%, 7 (14%) reporting an increase of 25% - <50%, 13 (26%) reporting an increases of 0% to <25%, and 8 (16%) reporting a decrease. Analyses of the 29 high burden subregions found that 16 (55%) reported at least one opioid overdose outbreak compared to 3 of 21 other subregions (14%) (Table 1). The 16 high burden subregions that reported any outbreak had a mean yearly increase in opioid overdose rates from Q3 2016 to Q3 2017 of 107%, range 33% to 266%. Eight of these 16 high burden subregions either reported two opioid overdose outbreaks or an opioid overdose outbreak and a quarterly increase of between 25% - <50%. All states had at least one subregion report an opioid overdose outbreak between Q3 2016 to Q2 2017. Also, within OH, PA, WI, and WV, half or more of their subregions reported an outbreak between Q3 2016 and Q3 2017 (Table 1). Fifteen of the 22 (68%) quarterly opioid overdose outbreaks occurred either during Q4 2016 or Q1 2017 (Table 1). Across all outbreaks, state subregions reported a mean quarterly increase of 83% with a range from 50 - 156%. Conclusions Opioid overdose outbreaks in a subset of 16 high burden subregions across all 9 states were a key factor driving increases in the states' opioid overdose rates. Half of these 16 subregions experienced a single opioid overdose outbreak while the other half experienced two or more sharp increases. The majority of opioid overdose outbreaks occurred during October 2016 to March 2017 were concentrated in Ohio, a state reporting extremely large increase in IMF supply and overdose deaths involving fentanyl, and states contiguous with Ohio. Although most subregions reported outbreaks at the beginning of the study period, higher opioid overdose rates persisted in the vast majority of subregions reporting opioid overdose outbreaks. This outbreak pattern is consistent with previous findings showing large increases in the supply of IMF and fentanyl analogs, including carfentanil, in Midwestern states during 2016 and in early 2017. Although opioid overdose outbreaks were concentrated in subregions in OH, PA, and WV, all 9 states included in the analysis were impacted by at least one outbreak during the study period. Findings highlight the need for targeting of hotspots within states and implementation of public health interventions to reduce harm and surge resources during an outbreak. These short-term efforts, however, must be complemented by a sustained response to reduce increased drug overdose rates that persist after an initial outbreak. A key limitation of this study was that it only included data from a single year and as a result may underestimate the length and severity of outbreaks. As changes in the illicit opioid market continue, surveillance of local outbreaks must be supplemented by broader surveillance designed to detect both localized

introduction of new novel psychoactive substances as well as large scale changes in the illicit opioid market. References Vivolo-Kantor, A. M., Seth, P., Gladden, R.M., et al. (2018). Vital Signs: Trends in Emergency Department Visits for Suspected Opioid Overdoses—United States, July 2016–September 2017.Morbidity and Mortality Weekly Report, 67, 279-285. O'Donnell J, Gladden RM, Mattson CL, et al. Notes from the Field: Overdose Deaths with Carfentanil and Other Fentanyl Analogs Detected — 10 States, July 2016–June 2017. Morb Mortal Wkly Rep 2018;67:767–768. O'Donnell JK, Halpin J, Mattson CL, et al. Deaths Involving Fentanyl, Fentanyl Analogs, and U-47700 — 10 States, July–December 2016. Morb Mortal Wkly Rep 2017;66:1197–1202.

Roles of Health Literacy in Relation to Social Determinants of Health and Recommendations for Informatics-Based Interventions: Systematic Review

Abstract

Objective To describe national-level trends in nonfatal self-harm and suicidal ideation among 10-19 year old youth from January 2016 through December 2017 and examine the impact of popular entertainment on suicidal behavior. Introduction In 2016, a half million people were treated in U.S. emergency departments (EDs) as a result of self-harm. 1 Not only is self-harm a major cause of morbidity in the U.S., but it is also one of the best predictors of suicide. Given that approximately 40% of suicide decedents visited an ED in the year prior to their death and that the majority of medically-serious self-harm patients are treated in EDs2, EDs serve as a critical setting in which to monitor rates and trends of suicidal behavior. To date, the majority of ED data for self-harm are generally two to three years old and thereby can only be used to describe historical patterns in suicidal behavior. Thus, in 2018, a syndrome definition for suicide attempts and suicidal ideation (SA/SI) was developed by the International Society for Disease Surveillance (ISDS) Syndrome Definition Committee in conjunction with Centers for Disease Control and Prevention (CDC) staff, allowing researchers to better monitor recent trends in medically treated suicidal behavior using data from the CDC's National Syndromic Surveillance Program (NSSP). These data serve as a valuable resource to help detect deviations from typical patterns of SA/SI and can help drive public health response if atypical activity, such as geospatial or temporal clusters of SA/SI, is observed. Such patterns may be indicative of suicide contagion (i.e., exposure to the suicide or suicidal behavior of a friend or loved one, or through media content, that may put individuals at increased risk of suicidal behavior). Research has demonstrated that suicide contagion is a real phenomenon. 313 Reasons Why is a Netflix series focused on social, school, and family-related challenges experienced by a high school sophomore; each episode in the 13-episode series describes a problem faced by the main character, which she indicates contributed to her decision to die by suicide. The series premiered March 31, 2017 and is rated TV-MA by TV Parental Guidelines4 (may be unsuitable for those under age 18 years due to graphic content). Nevertheless, the series has become popular among youth under 18 years of age. Of note, in the final episode, the main character's suicide by wrist laceration is graphically depicted. Following the premiere of the series, researchers and psychologists across the U.S. expressed concern that this graphic depiction of suicide could result in a contagion effect, potentially exacerbating suicidal thoughts and behavior among vulnerable youth viewers. To date, the only empirical data demonstrating the potential iatrogenic effects of this graphic portrayal of suicide comes from a study of Google Trends data demonstrating an increase in online suicide queries in the weeks following the show, with most of the queries focusing on suicidal ideation (e.g., "how to commit suicide," "how to kill yourself").5 However, there has been no study to examine changes in nonfatal self-harm trends following the series debut. Methods NSSP data were aggregated at the national level from January 2016 through December 2017 to examine weekly trends in the percentage of ED visits that involved SA/SI among all ED visits for youth aged 10-19. Google Trends data were also used to examine suicide-related online searches conducted during this period. Additional sensitivity analyses to explore these findings will be conducted by HHS region using NSSP data. Results Preliminary results suggest an increase in ED visits due to SA/SI among 10-19 year old youth across the U.S. beginning about two weeks after the premiere of 13 Reasons Why (April 16, 2017) and lasting a total of six weeks before weekly percentages of SA/SI ED visits returned to their endemic levels during the week of May 28-June 3, 2017. The peak of the increase represented a 26% increase in SA/SI compared to the highest weekly percentage of these visits in the previous 15 weeks in 2017. Additionally, this peak coincided with marked peaks in online searches for phrases including "13 Reasons Why" from March 26-June 3, 2017, "how to kill yourself" from April 16-June 3, 2017, and "how to slit wrists" from April 2-June 3, 2017 as demonstrated by Google Trends data. Conclusions This study demonstrates the utility of syndromic surveillance data for tracking SA/SI at the national level and for detecting atypical fluctuations in trends over time. Using syndromic surveillance data for this purpose could help spark public health response to emerging health threats. However, it is important to note that NSSP data are subject to some limitations; for instance, although about 60% of ED visits in the U.S. are captured in NSSP, the system is not nationally representative and thus, these findings are not generalizable to areas not participating in NSSP. Additionally, our definition may under- or over-estimate SA/SI based on differences in chief complaints or discharge diagnosis data between jurisdictions. Further, hospital participation in NSSP can vary across months–a factor that could contribute to trends observed in NSSP data. Finally, these analyses explored the concurrent trends in SA/SI among youth and the popularity of only one television series. Although these analyses point to an association between the increases in SA/SI and the time period in which the series reached its peak popularity as evidenced by Google Trends, there may have been other sociocultural factors that impacted SA/SI trends during the study period. Still, preliminary findings suggest that media content containing graphic depictions of suicide viewed by youth audiences may contribute to increases in ED visits for self-harm and suicidal ideation, as well as greater interest in searching for information about suicidal behavior online. While it is impossible to assess causation, these results are consistent with the phenomenon of suicide contagion. It is also possible that the series or related media coverage during this time increased help-seeking among some youth or their families

that contributed to the increases observed. Regardless of the underlying mechanism, entertainment content creators may consider referring to the Recommendations for Reporting on Suicide (www.reportingonsuicide.org), which can help reduce the risk of suicide among vulnerable individuals and avoid contributing to suicide contagion while promoting suicide prevention messages. Finally, ongoing surveillance of suicidal behavior using NSSP data could help reduce the burden of nonfatal self-harm by catalyzing the implementation of prevention efforts. Results 1. Center for Disease Control and Prevention, National Center for Injury Prevention and Control. (2018). Web-based Injury Statistics Query and Reporting System (WISQARS). Available from www.cdc.gov/ncipc/wisqars. Accessed 10-3-2018. 2. Ahmedani BK, Simon GE, Stewart C et al. (2014) Health care contacts in the year before suicide death. J Gen Intern Med, 29, 870-877. 3. Gould, M., Jamieson, P., & Romer, D. (2003). Media contagion and suicide among the young. American Behavioral Scientist, 46(9), 1269-1284. 4. The TV Parental Guidelines. (2018). Available from http://tvguidelines.org/. Accessed 10-3-2018. 5. Ayers, J. W., Althouse, B. M., Leas, E. C., Dredze, M., & Allem, J. P. (2017). Internet searches for suicide following the release of 13 Reasons Why. JAMA internal medicine, 177(10), 1527-1529.

Roles of Health Literacy in Relation to Social Determinants of Health and Recommendations for Informatics-Based Interventions: Systematic Review

Abstract

Objective To determine whether emergency department (ED) visits were captured in syndromic surveillance for coagulopathy cases associated with an outbreak linked to synthetic cannabinoid (SC) use and to quantify the number of ED visits and reasons for repeat visits. Introduction In March 2018, the Illinois Department of Public Health (IDPH) was informed of a cluster of coagulopathy cases linked to SC use. By June 30, 2018, 172 cases were reported, including five deaths, where 74% were male and the mean age was 35.3 years (range: 18–65 years). All cases presented to an emergency department (ED) at least once for this illness. Ninety-four cases provided clinical specimens and all tested positive for brodifacoum, a long-acting anticoagulant used in rodenticide. Cases were reported to the health department by the Illinois Poison Control Center and direct reporting from hospitals. REDCap was the primary database for tracking cases and collecting demographic information, risk factor data and healthcare facility utilization, including number of ED visits. Syndromic surveillance was utilized to monitor ED visits related to the cluster, assist with case finding and provide situational awareness of the burden on the EDs and geographic spread. In this study, we retrospectively used syndromic surveillance along with the data in REDCap to quantify the number of ED visits per coagulopathy case, understand the reasons for repeat visits, and determine whether visits were captured in syndromic surveillance. Methods Illinois hospital ED data submitted to the National Syndromic Surveillance Platform instance of ESSENCE (ESSENCE), was compared to data present in our primary REDCap database. A subset of the cases, males 18-44 years of age (n=105; 61% of cases), were included in this analysis. Illinois ESSENCE data in males aged 18-44 years from March 10, 2018–June 30, 2018 were matched to cases in the REDCap database by age, zip code, initial visit date, facility, and reason for visit including: chief complaint, discharge diagnosis, and triage note. If the initial visit was found, the matching criteria and medical record number were used to search for additional related visits. The number of visits in ESSENCE and reasons for visits were totaled for each patient. Reasons for repeat visits were categorized into four categories: continued gross bleeding or symptoms associated with coagulopathy, medical evaluation or follow-up, laboratory work and prescription refill. Repeat visits may fall into more than one category. The number and dates of ED visits captured in ESSENCE per case were compared to that reported in REDCap. An epidemic curve was constructed to display the number of ED visits and type (i.e. primary visit or repeat visit) captured by REDCap only, ESSENCE only or both by visit date. Results Of the 105 cases in REDCap, 89 (85%) were matched to at least one ED visit in ESSENCE from March 10, 2018–June 30, 2018. The mean number of ESSENCE ED visits per case was 1.9 visits and the median was one visit (range: 1–11 visits). The main chief complaints for the primary visit included hematuria (n=31), abdominal pain (n=20), back pain/flank pain (n=13), K2 (n=11), bleeding from multiple sites (n=8), vomiting blood (n=7), and urinary tract infection or kidney stones (n=7). Of the 89 cases matched to a visit in ESSENCE, 84 (94%) cases, representing 142 (79%) of ED visits, were captured by syndrome definitions that were being utilized to monitor the cluster. Forty-three cases (48%) had at least two visits in ESSENCE. The reasons for return visits captured in ESSENCE (n=84) were continued gross bleeding or symptoms associated with coagulopathy (n=53), medical evaluation or follow-up (n=14), laboratory work (n=13), prescription refill (n=7) or unknown (n=2). Of the 105 cases, the number of ED visits reported in REDCap matched the number of visits found in ESSENCE for 49 cases (47%). For 24 cases (23%), ESSENCE identified more visits than REDCap and for 16 cases (15%), REDCap had more ED visits reported than captured in ESSENCE. Sixteen cases (15%) in REDCap were not found in ESSENCE. All of the unmatched visits were due to ESSENCE data quality, including a lack of reporting hospital admissions, lack of submitting data to ESSENCE, and missing data including: date of birth, medical record number, and triage notes. Conclusions Syndromic surveillance was a useful tool in describing the burden of ED visits for patients in the Illinois coagulopathy outbreak linked to SC use. ESSENCE data helped to quantify the number of ED visits per patient and identify patients that re-presented for the same illness. The most common reason for repeat ED visits was continued symptoms, which may be attributed to misdiagnosis at the initial healthcare visit. ED visits that were not picked up by ESSENCE were a result of data quality issues from select facilities that were not reporting hospitalizations or key information such as date of birth, medical record number or triage notes. Engagement with healthcare facilities to provide this information will improve the data quality of syndromic surveillance.

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Roles of Health Literacy in Relation to Social Determinants of Health and Recommendations for Informatics-Based Interventions: Systematic Review

Abstract

Objective Demonstrate the use of timely, actionable data from a data visualization tool, the California Opioid Overdose Surveillance Dashboard, which integrates statewide, geographic- and demographic-specific data, by describing the changes in opioid overdose deaths in California. Introduction California continues to face a serious public health crisis with the opioid epidemic having substantial health and economic impacts. The epidemic is dynamic and rapidly changing, involving both prescription opioids influenced by prescribing and dispensing patterns as well as illicit opioids influenced by the availability of heroin and recently, the increased availability of fentanyl. The complexity of the issue necessitates data-informed actions through multi-sector, strategic collaboration at both the state and local levels to address the problem comprehensively. With nearly 2,000 opioid overdose deaths per year and wide variation of overdose rates across counties and demographic groups, there is a need for integrated, timely, actionable data for use by state policy makers, local opioid safety coalitions, media, community stakeholders, and the public to monitor and combat this dynamic epidemic at the state and local level. Using fatality data from the California Opioid Overdose Surveillance Dashboard1, the opioid overdose epidemic is described along with the differential geographic and demographic impacts. Methods As part of California Department of Public Health's Prevention for States grant funded by the Centers for Disease Control and Prevention, the California Opioid Overdose Surveillance Dashboard was developed as a data tool to provide enhanced visualization and integration of non-fatal and fatal opioid-involved overdose data and opioid prescription data. The dashboard was built on an open source RStudio server using Shiny, an R package that provides a framework for building web applications. Data incorporated on the dashboard include emergency department visits, hospitalizations, fatalities, and prescriptions related to opioid overdoses among California residents, presented in raw counts, crude rates, and age-adjusted rates at the state, county, and zip code levels, as well as by sex, age, and race/ethnicity. Overdose deaths are identified using ICD-10 (International Classification of Diseases, 10th Revision) codes X40-X44, X60-X64, X85, Y10-Y14, and T40.0-T40.6, recorded in the underlying cause of death and multiple cause of death fields on death certificates. Fentanyl overdose deaths are identified using a text search on contributing cause of death fields on death certificates. Using data from the California Opioid Overdose Surveillance Dashboard, we present one perspective of the epidemic by using 2017 death data to describe the changing trend and geographic and demographic variation of prescription drug, heroin, and fentanyl overdose deaths. Results Overall trends from 2011-2017 show that deaths due to opioid overdoses have increased. Prescription drug overdose death rates have slightly decreased by 6% from 3.93/100,000 in 2011 to 3.7/100,000 in 2017. Heroin overdose death rates have increased by 89% from 0.90/100,000 in 2011 to 1.70/100,000 in 2017. Fentanyl overdose death rates have increased by 320% from 0.25/100,000 in 2011 to 1.05/100,000 in 2017. The highest rates of prescription opioid overdose deaths are primarily concentrated in northern rural counties, while the highest rates of heroin and fentanyl overdose deaths are more dispersed throughout the state with many coastal counties showing higher rates of overdose deaths (Figure 1). Prescription opioid overdose deaths are concentrated among older ages showing highest rates among 55 to 59 year olds (8.27/100,000). In contrast, heroin and fentanyl overdose death rates are concentrated among younger ages with the highest rates seen among 25 to 29 year olds, 4.54/100,000 and 2.78/100,000, respectively (Figure 2). Males died from prescription opioid, heroin, and fentanyl overdoses at significantly higher rates than females. Prescription opioid and fentanyl overdose death rates (11.5/100,000 and 4.80/100,000, respectively) are significantly higher among Native Americans compared to other races/ethnicities (Table 1). Non-Hispanic whites had significantly higher prescription opioid and heroin overdose death rates (6.90/100,000 and 2.96/100,000, respectively) compared to non-Hispanic black, Hispanic, and Asian residents of California. Conclusions Fatality data from 2017 show the characteristics of the opioid overdose epidemic in California are changing. While still high, overdose deaths from prescription opioids, seen primarily in older age groups and northern rural California, are slightly declining. Concurrently, we are seeing sharp rises in heroin and fentanyl overdose death rates among younger adults throughout the state. Regardless of any change in trend, there remain clear disparities in overdose death rates by race/ethnicity; with Native Americans having the highest rates for both prescription and illicit opioids, and non-Hispanic whites have higher rates of prescription opioid and heroin overdose deaths. Given the varying demographic and geographic impacts based on the type of opioid, as demonstrated with the use of death data, there needs to be targeted data-informed interventions to address and prevent prescription and illicit opioid overdoses. Death data is just one perspective on the epidemic, other data sources (emergency department visits, hospitalizations, and prescriptions) are needed complete the picture to truly provide a robust data-informed approach. The California Opioid Overdose Surveillance dashboard integrates these multiple data sources and serves as a valuable tool in providing specific and timely data to inform approaches and interventions at the state and local level in continuing to fight California's opioid overdose epidemic. The enhanced visualization, geographic- and demographic-specific data, and increasingly timely data allow for state and local policy makers, local opioid safety coalitions, and community stakeholders to track the dynamics and impact

of the epidemic and to identify those who are most vulnerable and differentially impacted. References 1 California Opioid Overdose Surveillance Dashboard https://discovery.dev.cdph.ca.gov/CDIC/ODdash/

Roles of Health Literacy in Relation to Social Determinants of Health and Recommendations for Informatics-Based Interventions: Systematic Review

Abstract

Objective Opioid and illicit substance abuse continues to have major public health implications in the state of West Virginia. By analyzing the Emergency Medical Service (EMS) utilization history of drug overdose decedents, opportunities to improve surveillance of fatal and non-fatal drug overdoses can be identified which can help lead prevention efforts of fatal drug overdoses in the state. Introduction West Virginia continues to lead the nation in drug overdose deaths per capita. In 2016, the age-adjusted rate of drug overdose deaths was 52 per 100,0001. In the same year, there were roughly 64,000 overdose deaths in the United States, a 21.5% rate increase from 20151. The drug overdose epidemic in West Virginia has taken a significant toll on individuals, families, communities, and resources. As part of a rapid response plan to help reduce the burden of overdose deaths, the West Virginia Department of Health and Human Resources conducted an investigative report to study 830 overdose related deaths that occurred in 2016 and identify opportunities for intervention in the 12 months prior to death. Utilization of EMS among decedents was analyzed to determine demographic differences between decedents at different time points of EMS contact: EMS contact at death only; EMS contact 12 months prior to death only; and both EMS contact at death and 12 months prior to death. Methods A list of decedents that had died in 2016 from a drug overdose was obtained from the West Virginia Vital Registration Office and then matched to EMS ambulance run data. The inclusion criteria for this decedent sample were: state residency, drug overdose as the primary cause of death, and a history of EMS utilization. Overall, 588 West Virginia overdose decedents were identified for analysis. Drug classes, identified by forensic toxicology reports, and demographic information including gender, age, race, marital status, education level, and occupation of each decedent were analyzed to identify trends related to overdose deaths. A 'death run' was defined as an EMS run that occurred within 48 hours of death. A 'prior EMS run' was defined as an EMS run that occurred within 12 months prior to death. Results Among decedents with an EMS contact, 50% (N=295) of decedents' only contact was at death. Of the remaining half of decedents with an EMS contact: One-third (N=195) had both a previous EMS run in the 12 months prior to death and at death; and 17% (N=98) of decedents only EMS contact was in the year prior to death that was not a fatal run (Table 1). There were gender differences in EMS utilization among male and female decedents at death run only, 12 months prior to death only, and at both time points. When comparing time points, the largest percentage of EMS contact among males and females occurred at death run only; although males (53% n=206) had more contact with EMS at death run only compared to females (45%, n=89). However among those that had utilized EMS at both time points, females had more encounters with EMS (38.3%, n=75) than male decedents (30.61%, n=120) (Table 1). Decedents aged 15-24 years (64.5%, n=20) had the largest percentage of EMS utilization at death run only compared to the other age groups. Decedents aged 65 years and older of prior EMS runs (50.0%), compared to other age groups (Table 1). Of the decedents that received at least one naloxone administration in their EMS history (n=178), decedents that utilized EMS at both time points received the largest administration at 44% (n=80). This was followed by 41% (n=73) of decedents that had EMS contact at death only. Conclusions For half of the decedents analyzed, their only encounter with EMS was associated with their death. This could be explained by the type of drugs that contributed to their deaths, as stronger illicit and/or pharmaceutical drugs such as fentanyl, contributed to more overdose deaths in this population than other drug types2. Although decedents aged 15-24 years had highest EMS contact at death run only, illicit drugs were more commonly found in this particular group than other age groups2. Evidence has shown that a prior non-fatal overdose in the past, increases the risk of a fatal overdose in the future3. One-third (n=195) of decedents in this analysis had both a prior contact with EMS in the year before death and within 48 hours of death. However, it is unknown whether their previous contacts with EMS was associated with an overdose. Further investigation into chief complaints of EMS runs would need to be done to assess the association between prior EMS contact due to a non-fatal overdose and risk of a subsequent fatal overdose. In this analysis, women had a larger percentage of EMS contact at both time points than men. Studies have indicated that women are more at risk than men for having a fatal overdose4. One possibility is that the concurrent use of opioid prescription and illicit drugs, occurs more often among women than in men elevating their risk of having non-fatal and fatal overdoses. Identifying high-risk individuals with previous overdoses can help to minimize the gap between overdose and accessibility to treatment services. As part of the rapid response plan, the West Virginia Drug Control Policy Act was passed to improve drug overdose surveillance and help strengthen response5. The policy enacted the creation of a central repository that will store drug overdose information, making drug overdoses a notifiable condition. References 1. Seth P, Scholl L, Rudd RA, Bacon S. Overdose Deaths Involving Opioids, Cocaine, and Psychostimulants — United States, 2015–2016. MMWR Morb Mortal Wkly Rep. 2018; 67: 349–358. 2. West Virginia Violence and Injury Prevention Center. 2016 WV Overdose Fatality Analysis: Healthcare Systems Utilization, Risk Factors, and Opportunities for Intervention. 2017 Dec 20. 3. Stoové MA, Dietze PM, Jolley D. Overdose deaths following previous non-fatal heroin overdose: record linkage of ambulance attendance and death registry data. Drug Alcohol Rev. 2009 Jul; 28(4): 347-52. 4. Evans E, Kelleghan A, Li L, Min J, Huang D, Urada D, Hser YI, Nosyk B.

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Roles of Health Literacy in Relation to Social Determinants of Health and Recommendations for Informatics-Based Interventions: Systematic Review

Abstract

Objective This study describes how Florida Poison Information Center Network (FPICN) and emergency department (ED) data accessed through Florida's syndromic surveillance system were used to conduct near real-time carbon monoxide (CO) poisoning surveillance and active case finding in response to Hurricane Irma in Florida. Introduction On September 10, 2017, Hurricane Irma made landfall in Florida. Over 90% of Florida counties reported power outages as of September 11. During power outages, CO poisonings often occur due to indoor use of fuel combustion sources (e.g., cooking, heating) or generators for electricity. CO poisoning is a reportable condition in Florida; health care providers and laboratories are required to report suspected cases to the Florida Department of Health (FDOH). In Florida, approximately 202 cases of CO poisoning are reported each year (three-year average from 2014 to 2016). In addition to passive surveillance, FDOH uses the Electronic Surveillance System for the Early Notification of Community-based Epidemics (ESSENCE-FL) to find cases of CO poisoning. ESSENCE-FL provides access to ED data from 98% (255 out of 260) of EDs in Florida and all statewide FPICN call data (includes three poison control centers). ESSENCE-FL provides near real-time access to these data sets, as ED data are uploaded every 2 hours or once a day (depending on the hospital system) and FPICN data are uploaded every 10 minutes. The statewide FPICN database includes information about substance, signs and symptoms, exposure scenario, and patient identification information provided by the individual caller or clinician from a health care facility. Methods In addition to receipt of health care provider reports through traditional disease reporting, active case finding was conducted using ESSENCE-FL during Hurricane Irma. Exposure calls to the FPICN indicating CO exposure were extracted from the statewide database. Calls coded with the following medical outcomes were excluded: no health effect, not followed – judged as nontoxic exposure, not followed – minimal clinical effects possible, unrelated effect – the exposure was probably not responsible for the effect(s), and confirmed non-exposure. To query ESSENCE-FL ED data, a free-text query was created and executed against the concatenated chief complaint and discharge diagnosis (CCDD) field: (^carbon^,andnot,(,^retention^ ,or,^narcosis^,),),or,^monox^,or,(,^generator^,and, (,^fumes^,or,^expos^,or,^nausea^, or,^headach^,or,^exhaust^,or,^garage^,or,^inhale^,),) . Results of these queries were analyzed and sent to county and regional epidemiologists daily for investigation. Reports of CO poisoning exposures were investigated by collecting medical records and conducting interviews using an expanded risk factor questionnaire.1 Cases were classified using Florida's reportable disease case definition2 and documented in the electronic reportable disease surveillance system, Merlin (see process flow chart). Descriptive analysis of Hurricane Irma-related CO poisoning cases reported in Merlin was conducted to characterize morbidity, mortality, and exposure scenarios. Results In September 2017, FDOH investigated 666 reports of CO poisoning and identified 529 people (79.4%) who met the case definition for CO poisoning. Among 529 cases, 56.3% were reported by ED data, 5.7% by FPICN data, 29.1% from both data sets, and the remaining 8.9% by other sources (e.g., self-report, media). About 60.1% of cases were only reported by FPICN and ED data, 33.1% by health care providers and laboratories, and 6.8% by other sources. Among 15 deaths, 20% were identified through active case finding using ED and FPICN data. CO poisoning cases peaked on September 12 (within two days of hurricane landfall) and decreased by September 16, as power was restored. About 95% of cases reported CO exposures within the first week of hurricane landfall. Merlin data analysis of 529 cases identified some notable findings related to Hurricane Irma. CO poisoning rates were highest among those aged 5–14 years (4.8 per 100,000 population), and the mean age was 33.2 years (median: 31 years, range: 3 months – 89 years). Most cases were in females (55.6%), non-Hispanics (58.3%), and whites (73%). CO exposures were predominantly caused by generator use (97.5%). Among 516 generator-related exposures, 15.7% of people had a CO detector, 62.8% did not have CO detector, and it was unknown for 21.5%. Among 516 residential exposures due to generator use, 31.3% of people reported generator use inside the home, attached garage, or other attached structures, and 66% reported generator use outside the home, including covered decks and carports. Among 340 people who reported generator use outside the home, 63.5% reported having a generator within 20 feet of windows, doors, air conditioners, or air intake vents. Conclusions Even though CO poisoning is a reportable condition in Florida, use of active surveillance was key in the public health response to Hurricane Irma-related CO poisonings. FDOH would not have identified 60% of these hurricane-related CO poisoning cases without access to FPICN and ED data. During Hurricane Irma, active case finding complemented routine disease surveillance not only in early detection of CO poisonings but also in guiding rapid public health response. Similarly, in the 2005 hurricane season, FDOH monitored FPICN data and identified an increase in CO poisonings.3 Based on near-real-time CO poisoning surveillance, FDOH produced daily situation reports, sent out a press release about the dangers of CO poisoning from generator use, prepared a YouTube video, and conducted educational outreach through social media and text alert. Other jurisdictions may benefit from use of near real-time ED and poison control center data to better understand the magnitude and characteristics of CO poisonings during power outages in their areas. Public education messages need to emphasize outdoor use of generators (at least 20 feet away from doors, windows, and air conditioners) and use of CO

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