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

Abstract

ObjectiveTo obtain feedback and seek future directions for an ISDS initiativeto establish and update research questions in Informatics, Analytics,Communications, and Systems Research with the greatest perceivedimpact for improving surveillance practice.IntroductionOver the past fifteen years, syndromic surveillance (SyS) hasevolved from a set ofad hocmethods used mostly in post-disastersettings, then expanded with broad support and development becauseof bioterrorism concerns, and subsequently evolved to a maturetechnology that runs continuously to detect and monitor a widerange of health issues. Continued enhancements needed to meetthe challenges of novel health threats with increasingly complexinformation sources will require technical advances focused onday-to-day public health needs.Since its formation in 2005, the International Society for DiseaseSurveillance (ISDS) has sought to clarify and coordinate globalpriorities in surveillance research. As part of a practitioner-driveninitiative to identify current research priorities in SyS, ISDS polledits members about capabilities needed by SyS practitioners that couldbe improved as a result of research efforts. A taskforce of the ISDSResearch Committee, consisting of national and global subject matterexperts (SMEs) in SyS and ISDS professional staff, carried out theproject. This panel will discuss the results and the preferred means todetermine and communicate priorities in the 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

ObjectiveThis roundtable will address how multiple data sources, includingadministrative and syndromic surveillance data, can enhance publichealth surveillance activities at the local, state, regional, and nationallevels. Provisional findings from three studies will be presented topromote discussion about the complementary uses, strengths andlimitations, and value of these data sources to address public healthpriorities and surveillance strategies.IntroductionHealthcare data, including emergency department (ED) andoutpatient health visit data, are potentially useful to the publichealth community for multiple purposes, including programmaticand surveillance activities. These data are collected through severalmechanisms, including administrative data sources [e.g., MarketScanclaims data1; American Hospital Association (AHA) data2] andpublic health surveillance programs [e.g., the National SyndromicSurveillance Program (NSSP)3]. Administrative data typically becomeavailable months to years after healthcare encounters; however, datacollected through NSSP provide near real time information nototherwise available to public health. To date, 46 state and 16 localhealth departments participate in NSSP, and the estimated nationalpercentage of ED visits covered by the NSSP BioSense platform is54%. NSSP’s new data visualization tool, ESSENCE, also includesadditional types of healthcare visit (e.g., urgent care) data. AlthoughNSSP is designed to support situational awareness and emergencyresponse, potential expanded use of data collected through NSSP(i.e., by additional public health programs) would promote the utility,value, and long-term sustainability of NSSP and enhance surveillanceat the local, state, regional, and national levels. On the other hand,studies using administrative data may help public health programsbetter understand how NSSP data could enhance their surveillanceactivities. Such studies could also inform the collection and utilizationof data reported to NSSP.

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

Abstract

ObjectiveThe Department of Defense data is available to NationalSyndromic Surveillance Program (NSSP) users to conduct syndromicsurveillance. This report summarizes the demographic characteristicsof DoD health encounter visits.IntroductionThe DoD provides daily outpatient and emergency room data feedsto the BioSense Platform within NSSP, maintained by the Centersfor Disease Control and Prevention. This data includes demographiccharacteristics and diagnosis codes for health encounter visits ofMilitary Health System beneficiaries, including active duty, activeduty family members, retirees, and retiree family members. NSSPfunctions through collaboration with local, state, and federal publichealth partners utilizing the BioSense Platform, an electronic healthinformation system.MethodsDoD data was pulled from the BioSense Platform through aRStudio server on October 11, 2016, querying data from November1, 2015 to September 30, 2016. Appointment type and beneficiarycategory data was not available in BioSense until November 1, 2015.Appointment type was categorized into clinic visits and telephoneconsults. Demographic characteristics (age group, gender, beneficiarycategory) are stratified by appointment type.ResultsDuring the time period of November 1, 2015 to September 30, 2016,data were received from 452 clinics. There is a military treatmentfacility located in 45 states and a military treatment facility mayhave one to 12 clinics. There were a total of 86,840,632 healthcareencounter records. The age group, 25-44 years, accounted for 39.4%of the medical encounters; the mean age was 33.9 (SD=19.1). Malesaccounted for 55.6% of the medical encounters. For the time periodfrom November 1, 2015 to September 30, 2016, 78.9% of medicalencounters were clinic visits. The remaining medical encounterswere telephone consults. Of the clinic visits, 53.7% of the medicalencounters were for active duty personnel.ConclusionsThis report highlights the DoD data available to NSSP users forcollaborative syndromic surveillance efforts, promoting a communityof practice. It is important to understand the population demographicsand limitations to the DoD data when conducting syndromicsurveillance.

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

Abstract

ObjectiveTo describe how syndromic surveillance was enhanced to detecthealth events during the 9thIndian Ocean Island Games (IOIG) inReunion Island.IntroductionThe 9thIOIG took place in Reunion Island from July 31 to August9, 2015. This sport event gathered approximatively 1 640 athletes,2 000 volunteers and several thousand spectators from seven islands:Comoros, Madagascar, Maldives, Mauritius, Mayotte, Seychelles andReunion.In response to the import risk of infectious diseases from thesecountries where some of them are endemics, the syndromicsurveillance system, which captures 100% of all EmergencyDepartment visits, was enhanced in order to detect any health event.MethodsIn Reunion Island, syndromic surveillance system is based onOSCOUR® network (Organisation de la surveillance coordonnéedes urgences) that collects data from all emergency departments ofthe island. Data are daily transmitted to the French national publichealth agency then are available to the regional office. At the regionallevel, data are integrated into an application that allows the built ofpredefined syndromic groups according to the health risks related tomass gatherings (Table 1, parts 1 to 3) and complemented by specificsyndromic groups (table 1, part 4). Daily analyses with temporal[1] and spatial-temporal [2] algorithms were performed during thesurveillance period of July 27 to August 13, 2015. In addition to thismonitoring, ED physicians were requested to proactively tag Y33(ICD-10) as secondary diagnosis, each ED visits related to IOIG. Linelists were reviewed daily. Each day, an epidemiological report wassend to public health authorities.ResultsFrom July 31 to August 9, 2015, the activity of EDs was inaccordance with that expected. No health events were detected bythe syndromic surveillance system except for the syndrome “alcoholintoxication” for which consecutive signals were observed fromAugust 6 to 9, 2015. This increase occurs commonly at the beginningof each month (due to the social benefits payday) [3] nevertheless thisevent has probably been increased by IOIG (finals for team sportsand games closing ceremony). In total, 8 ED visits were tagged Y33as secondary diagnosis. In over half the cases, visits were related totrauma.ConclusionsThe syndromic surveillance system proved to be useful for thesurveillance of mass gathering events due to its capacity to detecthealth events but also to provide reassurance public health authorities[4]. As described in literature [5], few ED visits were tagged in relationto IOIG. Indeed, the tag of ED visits was implemented two weeksbefore the games, and given the shifts of ED physicians, some of themmay have not been informed. In the future, preparation meetings withphysicians will have to be planned several months before in order toimprove the response rate for mass gathering events.

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

Abstract

Objective1. To assess the knowledge, perception, and practices of mothers/caregivers on vaccine preventable diseases in children aged 12-23months in Kaduna State, Nigeria2. To determine the immunization coverages in Kaduna State, Nigeria3. To determine the sources of information on routine immunizationamong mothers/caregivers of children aged 12-23months in the study areaIntroductionImmunization is one of the safest and most effective interventionsto prevent disease and early child death1. Although, about threequarters of the world's child population is reached with the requiredvaccines, only half of the children in Sub-Saharan Africa get accessto basic immunization2. A substantial number of children worldwidedo not complete immunization schedules because neither healthservices nor conventional communication mechanisms regularlyreach their communities3. Separate studies in Australia and PapuaNew Guinea have shown that knowledge gaps underlie lowcompliance with vaccination schedules3, 4. Mothers are less likely tocomplete immunization schedules if they are poorly Informed aboutthe need for immunization, logistics (which includes time, date, andplace of vaccination), and the appropriate series of vaccines to befollowed5, 6. Although knowledge in itself is insufficient to createdemand, poor knowledge about the need for vaccination and whenthe next vaccination is due is a good indicator of poor compliance7.Up-to-date, complete, and scientifically valid information aboutvaccines can help parents to make informed decisions8.Immunity gap created by this low immunization coverage inNorthern Nigeria favors the emergence and transmission of somevaccine preventable diseases (VPDs) especially measles and polio9.MethodsA cross-sectional descriptive study was conducted using multistagesampling technique; 379 mothers/caregivers with children aged12-23 months were recruited. Data collection was done using semistructured interviewer-administered questionnaire and analyzed usingEpi infoTMversion 7. Descriptive statistics using absolute numbers andproportions and Odds ratio/Chi2 were determined between variablesand p≤0.05 was considered statistically significant. Multivariateanalysis was conducted using logistic regression.ResultsMean age of respondents was 28.6 (SD=±6.6), 245(64.7%)practiced Islam, 128(33.8%) completed Secondary school,246(64.9%) unemployed, 361(92.3%) were married and 186(49.1%)were from rural settlements. Among the children whose mothers/caregivers were interviewed, 163(43.01%) were between aged16-19 months old while most 238(62.80%) fell within the birth orderof 2nd -5thchild. Only 59 (15.6%) of these children were found tobe fully immunized, evidenced by vaccination card history. Majorityof respondents 244(64.4%) had unsatisfactory knowledge while197(55.4%) and 204(54.0%) exhibited poor perception and badpractices respectively, regarding routine immunization. Commonestsource of information was radio 69(61.61%). Educationalstatus [OR=1.9 (95%CI:1.1-3.3)] and good perception [OR=2.6(95%CI:1.5-4.5)] of mothers were found to be associated with gettinginformation on routine immunization within 12months prior to thisstudy while Polygamous family setting [OR=0.6(95%CI:0.2-0.6)],unsatisfactory knowledge [OR=0.3(95%CI:0.2-0.7)] and badpractices [OR=0.5(95%CI:0.3-0.9)] of mothers were independentlyassociated with lack of information on routine immunization.ConclusionsThere is low immunization coverage in this community. Mother'seducational status, family setting, knowledge, perception andpractices about immunization are important factors that influenceaccess to information on routine immunization.

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Abstract

ObjectiveTo analyse population coverage of syndromic surveillance(SS)based on emergency care data by studying i)the attractiveness ofrespectively SOS Médecins (Emergency care general practitioners)and Hospital emergency departments in the Centre-Val de Loireregion and ii) the contribution of ecological deprivation factors inemergency access to healthcare.IntroductionSOS Médecins France (SOS Med) is the first private and permanentnetwork of general practitioners providing emergency care in France.Besides Hospital emergency departments (HED), SOS Med istherefore a major source of data for detecting and measuring near-real-time health phenomena. The emergency services provided by theSOS Med have been subject to important changes in the recent years.Their services are enriched by a medical consultation center togetherwith extended working hours. Besides, the south of the region ismarkedly affected by a declining number of medical practitionersThis study was conducted to analyze the regional population coverageof emergency healthcare data provided by HED and SOS Med tothe French syndromic surveillance system (SurSaUD®) takinginto account distance, health care offer, demographic factors andecological deprivation factors.MethodsAn analysis of the activities and geographic attraction was carriedout based on the data respectively provided by the three regional SOSMed and three HED (Bourges, Orléans and Tours). Quasi-Poissonregression modelling was used to identify the factors influencing theattractiveness of each organization. Next, the findings were refinedthrough spatial analysis of the attractiveness of HED and SOS Medand analysis of the contribution of deprivation based on socio-economical and healthcare facilities ecological indexes.ResultsIn terms of age group, children under 2 years required the largestservice consultations as well as seniors over 75 who sought moreemergency visits at home. The SOS Med were almost always active inurban areas and at least once in two due to continuity of care. So theyare an efficient source of general medical care given present workhours. Distance as an influential factor may explain the differencesin attraction to the support type. The extent of the attraction appearsin 36% SOS Med Bourges and 14% for SOS Med Orleans. Addthe extent of attraction for SOS, remote consultation for SOS Medassociations are a good use of care in general practice in present workhours scheme.In terms of monitoring of epidemics, we note that the SOSMédecins associations are most active in winter, particularly duringthe seasonal epidemics of influenza. This can be explained by the factof patient referrals during calls. The most serious cases are redirectedto the ED and cases of general medicine to the SOS Médecins.It is also important to note that the attraction of ED ofCHR Orléanscovers more or less important a large part of the regional territory,which is not visible to the ED ofCH Bourges. It should neverthelessbe noted that theCHR Orleansa larger bed capacity than theCH Bourges.ConclusionsThis research has analysed the changes taking place in the SOSmédecins associations in the Centre-Val de Loire region. Findingsshows that these associations help ensure access to general medicalcare in a context of strongly reduced medical demography althoughwith an uneven, primarily urban, geographical coverage. Withbetter knowledge of the geographic span and sources and types ofemergency care provision, further research can be undertaken tofurther refine and interpret the data.

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Abstract

ObjectiveThe study aimed at: i) analyses the regional characteristics and riskfactors of severe influenza, taking into account dominant circulatingvirus(es) ii) estimate the regional completeness of the surveillancesystem.IntroductionEvery year, circulating influenza viruses generate a significantnumber of deaths. During the 2009 pandemic influenza A(H1N1),a national non mandatory surveillance system of severe influenzacases admitted to intensive care units(ICU) was set up in France.This surveillance is regionally driven by the regional offices (CIRE)of Santé publique France, the French Public Health Agency. Thisreport provides epidemiologic analysis of the recorded data sincethe implementation of surveillance in the Centre-Val de Loire regionover seasons 2009-10 to 2015-16 in regard of influenza epidemicsdynamics.MethodsSurveillance was carried out each year from October to April.Descriptive and analytic analyses were conducted to comparepopulation characteristics, pre-existing risk factors and the clinicaldata according to influenza season and dominant circulatinginfluenza virus(es). Logistic regressions were performed to identifyfactors associated with an increased risk of acute respiratory distresssyndrome (ARDS) or death. Two capture-recapture analyses wereperformed to establish the completeness of the surveillance systemin the region. The first one was realized on all cases, using two datasources (hospital records/surveillance data) and the second one, onlyon deaths, using three data sources(additional source: medical deathcertificates).ResultsFrom 2009-10 to 2015-16, the outbreak of influenza epidemicswas started more and more late. The number of severe influenzacases reported in the Loire Valley varied from 19 in 2010-11 to 75 in2014-15. Overall, the most affected population was adults, from 41%in 2011-12 to 83% in 2009-10. However seniors (more than 65 yearsold) represented an important part of patients during three epidemics:50% in 2011-12 and around 45% during the two last seasons;during these epidemics, men, (60%-68%), were more affected thanwomen. Patients' pre-existing risk factors were mainly: being olderthan 65 years old and suffering of cardiac or pulmonary diseases.The comparison by dominant viruses over the seasons revealed thatwhen A(H1N1) virus prevailed, severe influenza occurred mainlyin adults patients with any type of pre-existing risk factors whereaswhen A(H3N2) virus prevailed, seniors with pre-existing pulmonarydisease were the most affected. More than a third of patientsdeclared an ARDS. The overall observed lethality was close to 16%.ARDS occurred more frequently in patients who were middle-aged(45-64 years), immunocompromised or infected with A(H1N1).Pre-existing pulmonary disease was a protective factor. Risk factorsassociated with death were being older than 65 years, male and havingdeclared an ARDS. The completeness of this surveillance system wasestimated by capture-recapture methods at 59% for severe influenzacases and 40% for death cases.ConclusionsThe epidemiology of severe influenza and epidemics dynamics inthe Centre-Val de Loire follow the national trends. Every season ischaracterized by the same dominant virus at national and regionallevels in intensive care units. Influenza epidemics 2009-10 and2014-15 were particularly long and severe, the first dominatedby the A(H1N1)pdm09 virus and the second by the A(H3N2).Our study has demonstrated that the populations at risk of severeinfluenza differ according to the circulating virus(es). Accordingto the obtained estimations, the completeness of the surveillancesystem, based on voluntary report by physicians, can be consideredas satisfactory. Regarding influenza deaths relatively low percentageof completeness may be explained by the fact that two sources arehospital based whereas the third one, medical death certificates,includes all influenzadeaths with no information on the death place.Many patients were not vaccinated or their status was unknown. Mostcases admitted to ICU presented pre-existing risk factors includedin eligibility criteria in influenza vaccination policies. This studyoutlines the importance of vaccination as the first prevention measure.

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Abstract

ObjectiveTo describe the surveillance indicators implemented for the healthimpact assessment of a potential health event occurring before, duringor after the UEFA Euro 2016 football matches in order to timelyimplement control and prevention measures.IntroductionFrance hosted 2016 UEFA European Football Championshipbetween June 10 and July 10. In the particular context of severalterrorist attacks occurring in France in 2015 [1], the French nationalpublic health agency « Santé publique France » (formerly FrenchInstitute for Public Health Surveillance-InVS) was mandated bythe Ministry of Health to reinforce health population surveillancesystems during the UEFA 2016 period. Six French regions and10 main stadiums hosted 51 matches and several official andnonofficial dedicated Fan Zones were implemented in many citiesacross national territory. Three types of hazard have been identified inthis context: outbreak of contagious infectious disease, environmentalexposure and terrorist attack.The objectives of health surveillance of this major sportingevent were the same as for an exceptional event including massgathering [2] : 1/ timely detection of a health event (infectiouscluster, environmental pollution, collective foodborne disease...)to investigate and timely implement counter measures (control andprevention), 2/ health impact assessment of an unexpected event.The French national syndromic surveillance system SurSaUD® wasone of the main tools for timely health impact assessment in thecontext of this event.MethodsFrench national syndromic SurSaUD® system has been setup in 2004 and supervised by Santé publique France for 12 years.It allows the daily automatic collation of individual data from over650 emergency departments (ED) involved in the OSCOUR®network and 61 emergency general practitioners' (GPs) associations(SOS Médecins) [3]. About 60,000 attendances in ED (88% of thenational attendances) and 8,000 visits in SOS Médecins associations(95% of the national visits) are daily recorded all over the territoryand transmitted to Santé publique France.Medical information such as provisional medical diagnosiscoded according to the International Classification of Diseases, 10thRevision (ICD-10) for EDs and specific thesaurus for SOS Médecinsis routinely monitored through different syndromic indicators (SI).SI are defined by medically relevant clusters of one or severaldiagnoses, serving as proxies for conditions of public health interest.From June 10 to July 10, 19 SI were daily analyzed throughautomatic national and regional dashboards. SI were divided into3 groups of public health surveillance interest :1/ description of population health: injuries, faintness, myocardialinfarction, alcohol, asthma, heat-related symptoms, anxious troubles ;2/ infectious diseases/symptoms with epidemic potential ordiseases/symptoms linked with an environmental exposure: fever,fever associated with cutaneous rash, meningitis, pneumonia,gastroenteritis, collective foodborne disease ;3/ symptoms potentially linked with a CBRN-E exposure:influenza-like illness, burns, conjunctivitis, dyspnea/ difficultybreathing, neurological troubles, acute respiratory failure.Daily analysis were integrated into specific UEFA 2016surveillance bulletins and daily sent to the Ministry of Healthincluding week-ends.ResultsSI followed during the UEFA Euro 2016 period were nonspecificand potentially affected or influenced by several events appart fromthe championship. Between June 10 and July 10, two moderateheat-wave periods occurred on a large part of mainland France : thefirst one from June 22 to 25 (beginning in the West-South of Franceand then moving North and East of the country) and the secondone from July 8 to 11 in the East-South. An increase in heat-relatedindicators (hyperthermia/heat stroke, dehydration, hyponatremia andburns) has been observed during both periods in five French regionsincluding four hosting regions. Only minor increases in the other SIfollowed during the Euro 2016 period were observed.ConclusionsHealth surveillance implemented during 2016 UEFA EuropeanFootball Championship through a daily analysis of non-specificSI from the French syndromic surveillance system SurSaUD® didnot show any major variation associated with the sporting event.The observed variations were related with specific environmentalconditions (heat-waves). Together with the health surveillancesystem, preventive plans were set up during the event essentially byoffering flyers with information and useful tips on the main preventiveattitudes and measures to adopt in a summer festive context (risksassociated with alcohol and drug intake, injuries, heat and sunexposure, dehydration, unprotected sexual behaviour...).

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Abstract

The International Society for Disease Surveillance (ISDS) held its fifteenth annual conference in Atlanta, GA, from December 6-8, 2016. Since 2001, individuals interested in sharing and learning emerging trends in surveillance research and practice have found the ISDS Annual Conference a unique forum to advance their knowledge in the discipline of disease surveillance. The 15th ISDS conference received a total of 233 abstracts from 23 countries. From the submissions, 189 (81%) were accepted for presentation at the conference as an oral presentation (N=96) or poster (N=93). The theme for the 15th annual conference was New Frontiers in Surveillance: Data Science and Health Security. The theme united two dominant trends in public health surveillance: 1) a growing desire to extract knowledge from increasing volumes of structured and unstructured data available from health information systems; and 2) increased pressure on nations to strengthen their capacity for disease surveillance and response to outbreaks when and where they occur across the globe. In addition to the major themes of the conference, abstracts were accepted in additional tracks that remain important to the practice of public health around the world: One Health uniting animal and human health; Methodological advances in applied epidemiology; Public health informatics; Public health policy; and Biosurveillance practice. As usual, accepted abstracts for the 2016 ISDS Conference span the breadth of surveillance practice around the globe. There are timely abstracts on the detection and response to vector-borne diseases such as Zika virus and chikungunya across the Americas, as well as abstracts on the surveillance of opioid abuse observed in many parts of the U.S. Other abstracts cover the surveillance of non-communicable diseases that are now the leading causes of death globally. Additionally, some abstracts focus on capacity building within low resource settings on multiple continents to enhance global health security. While other abstracts describe the impact of health information technology (or eHealth) policies on surveillance practice at local, national, or regional levels. And still other abstracts contain emerging, novel methods that advance our understanding of how to analyze “Big” data or reduce the messiness associated with realworld surveillance data. Together these abstracts represent the broad, diverse and interesting nature of surveillance practice. Furthermore, the abstracts represent important work being done in high income countries like the U.S., Canada and the U.K. as well as critical work being done in low-and-middle income nations such as Nigeria, Pakistan, and Sierra Leone. I wish to thank the dedicated members of the Scientific Programming Committee (SPC) and ISDS staff who helped to manage the process of selecting this year’s abstracts for presentation. These individuals are domain experts across the spectrum of tracks and themes represented in the program, and their service is much appreciated. The SPC helped to recruit dozens of public health researchers and practitioners who also spent time reviewing abstracts. I also thank these volunteers for contributing to the richness and diversity of this year’s program. Finally, I wish to thank the Track Chairs who reviewed abstracts and recruited peers to perform reviews, and whom helped me organize presentations into meaningful sessions for the final conference program. Their names are listed in the proceedings to recognize their selfless service to ISDS and the field of public health surveillance. I hope that these proceedings help to advance scientific understanding and the practice of surveillance in public health. Please use the knowledge herein to improve how you practice or evaluate surveillance in your jurisdiction. Or you may find ways to apply the knowledge elsewhere in population health. However you use it, I ask that you document your lessons or findings and submit to ISDS in the future to share the outcomes with others. Together we can reduce the burden of disease and improve health outcomes for populations globally.

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Abstract

ObjectiveTo describe characteristics of Veterans Health Administration(VHA) patients with ICD 9/10 CM inpatient discharge and/oremergency department (ED)/urgent care outpatient encounter codesfor carbon monoxide (CO) poisoning.IntroductionIt is estimated that in the United States (US), unintentional non-firerelated CO poisoning causes an average of 439 deaths annually, and in2007 confirmed CO poisoning cases resulted in 21,304 ED visits and2,302 hospitalizations (71 per million and 8 per million population,respectively)1. Despite the significant risk of morbidity and mortalityassociated with CO poisoning, existing surveillance systems in theUnited States are limited. This study is the first to focus specificallyon CO poisoning trends within the VHA population.MethodsQueries were performed in VA PraedicoTMPublic HealthSurveillance System for inpatient discharges and emergency roomand urgent care outpatient visits with ICD 9/10 CM codes for COpoisoning from 1/1/2010 – 6/30/2016. A dataset of unique patientencounters with CO poisoning was compiled and further classified asaccidental, self-harm or unspecified. Patients with carboxyhemoglobin(COHb) blood level measurements≥10%2for the same timeframewere extracted and merged with the CO poisoning dataset.We analyzed for demographic, geographic and seasonal variables.Rates were calculated using total unique users of VHA care formatching time frame and geographic area as denominators.ResultsThere were a total of 671 unique VHA patients identified with COpoisoning. Of these, 298 (44%) were classified as accidental, 104(15%) self-harm, and 269 (40%) unspecified. A total of 6 patientsdied within 30 days of their coded diagnosis, however only 1 ofthese was directly attributable to CO poisoning. The overall rate ofCO poisoning over the study time frame was 18 per million uniqueusers of VHA care. CO poisoning diagnoses were obtained from396 (59%) outpatients, 216 (32%) inpatients, and 59 (9%) patientswith both and outpatient visit and inpatient admission. Patientswith self-harm classification were less likely to be seen in the ED(only 24 (6%) unique patients compared to 190 (48%) accidental and182 (46%) unspecified classifications). Of patients seen in the ED andsubsequently admitted, patients with the classification of accidentalpoisoning made up the largest percentage with 36 unique patients(61%). There were 71 (11%) females compared to 600 (89%) males.The highest represented age group was 45-64 with 342 unique patients(51%). Rates by US Census Region were highest in the Midwestand Northeast (27 and 23 per million unique users, respectively)compared to the West and South (15 and 13 per million uniqueusers, respectively) (Figure 1). Accidental CO poisonings showed aseasonal pattern with peaks occurring in late fall, winter, and earlyspring months (Figure 2). CO poisonings classified as unspecifiedhad a similar but less pronounced pattern, while those classified asself-harm were too few to observe any pattern over time. COHb bloodlevels≥10% were present in 111 (17%) of patients with CO poisoningcodes. Of patients with COHb measures≥10%, those with self-harmclassification were least represented with only 7 unique patients (6%).Accidental and unspecified classifications were equally representedwith 53 (48%) and 51 (46%) unique patients, respectively.ConclusionsThe impact of CO poisoning on the VHA patient population hasnot been well studied. The geographic distribution of the majorityof cases in the Midwest and Northeast, and the seasonal distributionof accidental cases in colder months seems to be appropriate withrespect to what is known of unintentional CO poisoning as oftenassociated with heat-generating sources3. Opportunities for furtherinvestigation include how potential CO poisoning cases are evaluatedin VHA given the low percentage of cases with COHb blood levelmeasurements.

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

Abstract

ObjectiveTo characterize fentanyl-associated mortality in Florida using freetext queries of the literal causes of death listed on death certificates.IntroductionIn October 2015, the Centers for Disease Control and Prevention(CDC) released health advisory #384 to inform people about increasesin fentanyl fatalities. Florida’s statewide syndromic surveillancesystem, Electronic Surveillance System for the Early Notification ofCommunity-based Epidemics (ESSENCE-FL), captures electronicdeath record data in near real time which allows for the monitoringof mortality trends across the state. One limitation of using deathrecord data for fentanyl surveillance is the lack of a fentanyl-specificoverdose ICD-10 code; however, the literal cause of death fields(“literals”) provide a level of detail that is rich enough to capturementions of fentanyl use. The “literals” are a free text field on thedeath certificate, recorded by a physician at the time of death anddetail the factors that led to the death. ESSENCE-FL has the benefitof not only receiving death record data in near real-time, but alsoreceiving the literal cause of death fields. This work analyzes trendsin fentanyl-associated mortality in Florida over time by using theliteral cause of death fields within death records data obtained fromESSENCE-FL.MethodsThe “literals” elements of Florida Vital Statistics mortality datafrom 2010 through 2015 accessed via ESSENCE-FL were queriedfor the term ^fent^. No necessary negations or extra term inclusionswere deemed necessary after looking at the records pulled with ^fent^alone. Deaths were analyzed by various demographic and geographicvariables to characterize this population in order to assess whichgroups are most heavily burdened by fentanyl-associated mortality.Population estimates by county for 2015 were obtained from the U.S.Census Bureau to calculate mortality rates. Language processing in RStudio was used to determine which other substances were commonlyreported when fentanyl was listed on the death certificate, in order toassess polydrug use and its impact on increased mortality.ResultsCompared to the number of fentanyl-associated mortalities in 2010(82), fentanyl-associated mortality in 2015 (599) was 6.5 times higherafter controlling for the natural increase in total mortality between2010 and 2015. Almost three-fourths of the deaths in 2015 were male(73%), which is higher than the proportion of male deaths in 2010(55%). The age group with the largest burden of fentanyl-associatedmortality was the 30 – 39 age group, with almost one-third of thedeaths in 2015 coming from this age group (31%) compared to only10% in 2010, a roughly 200% increase. Fentanyl-associated mortalitywas almost exclusive to people that are Caucasian, with 94% of thefentanyl-associated mortalities in 2015 occurring among Caucasians.Multi-drug use was also identified for those with fentanyl-associatedmortality. Mentions of other drugs were present in at least 10% of thedeaths. Some of the other drugs mentioned in the “literals” includedheroin, cocaine, and alprazolam. There was county variation in thenumber of fentanyl morality deaths ranging from 21.19 deaths per100,000 to 0.29 deaths per 100,000 residents. Two counties with thehighest rates were located adjacent to one another.ConclusionsHaving death record data readily available within the statesyndromic surveillance system is beneficial for rapid analysisof mortality trends and the analytic methods used for syndromicsurveillance can be applied to mortality data. Free text querying ofthe “literals” in the vital statistics death records data allowed forsurveillance of fentanyl-associated mortality, similar to methods usedfor querying emergency department chief complaint data. Althoughunderlying ICD-10 codes can lack detail about certain causes ofdeath, the “literals” provide a clearer picture as to what caused thedeath. The “literals” also make it possible to look at potential drugcombinations that may have increased risk of mortality, which willbe explored more thoroughly. Further work will explore other datasources for fentanyl usage and mortality trends, as well as examinepotential risk factors and confounders.

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

Abstract

ObjectiveTo evaluate syndrome definitions capturing storm- and extremeweather-related emergency department visits in Kansas hospitalsparticipating in the National Syndromic Surveillance Program(NSSP).IntroductionKansas storms can occur without warning and have potential tocause a multitude of health issues. Extreme weather preparednessand event monitoring for public health effects is being developedas a function of syndromic surveillance at the Kansas Departmentof Health and Environment (KDHE). The Syndromic SurveillanceProgram at KDHE utilized emergency department (ED) data to detectdirect health effects of the weather events in the first 9 months of2016. Current results show injuries directly related to the storms andalso some unexpected health effects that warrant further exploration.MethodsA basic syndrome definition was defined based on extreme springand summer weather events experienced in Kansas. This broaddefinition pulled records from Kansas EDs that included the followingin the Chief Complaint or Triage Notes fields:●Storm●Rain●Torna(dos)●Wind●FloodThis broad syndrome definition was performed on data submittedto the Kansas’s production server through NSSP between January 1stand August 30th, 2016. After the initial pull, duplicate records for thesame patient and visit were removed.The remaining set was then searched by hand to identify termscaught by the syndrome definition that were not related to stormactivity or extreme weather. Record chief complaints were thenscanned by hand to identify common words containing the searchcriteria and then removed. Keywords not of interest to the syndromedefinition that were caught were: migraine, window, drain, restrain,train, and many other proper nouns that contained one of the keywords.These remaining visits were then sorted by nature of visit andunexpected records were recorded for future direction of syndromedefinition development.ResultsThe initial data pull under these conditions yielded 17,691 uniqueemergency department visits from January 1stto August 30thduringthe 2016 year. From this, records were classified based on key wordsresulting in the pull. The table below shows the initial pull results, theremaining records after errant results were expunged, the percentageof visits that were removed, and the most common reason for removal.Of these records remaining after cleaning, 20 were related tostorms, 62 were related to rain, 7 were related to tornado activity,66 were related to wind, and 14 were related to flooding along withthe mixed variable instances shown in the table. A majority of thewind-related ED visits were injuries and the majority of the tornadoactivity events were related to injuries sustained while taking shelter.Many of the injuries mentioning storms were sustained in preparationfor the storm, and a handful were due to mental stresses regardingstorm activity.ConclusionsSyndrome definition development is an iterative process thatwill vary by region. By manually looking at line-level data details,future searches can better accommodate these errant results and falsepositives. These studies will facilitate more rapid extreme weatherresponse in Kansas and allow better situational awareness. Alongwith general storm-related injuries, knowledge of the unusual recordscaught by a syndrome definition can also help direct public educationin preparation of future storms. With injuries sustained while takingshelter and injuries sustained in preparation for the storm, we can takethese unique ED visits and work on interventions to prevent futureoccurrences.

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

Abstract

ObjectiveWe pilot a RTI surveillance system using data from FRSC, Policemotor traffic division and Health facilities in Kaduna metropolis,Nigeria to ascertain its feasibility and generate data needed for actiontoward achieving sustainable development goals 3.6 target.IntroductionRoad Traffic Injury is common cause of unintentional injuryglobally and Low and middle income countries account for 90%of 1.3 million Road Traffic Injury (RTI) deaths. In Africa region,Nigeria accounts for 25% of RTI mortality but has no comprehensiveand reliable RTI surveillance system. Data from Federal RoadSafety Commissions (FRSC) shows gaps in RTI reporting with largedisparity with estimated value from World Health Organization.MethodsKaduna metropolis is the capital of Kaduna State with estimatedpopulation of 1.96 million. It is a major route between Abuja, theNational capital and 15 northern Nigeria states with high vehicularmovement. We adapted WHO Injury surveillance guideline andCenters for Disease Control and Prevention surveillance trainingmanual for this study. A case of RTI is any person injured or diedwithin 30 days as a result injuries incurred from vehicular collision ona public road in Kaduna Metropolis. Data collected using a pretestedquestionnaire for RTI cases at health facilities, Police and FRSC.Data were linked by deterministic method, cleaned and analysed.Frequency and proportion were calculated to characterize the RTI.The study was supported by a mini-grant from Center for DiseaseControl and Prevention.ResultsData was collected from February to April 2016. Of the 324crashes reported, 566 people injured and 66 deaths with case fatalityrate of 11.7%. Male gender accounts for 81.8% and age 20 – 39 yearswere 64.6%. Commercial drivers were 20.7%, pedestrian 21% andpassengers were 53.7%. Sixty percent of the crash occurred betweencars or buses while 21% were without collision with any vehicle orstationary objects. Of the 66 deaths reported 61(92.4%) died at crashsite. FRSC evacuated 21%, 38.6% were evacuated by other road users.No use of seat belt and crash helmets reported and only 5.1% receivedfirst aid care before reaching reporting facility. RTI Incidence peakedbetween 6:00 PM to 8:59 PM with 26 persons per hour.ConclusionsEssential to sustainable development goal 3, a multisectorRTI surveillance system that generate data for action in Kadunametropolis, Nigeria is feasible and data generated was used for actionat different levels to mitigate against the burden of RTI

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

Abstract

ObjectiveTo discuss the implementation of confidentiality practices at theKumasi Cancer Registry.IntroductionCancer registration involves collecting information on patientswith cancer. Population-based cancer registries in particular areuseful in estimating the disease burden and to inform the institutionof prevention and control measures. Collecting personal informationon patients with cancer requires strict adherence to principles ofconfidentiality to ensure the safety of the collected data. Failure mayhave legal and medical implications. The Kumasi Cancer Registrywas established as a population-based cancer Registry in 2012. Theregistry collects data on cases of cancer occurring among residentsof the Kumasi Metropolitan area of Ghana. Issues bordering onconfidentiality were an integral part of the establishment of theregistry. We discuss the implementation of confidentiality plansduring the four years of existence of the Kumasi Cancer Registry.MethodsThe registry has a designed abstraction form which is used to collectdata. Data sources for the Registry are all major hospitals in Kumasiproviding cancer treatment services. Data sources also include privatepathology laboratories and the Births and Deaths Registry. Trainedresearch assistants collect data from the folders of patients. This isfollowed by coding and then entering into the Canreg 5 software.Coded and entered into the Canreg5 software for management andanalysis. After data entry, the forms are filed in order of registrynumbers as generated by the canreg5 software for easy reference.ResultsConfidentiality of KsCR data is ensured through the followingmeasures. The signing of a confidentiality agreement by all registrystaff. The confidentiality agreement spells out terms for the releaseof data to third parties in particular but even staff of the variousfacilities. The agreement also spells out the consequences of a breachof any of the clauses. No direct contact is made with patients duringthe process of abstraction of data by registrars. The data abstractionforms are kept in a secured safe in the registry office. The computersthat house the registry data are password enabled and are changedon a regular basis to ensure security. The Canreg5 software usedfor electronic data management also has individual profiles withpasswords for all registrars and supervisors. The scope of accessto Canreg data is limited by the profile status of the respectivestaff members. Supervisors have full access to all data includingsummarized reports. Registrars have limited access mostly restrictedto data entry. Access to the registry office is restricted to registry staffand other personnel authorized by the Registry Manager or Director.An established Registry Advisory Board is responsible for assessingrequests and approval of data from the registry. Where files have tobe sent electronically, they are password protected and sent in severalparts in separate emails.ConclusionsDespite the potential challenges to maintaining confidentialityof data in developing outcries, evidence from four years of cancerdata management in Kumasi suggests stringent measure can ensureconfidentiality. The use of multiple measures to ensure confidentialityis essential in surveillance data management

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

Abstract

ObjectiveTo demonstrate a method for estimating neighborhood foodselection with secondary use of digital marketing data; grocerytransaction records and retail business registry.IntroductionUnhealthy diet is becoming the most important preventablecause of chronic disease burden (1). Dietary patterns vary acrossneighborhoods as a function of policy, marketing, social support,economy, and the commercial food environment (2). Assessmentof community-specific response to these socio-ecological factorsis critical for the development and evaluation policy interventionsand identification of nutrition inequality. Mass administration ofdietary surveys is impractical and prohibitory expensive, and surveystypically fail to address variation of food selection at high geographicresolution. Marketing companies such as the Nielsen cooperationcontinuously collect and centralize scanned grocery transactionrecords from a geographically representative sample of retail foodoutlets to guide product promotions. These data can be harnessed todevelop a model for the demand of specific foods using store andneighborhood attributes, providing a rich and detailed picture of the“foodscape” in an urban environment. In this study, we generated aspatial profile of food selection from estimated sales in food outletsin the Census Metropolitan Area (CMA) of Montreal, Canada,using regular carbonated soft drinks (i.e. non-diet soda) as an initialexample.MethodsFrom the Nielsen cooperation, we obtained weekly grocerytransaction data generated by a sample of 86 grocery stores and 42pharmacies in the Montreal CMA in 2012. Extracted store-specificsoda sales were standardized to a single serving size (240ml) andaveraged across 52 weeks, resulting in 128 data points. Using linearregression, natural log-transformed soda sales were modelled as afunction of store type (grocery vs. pharmacies), chain identificationcode and socio-demographic attributes of store neighborhood, whichare median family income, proportion of individuals who receivedpost-secondary diplomas, and population density as measured by the2011 Canadian Household Survey. Selection of the predictors andfirst-order interaction terms was guided by the minimization of themean squared error using 10-fold cross-validation. The final modelwas applied to all operating chain grocery stores and pharmacies in2012 (n=980) recorded in a comprehensive and commonly availablebusiness establishment database. The resulting predicted store-specific weekly average soda sales was spatially interpolated toprovide a graphical representation of the soda sales (representing anunhealthy foodscape) across the Montreal CMA.ResultsFigure 2 demonstrates the spatial distribution of the predicted sodasales in the Montreal CMA.ConclusionsThe current lack of neighborhood-level dietary surveillanceimpedes effective public health actions aimed at encouraging healthyfood selection and subsequent reduction of chronic illness. Ourmethod leverages existing grocery transaction data and store locationinformation to address the gap in population monitoring of nutritionstatus and urban foodscapes. Future applications of our methodologyto other store types (e.g. convenience stores) and food productsacross multiple time points (e.g. mouths and years) will permit acomprehensive, timely and automated assessment of dietary trends,identification of neighborhoods in special dietary needs, developmentof tailored community health promotions, and the measurement ofneighbourhood-specific response to nutrition policies and unhealthyfood advertising.

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Abstract

IntroductionFirearm violence is an issue of public health concern leading tomore than 30,000 deaths and 80,000 nonfatal injuries in the UnitedStates annually.1To date, firearm-related studies among Veteranshave focused primarily on suicide and attempted suicide.2-5Herein,we examine firearm violence among VHA enrollees for all manners/intents, including assault, unintentional, self-inflicted, undeterminedand other firearm-related injury encounters in both the inpatient andoutpatient settings.MethodsInpatient and Outpatient encounters with one or more ICD-9-CM firearm external-cause-of-injury codes (E-codes) from1/1/2010-9/30/2015 were extracted from the VHA's Praedico™Public Health Surveillance System, including demographics, era ofservice/eligibility, encounter type, and deaths. Firearm E-codes wereclassified for manner/intent based on the CDC's Web-based InjuryStatistics Query and Reporting System (WISQARS™) matrix.6Outpatient/emergency department (ED) data were exclusively fromVHA facilities (a single pediatric patient seen as a humanitarianemergency was excluded from the dataset). Inpatient data includedVHA facilities and some records received from non-VHA facilities.VHA rate of hospitalization for firearm-related admissions wascalculated using the total VHA acute-care admissions for the sametime period as the denominator.ResultsDuring the time frame examined, 5,205 unique individuals wereseen with a firearm E-code. Of these, 4,221 were seen in the outpatient/ED setting only, 597 in the inpatient setting only, and the remaining387 had encounters in both the outpatient/ED and inpatient settings.VHA firearm admission rate was 1.63 per 10,000 VHA admissions,compared to a national rate of 1.96 per 10,000 in 2010.7Table 1 showsthe breakdown of encounters by manner/intent. Unintentional was themost common firearm injury manner/intent. Overall, the median age atinitial encounter was 54 (range 19-100 years), and 96% were male. Thehighest percentage served in the Persian Gulf War Era (2,136, 41%),followed by Vietnam Era (1,816, 35%) and Post-Vietnam Era (716,14%). The greatest number of patients with a firearm-coded encounterresided in Texas (453), California (349), Florida (326), Arizona (214)and Ohio (212).ConclusionsUnintentional injuries were the most common form of firearminjury among VHA enrollees, representing over half of alloutpatient/ED firearm encounters and more than twice the numberof firearm hospitalizations compared with any other manner/intent.Limitations include that not all U.S. Veterans are VHA enrollees;miscoding and misclassification of firearm-related injuries may haveoccurred; and data from non-VHA outpatient/ED encounters andsome non-VHA hospitalizations are not available to our surveillancesystem for analysis. Additional study is needed to further understandthe epidemiology of firearm-related injuries among Veterans andinform VHA leadership and providers

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

Abstract

ObjectiveThe objective of this presentation is to describe the new word alertcapability in ESSENCE and how it has been used by the FloridaDepartment of Health (FDOH). Specifically, this presentation willdescribe how the word alert feature works to find individual chiefcomplaint terms that are occurring at an abnormal rate. It willthen provide usage statistics and first-person accounts of how thealerts have impacted public health practice for the users. Finally,the presentation will offer future enhancement possibilities and asummary of the benefits and shortcomings of this new feature.IntroductionSyndromic surveillance systems have historically focused onaggregating data into syndromes for analysis and visualization. Thesesyndromes provide users a way to quickly filter large amounts ofdata into a manageable number of streams to analyze. Additionally,ESSENCE users have the ability to build their own case definitionsto look for records matching particular sets of criteria. Those user-defined queries can be stored and analyzed automatically, along withthe pre-defined syndromes. Aside from these predefined and user-defined syndromic categories, ESSENCE did not previously providealerts based on individual words in the chief complaint text that hadnot been specified a priori. Thus, an interesting cluster of recordslinked only by non-syndromic keywords would likely not be broughtto a user’s attention.MethodsIn the FDOH ESSENCE system a new detection feature wasdeveloped to trigger alerts based on anomalous occurrence of termsin chief complaints.1This feature used Fisher’s Exact Test to testfrequencies of individual chief complaint terms relative to all termsin a 1-month baseline. The feature used a 7-day guard-band, andautomatically switched to an efficient chi-square test for sufficientlylarge term counts. A term triggered an alert if its p-value≤10E-4.This algorithm was then run on chief complaint sets both by hospitaland by region, with region assignment according to patient zip code.Results were then displayed in new visualizations showing alerts inword cloud and line listing form. Additionally, users were given theoption to ignore stop words, syndromic terms, and a user-created listof ignorable words in order to focus on words of greater interest.ResultsThe result of using the tool since June 2016 has seen three majorbenefits. First, the original intent for the system to notify users ofabnormal word clusters has proven useful. Users have been able to seeterms such asDisaster, ShelterandFireworkswhich were not part ofany prior syndromes and use these notifications to investigate possibleissues. The second benefit found by users was the ability to find newmisspellings or abbreviations commonly used by hospitals. The termsZykaandGLF(Ground Level Fall) are examples of these. Finally,the system has helped discover new trends in hospital processes. Forexample, the tool has helped discover first person and non-Englishphrases in the chief complaint. This observation led to the discoverythat some hospitals are using kiosks or mobile phone apps to allowpatients to enter their own chief complaints.ConclusionsThe word alert feature has provided value to the users of FDOHESSENCE. While accomplishing its initial goal of triggeringabnormal non-syndromic term usage, the additional ability to findnew misspellings and abbreviations may have even larger impact bykeeping syndrome and subsyndrome definitions up-to-date over timefor traditional syndromic alerting. Beyond these current benefits,additional visualization enhancements are under consideration.Additionally, the resources required to perform the detection aresubstantial, and implementation improvements are under developmentto improve the performance and enable more advanced free-textanomaly detection.

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Abstract

ObjectiveTo streamline production of a daily epidemiology report includingsyndromic surveillance, notifiable disease, and outbreak data duringa mass gatheringIntroductionThe 2016 U.S. Olympic Track and Field Team Trials were heldJuly 1-10 in Eugene, OR. This mass gathering included over 1,000athletes, 1,500 volunteers, and 175,000 spectators. The Oregon PublicHealth Division (PHD) and Lane County Public Health (LCPH)participated in pre-event planning and collaborated to produce adaily epidemiology report for the Incident Management Team (IMT)during the event. The state and county public health agencies hadcollaborated on surveillance for prior mass gatherings, including the2012 Trials. However, 2016 was the first opportunity to use completestate and county syndromic surveillance data.MethodsPHD staff developed an ESSENCE report, highlighting sevenpriority health outcomes: total emergency department visits; injury,gastrointestinal, respiratory, and fever syndromes; and asthma-like and heat-related illness queries. The report included side-by-side comparisons of county and state time series graphs, a tablesummarizing reportable diseases, and space to narratively describeoutbreaks. PHD staff did a virtual demonstration and in-persontutorial for LCPH staff on how to run the report. ESSENCE accesspermissions had to be modified so that county users could see andproduce state time-series graphs but not data details for non-LaneCounty visits. Emphasis was placed on interpretation of likelyscenarios, i.e., one or two days with a warning that was not indicativeof an incident of public health importance.ResultsDuring the event, LCPH staff were able to run the reportsuccessfully, i.e., there were no technical glitches. For the first fewdays, LCPH staff consulted with PHD staff about epidemiologicalinterpretation. State data were of specific interest since data detailswere suppressed. Additionally, increases were seen in the injurysyndrome in the days preceding the July 4 holiday. Stratification bykey demographic factors and looking at subsyndrome breakdownson warning and alert days provided the needed information withoutrequiring the use of the detail details.ConclusionsAfter the event, there were three main recommendations forimproving the process.LCPH suggested that the side-by-side visualization of countyand state time series graphs was useful to see trends but the relativescale of the number of visits was unclear due to size and placement(see figure 1). Solutions for future reports include additionalexplanatory text, limiting the report to only county data, and alternativevisualizations that highlight the differences in visit magnitude.As part of the IMT process, the LCPH lead felt that her efforts tophysically go to the Emergency Operations Center to run the reporthelped facilitate communication with partners. However, it is notclear if this effort directly translated into IMT use of the report, whichwas posted to the online event management system and not includedin the daily situation status reports. While LCPH leadership and staffreported anecdotally that they found the report to be very useful,no formal evaluation of use was done with either public health orIMT staff. In advance of the next event, state and county staff shouldprepare evaluation metrics.The report feature in ESSENCE is a bit cumbersome to set up, butit allows for easy production of appealing and customizable reports.This template can be modified for future mass gatherings, includingathletic competitions and county fairs. PHD staff will continueto collaborate with LCPH to repurpose and improve the report foruse in Lane and other counties. Fostering local user comfort withinterpreting ESSENCE data and generating summaries for local useis a priority of the OR ESSENCE team.

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Abstract

ObjectiveTo assess the use of syndromic surveillance to assess trends inmental health-related emergency department (ED) visits amongschool-aged children and adolescents in New York City (NYC).IntroductionFrom 2001-2011, mental health-related hospitalizations and EDvisits increased among United States children nationwide [1]. Duringthis period, mental health-related hospitalizations among NYCchildren increased nearly 23% [2]. To estimate mental health-relatedED visits in NYC and assess the use of syndromic surveillance chiefcomplaint data to monitor these visits, we compared trends from anear real-time syndromic system with those from a less timely, codedED visit database.MethodsThe NYC ED syndromic surveillance system receives anonymizedpatient chief complaint and basic demographic data for nearly everyED visit citywide to provide timely surveillance information tohealth authorities. Using NYC ED syndromic surveillance datafrom 2003-2015, we applied previously developed definitions forgeneral psychiatric syndromes. We aggregated ED visits by agegroup (5-12 years, 13-17 years, and 18-20 years), geography, andtemporality. Syndromic data were compared with Statewide Planningand Research Collaborative System (SPARCS) data from 2006-2014which reported mental health diagnosis (ICD-9), treatment, service,and basic demographics for patients visiting facilities in NYC. Usingthese two data sources, we compared daily visit patterns and annualtrends overall as well as stratified by age group, area-based poverty(ZIP code), and time of visit.ResultsBoth syndromic surveillance and SPARCS data for NYC showedan increasing trend during the period. While both showed relativeincreases with similar slopes, mental health-related chief complaintdata captured fewer overall visits than the ICD-9 coded SPARCSdata. Trends in syndromic data during 2003-2015 differed by age-group and area-based poverty, e.g., among children ages 5-12 yearsthe annual proportion of mental health-related ED visits increasedroughly 3-fold from 1.2% to 3.8% in the poorest areas, which wasgreater than the increase in the richest areas (1.7% to 2.6%). Seasonal,day-of-week, and school holiday patterns found far fewer visits duringthe periods of NYC public school breaks (Figure).ConclusionsWe conclude that syndromic surveillance data can provide areliable indicator of mental health-related ED visit trends. Thesefindings suggest potential benefit of syndromic surveillance data asthey may help capture temporal and spatial clustering of events in amuch more timely manner than the >1 year delay in availability ofED discharge data. Next steps include a qualitative study exploringthe causes of these patterns and the role of various factors drivingthem, as well as use of patient disposition and matched data to bettercharacterize ED visit patient outcomes.

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

Abstract

ObjectiveTo detect increases in health complaints resulting from the July2016 Sand Fire near Santa Clarita, CA using syndromic surveillanceand complementary systems.IntroductionOn July 22, 2016, the Sand Fire began burning in the Santa ClaritaValley of Los Angeles County (LAC), CA. This urban-adjacentwildfire breached the city limits of Santa Clarita (population 180,000).Fueled by record heat and an ongoing exceptional drought, the SandFire burned over 40,000 acres in 13 days1and caused a large increasein the air concentration of fine particulate matter2. The syndromicsurveillance team was tasked with reporting on possible health effectsfrom the fire. Fire, asthma, and heat related data were monitoreduntil the fire was reported as 98% contained. The team prepared anddistributed a daily special summary report to key stakeholders in theLAC Department of Public Health.MethodsEmergency department (ED) data were queried for cases relatedto fire, asthma, cardiac events, eye irritation, heat, and total volume.These queries consisted of key word searches within chief complaint(CC), diagnosis and triage note data fields. Queries were conductedon all participating syndromic EDs in LAC, and also restricted to nineEDs closest to the fire. The resulting line lists were reviewed dailyto rule out visits that were unrelated to the Sand Fire. The fire querywas refined periodically with additional exclusion terms. Complaintsrelated to asthma were tallied in a second query. In order to assessheat-related ED visits and temperature trends, existing queries andreport templates were modified to focus on the nine fire-area EDs.Local temperatures were taken from the Weather Undergroundwebsite. Complementary systems were also monitored, includingover-the-counter medication sales and nurse hotline call data. Trendgraphs for hospital admissions and ED visits were produced daily toassess volume from 19 Reddinet participating hospitals. In additionto internal data sources, the South Coast Air Quality ManagementDistrict website was checked daily to monitor air quality in the SantaClarita Valley.ResultsThere were 48 syndromic ED patient records with direct mention ofthe fire in LAC’s syndromic hospitals in 13 days. Of these, 26 did notinclude asthma, and 32 came from the nine hospitals in the Sand Fireregion; 32 were identified from the CC, six by diagnosis and ten bytriage note. Despite an increase in fire-related visits, overall trends inED data were not affected; no increase was found for cardiac events,eye irritation, heat-related illness or total volume. Asthma visitsincreased at the time of the fire, which correlates with a sharp increasein the concentration of fine particulate matter in the Santa ClaritaValley following the start of the fire2. However, these increases wereno higher than other peaks observed in previous months3. No increasesin calls to a nurse hotline or over-the-counter medication sales wereobserved. Among Reddinet hospitals, admissions increased slightlybut ED visits remained unchanged.ConclusionsFor the Sand Fire, ED volume alone was not enough to estimatethe subsequent health effects on residents of LAC; instead a specificfire query was needed. Several factors could explain why overalltrends were not affected. In a region where air quality is alreadycompromised, it is challenging to distinguish between asthmaincreases from air pollution from those exacerbated by wildfiresmoke. It is also likely that residents heeded warnings about air qualityduring active fires, thus reducing their outdoor exposure. Althoughthe majority of cases were identified using the CC field, additionaldata fields such as triage notes available from some hospitals improvethe ability to elicit fire related visits. Regardless of the challengespresented in measuring health effects related to wildfires, syndromicsurveillance and complementary systems continue to be the primarytools for near real-time assessments in LAC.

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

Abstract

ObjectiveTo describe Carolinas Poison Control Center (CPC) calls datacollected in the NC DETECT syndromic surveillance system.IntroductionCPC provides the 24/7/365 poison hotline for the entire state ofNorth Carolina and currently handles approximately 80,000 callsper year. CPC consultation services that assist callers with poisonexposure, diagnosis, optimal patient management, therapy, andpatient disposition guidance remain indispensable to the public andhealth care providers. Poison control center data have been used foryears in syndromic surveillance practice as a reliable data source forearly event detection. This information has been useful for a varietyof public health issues, including environmental exposures, foodbornediseases, overdoses, medication errors, drug identification, drug abusetrends and other information needs. The North Carolina Departmentof Health and Human Services started formal integration of CPCinformation into surveillance activities in 2004. CPC call data areuploaded in real time (hourly), 24/7/365, to the NC DETECT statedatabase.MethodsCPC calls collected by NC DETECT from 2009-2015 wereanalyzed in this descriptive study. Counts of CPC calls wereexamined by year to assess total volume and changes over time, bymonth to assess seasonality, by geographic location, and call sitefacility and call originator. CPC calls were also categorized by type ofcall – exposure calls versus information calls – in order to determinewhy people call CPC and to assess if any trends exist amongst thesecategories.ResultsThe majority of CPC calls originate from the caller's own residence(53.40%). The age groups most represented are 0-1 years old,2-4 years old, and 25-44 years old. Calls to CPC were for male andfemale patients in approximately equal numbers. The region of NCthat has the highest number of calls, by a fairly wide margin, is theCharlotte Metro region. In 2009, the total number of CPC calls wasover 120,000. This number decreased monotonically every yearfollowing, with the total in 2015 being 80,000. This is a 1/3 reductionin the total number of calls over 7 years. When the calls were analyzedby type of call, an interesting trend emerged. The total number ofexposure calls remained relatively constant over the time period,ranging from 64,000 to 68,000 per year. However, the total number ofinformation calls decreased each year going from just over 40,000 toonly about 5,000. When examined by month to assess seasonality, thedata show an increase in the number of calls beginning in Februaryand peaking in May, and then a steady and slow decline throughoutthe rest of the year.ConclusionsOur study shows that CPC consultations from callers with exposureshave remained stable over time. However, in the absence of exposure,fewer people call CPC for information on various substances. Drugidentification calls saw a decrease each year during the study timeperiod. In 2009 there were 34,495 drug identification calls and in2015 there were 5,722. This dramatic decrease in information callsis most likely due to the increased use of the internet and searchengines. Because people have more access to the internet, especiallyvia mobile devices, they may not feel the need to call CPC to obtaininformation.

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

Abstract

ObjectiveIn this paper we used hospital charges to assess costs incurred dueto prescription drug/opioid hospitalizationsIntroductionThere is a resurgence in the need to evaluate the economic burdenof prescription drug hospitalizations in the United States. We used theWisconsin 2014 Hospital Discharge data to examine opioid relatedhospitalization incidence and costs. Fentanyl, a powerful syntheticopioid, is frequently being used for as an intraoperative agent inanesthesia, and post-operative recovery in hospitals. According to a2013 study, synthetic Fentanyl is 40 times more potent than heroinand other prescription opioids; the strength of Fentanyl leads tosubstantial hospitalizations risks. Since, 1990 it has been availablewith a prescription in various forms such as transdermal patches orlollipops for treatment of serious chronic pain, most often prescribedfor late stage cancer patients. There have been reported fatal overdosesassociated with misuse of prescription fentanyl. In Wisconsin numberof total opioid related deaths increased by 51% from 2010 to 2014with the number of deaths involving prescription opioids specificallyincreased by 23% and number of deaths involving heroin increasedby 192%. We hypothesized that opioids prescription drugs, as a proxyof Fentanyl use, result in excessive health care costs.MethodsOpioid hospitalizations was defined as any mention of the ICD9codes (304,305) in any diagnostic field or the mention of (:E935.09) onthe first listed E-code. Our analysis used the Heckman 2-stage model,a method often used by Economists in absence of randomized controltrials. In presence of unobserved choice, for example opioid relatedhospitalizations, there usually is a correlation between error in anunderlying function (fentanyl prescription) and an estimated function(hospital charges) that introduces a selection bias. Heckman treats thiscorrelation between errors as an omitted variable bias. Therefore, weestimate a Heckman two step model using hospitalization: where theselection function is the probability of being hospitalized for syntheticopioid via logistic regression. Finally, we estimate the hospitalcharges realized if the patient was given opioids.ResultsMale patients are significantly more likely to be hospitalized foropioids than are female patients; while white patients are significantlymore likely to be admitted for opioid usage than other racialgroups. We also find that comorbid factors, such as mental health,significantly impact hospital charges associated with opioid use. Wefind that persons with private health insurance are associated withhigher rates of opioid use.ConclusionsUsing a Heckman two step approach we show that comorbidconditions such as mental health, Hepatitis C, injuries, etc significantlyaffect hospital charges associated with hospitalization. We usethese findings to explore the impact of the 2013 rule mandatingdoctors share opioid prescription information on the incidence ofopioid related death and hospital charges associated with opioidprescriptions. This work is policy relevant because alternatives toopioid prescription such as meditation, pain management therapiesmay be relevant.

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

Abstract

ObjectiveWe will describe a real-time mobile surveillance and casemanagement system designed to organize data collected bymultiple officers about cases and their contacts. We will discuss thissurveillance system and its application for Ebola and other infectiousdiseases in the Democratic Republic of the Congo (DRC) and othersimilar settings. We will review the technology, results, challenges,lessons-learned, and applicability to other contexts.IntroductionImproving surveillance and response is a critical component ofthe Global Health Security Agenda. While it is impossible to predictwhere the next Ebola outbreak will occur, it is very likely that anotheroutbreak will occur in the DRC. Of the 20 known outbreaks, 7 haveoccurred in the DRC, one as recently as 2014. To rapidly detectand respond to an Ebola outbreak, we sought to develop a real-timesurveillance and response system for use in DRC and similar settings.RTI International developed Coconut Surveillance mobile software,which is currently used for real-time malaria surveillance andresponse in Zanzibar, Africa, where malaria elimination efforts areunderway. We took this system and adapted it for Ebola as a possibletool for surveillance and response to Ebola and other (re)emergingdiseases. Plans include pilot testing functionality at clinical sites inDRC, where surveillance infrastructure is limited at the local level.Coconut Surveillance is a mobile disease surveillance and rapidresponse system currently used for malaria elimination activities.It receives suspected positive case alerts from the field via mobilephones and uses mobile software to guide surveillance officersthrough a follow-up process. Coconut Surveillance runs on Androidmobile devices that are used to coordinate work in the field as well asprovide decision support during data collection and case management.In addition to standard case information, the GPS coordinates ofthe case’s household are captured as well as malaria status of allhousehold members. Data are collected and accessed off-line, and aresynchronized with a shared database when Internet connectivity isavailable. This tool has been used successfully in Zanzibar for morethan three years and has been recognized as one of the most advancedapplications of its kind.MethodsWe adapted the Coconut Surveillance system for Ebolasurveillance and response, and expanded the system for use with othercommunicable diseases. With a near real-time outbreak detectionsystem for Ebola, we may reduce the response time and contain anoutbreak faster. Using a cloud-based data repository, the modifiedCoconut System, known as Coconut Plus, also has the added value ofcase and case-contacts specific information sharing in real-time withthe national, provincial, and district level public health authorities,who would have convenient and secure access to case and contactinformation via the Internet. The software modifications to theCoconut System have been informed by testing and stakeholderfeedback.ResultsWe have developed Coconut Plus around the Coconut softwarearchitecture, which allows the team to quickly develop specificworkflows and applications, such as contact tracing, on top of a solidand well-supported base. Additionally, the adaptation was structuredto accommodate the build-out of multiple diseases, and is uniquelyhelpful for diseases that require tracking many contacts. We weregranted access in DRC to test interoperability with DHIS 2, the mostwidely used health information system software in Ebola effectedcountries. Coconut Plus is now using the DHIS 2 organizationalhierarchy definition, which means that organizational hierarchy(including information on administrative units and health carefacilities) can be exported directly from DHIS 2 to Coconut Plus.Stakeholder feedback on the usability and feasibility of the adaptedsystem has been enthusiastic, and stressed the need for additionalresources to make a pilot successful, including mobile phones andimproved mobility of surveillance staff in the field. The followingscreencast provides an overview of the application: https://www.youtube.com/watch?v=jjLT3pLLW-UConclusionsCoconut Surveillance Plus solves an absence of a real-time mobiledecision support disease surveillance and response system that can beused for Ebola and other infectious diseases in countries with limitedsurveillance infrastructure. More broadly, this system could also beused for many communicable diseases that require contact tracing andan urgent outbreak response in environments that require rapid scaleup of a distributed surveillance, rapid response, and case managementsystem.

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

Abstract

ObjectiveTo assess the impact on human health observed in associationwith periods of poor air quality which extended across internationalborders, affecting both London (UK) and Paris (France).In particular to quantify increased levels of emergency department(ED) attendances for asthma and wheeze/ difficulty breathing, andhow different age groups were affected. Here, using ED syndromicsurveillance from England and France, we aimed to identify anddescribe the acute impact of periods of particularly poor air qualityduring 2014 on human health in both London and Paris.IntroductionThe impact of poor air quality (AQ) on human health is a globalissue, with periods of poor AQ known to occur in multiple locations,across different countries at, or around the same time.The Public Health England (PHE) Emergency DepartmentSyndromic Surveillance System (EDSSS) is a public health legacyof the London 2012 Olympic and Paralympic Games, monitoringanonymised daily attendance data in near real-time from a sentinelnetwork of up to 38 EDs across England and Northern Ireland during2014.The Organisation de la Surveillance COordonnée des URgences(OSCOUR®) is a similar ED system coordinated by Santé publiqueFrance and has been running in France since 2004, establishedfollowing a major heatwave in 2003 to improve real-time publichealth surveillance capabilities. This truly national network includedaround 540 EDs in 2014.MethodsPeriods of poor AQ during 2014 in both London and Paris, whichwere likely to have an acute impact on human health were identifiedfrom the daily particulate monitoring data made available by themonitoring authorities in each location.1,2Daily ED syndromic surveillance data for selected health indicators(asthma, difficulty breathing type attendances and myocardialischaemia (MI)) were gathered from EDSSS and OSCOUR®forLondon and Paris respectively.The standard method used for the daily statistical analysis ofEDSSS(RAMMIE method),3was also applied to OSCOUR®and usedto identify days where the numbers of attendances reported in boththe EDSSS and OSCOUR®systems were statistically significantlydifferent to the historical data, based on the previous 2 years.ResultsDistinct differences were identified between the impact observedon different age groups, with increased asthma ED attendances forchildren during/ following some AQ events, though a greater impactwas observed in adults around other AQ events.Increases in ED attendances for asthma were identified at severalpoints where no AQ events were reported, both short lived spikesduring the summer period in particular and a more sustained increasetowards the start of autumn.ConclusionsDespite EDSSS and OSCOUR®having been developed in differentcountries, at different times and resulting from different drivers, bothsystems use very similar syndromic indicators to identify asthma,difficulty breathing and MI attendances. Using these systems theshort term impacts of multiple AQ events which crossed internationalboundaries were successfully identified and investigated by Englishand French public health authorities.Periods of poor AQ are not the only events that can affect asthmatype attendances as identified here, thunderstorm activity and thebeginning of a new academic year also coincided with increasedattendances in both London and Paris.Harmonisation of surveillance methods across differentinternational jurisdictions is possible and there is the potential forfuture cross border surveillance and harmonisation of methodsbetween countries to improve international health surveillance andearly warning of potential public health threats affecting multiplecountries.

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

Abstract

ObjectiveTo describe the process, benefits, and challenges of implementinga distributed model for chronic disease surveillance across thirteenCanadian jurisdictions.IntroductionThe Public Health Agency of Canada (PHAC) established theCanadian Chronic Disease Surveillance System (CCDSS) in 2009 tofacilitate national estimates of chronic disease prevalence, incidence,and health outcomes. The CCDSS uses population-based linkedhealth administrative databases from all provinces/territories (P/Ts)and a distributed analytic protocol to produce standardized diseaseestimates.MethodsThe CCDSS is founded on deterministic linkage of threeadministrative health databases in each Canadian P/T: health insuranceregistration files, physician billing claims, and hospital dischargeabstracts. Data on all residents who are eligible for provincial orterritorial health insurance (about 97% of the Canadian population) arecaptured in the health insurance registration files. Thus, the CCDSScoverage is near-universal. Disease case definitions are developed byexpert Working Groups after literature reviews are completed andvalidation studies are undertaken. Feasibility studies are initiatedin selected P/Ts to identify challenges when implementing thedisease case definitions. Analytic code developed by PHAC is thendistributed to all P/Ts. Data quality surveys are routinely conductedto identify database characteristics that may bias disease estimatesover time or across P/Ts or affect implementation of the analytic code.The summary data produced in each P/T are approved by ScientificCommittee and Technical Committee members and then submitted toPHAC for further analysis and reporting.ResultsNational surveillance or feasibility studies are currently ongoing fordiabetes, hypertension, selected mental illnesses, chronic respiratorydiseases, heart disease, neurological conditions, musculoskeletalconditions, and stroke. The advantages of the distributed analyticprotocol are (Figure 1): (a) changes in methodology can be easilymade, and (b) technical expertise to implement the methodology is notrequired in each P/T. Challenges in the use of the distributed analyticprotocol are: (a) heterogeneity in healthcare databases across P/Tsand over time, (b) the requirement that each P/T use the minimum setof data elements common to all jurisdictions when producing diseaseestimates, and (c) balancing disclosure guidelines to ensure dataconfidentiality with comprehensive reporting. Additional challenges,which include incomplete data capture for some databases and poormeasurement validity of disease diagnosis codes for some chronicconditions, must be continually addressed to ensure the scientificrigor of the CCDSS methodology.ConclusionsThe CCDSS distributed analytic protocol offers one model fornational chronic disease surveillance that has been successfullyimplemented and sustained by PHAC and its P/T partners. Manylessons have been learned about national chronic disease surveillanceinvolving jurisdictions that are heterogeneous with respect tohealthcare databases, expertise, and population characteristics.

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

Abstract

ObjectiveTo build capacity to conduct syndromic surveillance at the locallevel by leveraging a health surveillance need.IntroductionWildfires occur annually in Oregon, and the health risks of wildfiresmoke are well documented1. Before implementing syndromicsurveillance through Oregon ESSENCE, assessing the health effectsof wildfires in real time was very challenging. Summer 2015 markedthe first wildfire season with 60 of 60 eligible Oregon emergencydepartments (EDs) reporting to ESSENCE. The Oregon ESSENCEteam developed a wildfire surveillance pilot project with two localpublic health authorities (LPHAs) to determine their surveillanceneeds and practices and developed a training program to increasecapacity to conduct surveillance at the local level. Following thetraining, one of the LPHAs integrated syndromic surveillance intoits routine surveillance practices. Oregon ESSENCE also integratedthe evaluation findings into the summer 2016 statewide wildfiresurveillance plan.MethodsOregon ESSENCE staff recruited two LPHA preparednesscoordinators whose jurisdictions are regularly affected by wildfiresmoke to participate in the pilot project. A state public healthemergency preparedness liaison served as facilitator in order toincrease syndromic surveillance capacity among state preparednessstaff.A pre-season interview assessed data and surveillance needs,risk communication practices, and typical response activities duringwildfires. Initial project calls focused on determining specific queriesthat would meet local needs. Participants wanted total ED visitnumbers and health outcomes including asthma, chest pain or heartproblems. Both LPHAs were interested in using the data to assesshealth effects on vulnerable populations, including elderly, children,and migrant workers. Oregon ESSENCE staff also recommendedqueries that would be used if large numbers of people were displaced(e.g., medication refills, dialysis).Before the onset of wildfire season, Oregon ESSENCEepidemiologists created queries and a MyESSENCE page for eachparticipant. LPHA staff practiced running the queries, modifyingthem, and discussed interpretation and data-sharing best practices.During wildfire season, brief weekly webinars enabled participantsto ask questions and learn additional techniques including displayingtime series as proportions and adjusting geographic parameters tofocus on areas with poor air quality.Results2015 was a severe wildfire season in Oregon, with over 685,000acres burned2. For the first time, local and state public health were ableto monitor and share near real-time health information on interagencysmoke calls. In the post project evaluation, participants reportedincreased knowledge of syndromic surveillance, interpretation,and risk communications. There were no marked increases in totalemergency department visits, or visits for asthma, heart palpitations,or other heart complaints. The public may have adhered to warningsand effectively protected themselves against exposure to wildfiresmoke, or health effects may have been less severe and not reflectedin emergency department data. Over the next several years, OregonESSENCE will integrate select urgent care data, which may bettercapture morbidity due to wildfire smoke.ConclusionsFraming syndromic surveillance training around a healthsurveillance need was effective because participants were engagedaround a high-priority health hazard. In summer 2016, OregonESSENCE integrated wildfire health surveillance into a biweeklyESSENCE seasonal hazard surveillance report and invited wildfireresponse partners to subscribe. Local ESSENCE users can use ormodify the queries. In 2017, Oregon ESSENCE will incorporate airquality data from the Environmental Protection Agency so partnerscan monitor air quality and health effects simultaneously.

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

Abstract

ObjectiveThe objective of this pilot study was to develop and evaluatesyndromic definitions for the monitoring of alcohol-related emergencydepartment (ED) visits in near-real–time syndromic surveillance(SyS) data. This study also evaluates the utility of SyS ED data forthe monitoring of underage drinking.IntroductionUnderage drinking is a significant public health problem in theUnited States as well as in Nebraska1-2. Alcohol consumption amongunderage youth accounts for approximately 5,000 deaths each yearin the United States, including motor vehicle crash related deaths,homicides and suicides1. In Nebraska, 23% of 12-20 year olds havereported alcohol use during the past 30 days3. In 2010, the estimatedtotal costs of underage drinking in Nebraska were $423 million.These costs included medical care, work loss along with pain andsuffering2. The health consequences of underage drinking includealcohol-related motor vehicle crashes and other unintentional injuries,physical and sexual assault, suicide, self-inflicted injury, death fromalcohol poisoning, and abuse of other drugs1, 4. The monitoring ofnear-real–time ED data could help underage drinking preventionefforts by providing timelier actionable public health information.MethodsNebraska SyS data from 32 ED facilities was analyzed for visitsof 12 to 20 year olds during October 1, 2015 to August 31, 2016.Three syndromic definitions were developed and tested for themonitoring of alcohol-related ED visits in near-real–time SyS databy using ESSENCE. The first and second definitions were based onquerying the chief complaint (CC) field for search terms associatedwith alcohol use and alcohol abuse or intoxication respectively.The third definition consisted of ICD-9-CM and ICD-10-CMdiagnostic codes associated to alcohol abuse or intoxication. Thesethree definitions were evaluated for internal consistency: reporteddiagnostic codes were used to evaluate the first and second definition,while text in the CC field was used to evaluate the third definition.Records with missing CC or diagnostic codes were excluded from theconsistency analysis. In addition, the CC field of records detected bythe third definition was evaluated for possible alcohol-related healthconsequences.ResultsA total of 126 cases were detected by using the first definition(CC search terms for alcohol use); 61% (50/82) of these identifiedalcohol abuse-related diagnostic codes. On the other hand, a totalof 64 cases were detected by using second definition (CC searchterms specific for alcohol abuse or intoxication); 89% (33/37) ofthese identified alcohol abuse-related diagnostic codes. The thirddefinition (diagnostic codes only) detected 111 cases; 49% (51/105)of these identified alcohol-related search terms in records withreported CC. However, keywords associated to alcohol-related healthconsequences, such as injury, assault, and use of other drugs werefound in records with no alcohol-related search terms in the CC field.Diagnostic codes associated to alcohol-related health consequenceswere observed in 93% (50/54) of these records. These results indicatethat alcohol use is underreported in the CC field.ConclusionsA higher internal consistency was observed for the syndromicdefinition based on CC search terms associated with alcohol abuseor intoxication. However, a syndromic definition based on diagnosticcodes is preferred due to the underreporting of alcohol use in the CCfield. The detection of underage alcohol use-related cases could beimproved by adding alcohol abuse or intoxication CC search termsto a syndromic definition based on diagnostic codes. Overall, resultsof this pilot study suggest that a syndromic definition based ondiagnostic codes can potentially enhance the surveillance of underagedrinking and alcohol-related health consequences.

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

Abstract

ObjectiveTo describe the potential impact of using toxicology data to supportdrug overdose mortality surveillance.IntroductionAlthough Marin County ranks as the healthiest county in California,it ranks poorly in substance abuse indicators, including drug overdosemortality.1Death certificates do not always include specific detail onthe substances involved in a drug overdose.2This lack of specificitymakes it difficult to identify public health issues related to specificprescription drugs in our community. We analyzed 2013 drugoverdose death toxicology reports to determine if they could improvethe description of drug overdose deaths in our community and todescribe associated data characteristics.MethodsToxicology reports were requested from the Office of the Sheriff-Coroner for 37 drug overdose deaths among Marin County residents,comprising 95% of the 39 total drug overdose deaths in 2013.The remaining two deaths were excluded as they were associated withinhalation of therapeutic gases. Select information from toxicologyreports was entered into a database for aggregate analyses. Drugoverdose deaths were considered “fully detailed” if they included thespecific types of drugs involved in the death and did not use any broadlanguage to describe the death (i.e. narcotic, multiple drugs). Student’sT-tests (α=0.05) were used to identify significant differences betweengroups of interest.ResultsOf the 37 drug poisoning deaths analyzed, 34 (92%) had availabletoxicology information. The remaining three (8%) deaths occurredoutside of Marin County and were thus investigated by anotherjurisdiction. A basic toxicology panel was ordered on 17 (50%) ofthe 34 drug overdose deaths, while an expanded toxicology panelwas ordered on the remaining 17 (50%). Alcohol was identified inthe toxicology screen of 15 (44%); Amphetamines were identifiedin 8 (24%); and opiates were identified in 25 (74%) drug overdosedeaths. Among the 25 deaths with at least one opiate identified on thetoxicology screen, the majority (52%, n=13) also had alcohol present.The majority of drug overdose deaths, 18 (53%), did not have fullinformation about the type of drug involved. The average numberof drugs identified on the toxicology screen of all 34 drug overdosedeaths was 6 (SD: 3). The average number of drugs identified in thetoxicology screen significantly differed (p=0.0001) between causes ofdeath that were fully detailed (Mean: 4; 95% CI: 3-5) and those thatwere not fully detailed (Mean: 8; 95% CI: 7-10).ConclusionsData from the Sheriff-Coroner’s office provided detail on thetypes of drugs involved in overdose deaths; however, it is difficultfor local public health practitioners to make decisions about causalityor contributions of these drugs to the death. These data may beuseful in understanding the difference between fully detailed andnon-detailed drug overdose deaths, and a broader context of drugcombinations associated with these deaths. Less drugs were identifiedin the toxicology screen of deaths that were fully detailed, suggestingthat overdose deaths that are not fully detailed may be exceedinglycomplex, making it difficult for medical examiners and coroners toassess causality. Approximately three-quarters of 2013 drug overdosedeaths contained opiates on the toxicology screen, indicating thatopiates may be a significant contributor to overdose deaths in ourcommunity. Our results are descriptive in nature; therefore, eventhough alcohol or opiates were identified on the toxicology screen,they may not be responsible for the overdose death. Given that overhalf of our 2013 overdose deaths were not fully detailed with drugtype, local jurisdictions should work closely with their corner and/ormedical examiner to fully detail death certificates with drugs involvedin overdose deaths.

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Abstract

ObjectiveTo explore the use of emergency department syndromicsurveillance data to identify adverse health events related to electroniccigarettes in order in enhance existing surveillance.IntroductionThe North Dakota Department of Health (NDDoH) investigatedthe feasibility of using syndromic surveillance (SyS) data to identifyhealth care visits due to electronic cigarette (e-cigarette) use.E-cigarettes have been associated with injuries and fatalities in allage groups, including young children attracted to the colorful liquidnicotine carriage packaging [1]. Previously, poison control data wasthe only resource available to the NDDoH for e-cigarette adverseoutcomes surveillance.MethodsData for all visits from June 28, 2014 to June 28, 2015 weredownloaded using the BioSense 2.0 SyS analytic tool. Excel was usedto identify visits containing key words related to e-cigarettes in line-level data. We initially searched for visits using variations of the term“e-cigarette.” After meeting with NDDoH subject matter experts, weexpanded our search to include other related terms: nicotine, clouding,vaping and variations of “electronic nicotine delivery system(ENDS)”. No diagnosis codes were used as none refer specifically toe-cigarettes. Visits were identified solely through searching free textchief complaint and triage notes fields. Not all facilities participatingin the NDDoH SyS program during this time period submitted freetext data.ResultsOut of 650,069 unique visits, four e-cigarette-related visits wereidentified in rich-text data fields searching for “E-cig” and “E cig.”An additional visit was identified using the search term “nicotine,”although this search primarily identified visits including referencesto nicotine patches. Of the five visits identified, two were poisoningsresulting from small children sucking on liquid nicotine cartridges,one referred to eye irritation as a result of accidentally using liquidnicotine as eye drops, and two referred to cardiac issues (chestpain, heart palpitations) after e-cigarette use. Searches includingterms “clouding” and “vaping,” street terms related to e-cigarettes,did not result in the identification of any additional visits related toe-cigarettes; nor did searches related to ENDS. Poison control datafrom the same time period yielded two calls related to e-cigaretteadverse events.ConclusionsIt is possible to identify emergency department visits associatedwith e-cigarette use utilizing SyS data. More visits were identifiedusing SyS data than poison control data, although neither sourceidentified many occurrences of adverse outcomes related toe-cigarettes. E-cig, e cig and nicotine were the most useful searchterms, although a search for “nicotine” must exclude the word “patch”to avoid false identifications. The NDDoH receives free-text data fora majority of the visits in our system, but not all facilities submitfree-text fields, and the number that did varied over the study period.Because no drop-down chief complaints or diagnosis codes relatedto e-cigarettes exist, data from facilities that did not provide free textdata were not helpful in identifying e-cigarette-related visits. Thisinvestigation emphasizes the need for free text fields when using SySto investigate emerging issues.

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

Abstract

ObjectiveDemonstrate that use of the Washington State health informationexchange (HIE) to facilitate access to prescription monitoringprogram (PMP) data enhances the effectiveness of a PMP. Theincreased accessibility will lead to improved patient care by givingproviders more complete and recent data on patients' controlledsubstance prescriptions.IntroductionWashington State experienced a five-fold increase in deaths fromunintentional drug overdoses between 1998 and 2014. The PMPcollects data on controlled substances prescribed to patients andmakes the data available to healthcare providers, giving providersanother tool for patient care and safety. Optimal impact for theprogram depends on providers regularly accessing the information toreview patients' dispensing history. We have found through providersurveys and work with stakeholders that the best way to increase useis to make data seamlessly accessible through electronic health recordsystems (EHRs). This approach does not require a separate login tothe PMP portal. This linkage works through the Health InformationExchange (HIE) to make PMP data available to providers via EHRs.The HIE facilitates electronic communication of patient informationamong organizations including hospitals and providers. In additionto the PMP, another resource to address the prescription drug abuseproblem is the Emergency Department Information Exchange(EDIE), a web-based technology that specifically connects emergencydepartments statewide to track patients who visit multiple EDs.We also developed a connection between EDIE and PMP datathrough the HIE.MethodsIncreased provider utilization of the PMP will be achieved byusing the HIE to create more seamless access to PMP data throughproviders' EHRs and through the EDIE system. This will be done bycompleting the build out of a transaction using NCPCP 10.6, pilotingthe connection with healthcare systems and EHR vendors, and bycontinuing to promote and encourage the PMP to remain an MUoption through recent rule changes being proposed by CMS/ONC.The pilot with Epic was conducted in 2015 from April to October.Epic has released an update, available to Washington customers, thatincludes the connection between EHR and PMP. PMP data is alsoconnected to EDIE. That connection is now live in 80 of 93 acute carehospital emergency departments.ResultsTo date the transaction is in production with 80 emergencydepartments and achieving positive results. In 2015 the PMP receivedmore than 2 million queries from the EDIE system via the HIE,compared to 900,000 queries via the online PMP portal in the yearbefore the link through the HIE was available. We have also finisheda pilot with a major EHR vendor and are working to on-board theircustomers. We are also working directly with healthcare systems, andas of September 2016 there are 3 healthcare facilities in testing thatare expected to go live by the end of the year. Over 90 registrationsfor meaningful use of the PMP have been received, representing morethan 1000 clinics. Improved access to PMP data benefits providers byallowing them to check the history of transactions linked to their DEAnumbers, which can alert them to fraudulent prescriptions.ConclusionsIntegration of PMP data with other information systems will greatlyenhance the accessibility and impact of the data. Making a connectionto EDIE alone more than doubled the number of queries we receivedfrom providers in 2015. We anticipate even more inquiries onceadditional care settings are connected. We hope from this to see acontinued decline in unintentional poisonings due to prescriptiondrugs.

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

Abstract

ObjectiveThe purpose of this study was to investigate the use of large-scalemedical claims data for local surveillance of under-immunizationfor childhood infections in the United States, to develop a statisticalframework for integrating disparate data sources on surveillance ofvaccination behavior, and to identify the determinants of vaccinehesitancy behavior.IntroductionIn the United States, surveillance of vaccine uptake for childhoodinfections is limited in scope and spatial resolution. The NationalImmunization Survey (NIS) - the gold standard tool for monitoringvaccine uptake among children aged 19-35 months - is typicallyconstrained to producing coarse state-level estimates.1In recent years,vaccine hesitancy (i.e., a desire to delay or refuse vaccination, despiteavailability of vaccination services)2has resurged in the United States,challenging the maintenance of herd immunity. In December 2014,foreign importation of the measles virus to Disney theme parks inOrange County, California resulted in an outbreak of 111 measlescases, 45% of which were among unvaccinated individuals.3Digitalhealth data offer new opportunities to study the social determinantsof vaccine hesitancy in the United States and identify finer spatialresolution clusters of under-immunization using data with greaterclinical accuracy and rationale for hesitancy.4MethodsOur U.S. medical claims data comprised monthly reports ofdiagnosis codes for under-immunization and vaccine refusal(Figure 1). These claims were aggregated to five-digit zip-codes bypatient age-group from 2012 to 2015. Spatial generalized linear mixedmodels were used to generate county-level maps for surveillanceof under-immunization and to identify the determinants of vaccinehesitancy, such as income, education, household size, religious grouprepresentation, and healthcare access. We developed a Bayesianmodeling framework that separates the observation of vaccinehesitancy in our data from true underlying rates of vaccine hesitancyin the community. Our model structure also enabled us to borrowinformation from neighboring counties, which improves predictionof vaccine hesitancy in areas with missing or minimal data. Estimatesof the posterior distributions of model parameters were generated viaMarkov chain Monte Carlo (MCMC) methods.ResultsOur modeling framework enabled the production of county-levelmaps of under-immunization and vaccine refusal in the UnitedStates between 2012-2015, the identification of geographic clustersof under-immunization, and the quantification of the associationbetween various epidemiological factors and vaccination status.In addition, we found that our model structure enabled us to accountfor spatial variation in reporting vaccine hesitancy, which improvedour estimation.ConclusionsOur work demonstrate the utility of using large-scale medicalclaims data to improve surveillance systems for vaccine uptake andto assess the social and ecological determinants of vaccine hesitancy.We describe a flexible, hierarchical modeling framework forintegrating disparate data sources, particularly for data collectedthrough different measurement processes or at different spatial scales.Our findings will enhance our understanding of the causes of under-immunization, inform the design of vaccination policy, and aid inthe development of targeted public health strategies for optimizingvaccine uptake.Figure 1. Instances of vaccine refusal (per 100,000 population) for UnitedStates counties in 2014 as observed in medical claims data.

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

Abstract

ObjectiveThis study aims to show the application of longitudinal statisticaland epidemiological methods for building a proactive prescriptiondrug surveillance system for public health.IntroductionPrescription Drug Monitoring Programs (PDMPs) are operating in49 states and several U.S. territories. Current methods for surveillanceof prescription drug related behaviors, include the mean daily dosageof morphine milligram equivalent (MME) per patient, annualpercentage of days with overlapping prescriptions per patient, andannual multiple provider episodes for multiple controlled substanceprescription drugs per patient that are described elsewhere.1,2Thiswork builds on these efforts by extending longitudinal methodsto prescription drug behavior surveillance in order to predict risksassociated with prescription drug use.MethodsSchedule II prescription opioids from January 1, 2014 to February29, 2016 from the Kansas Tracking and Reporting of ControlledSubstances (KTRACS) was used for this analysis. Prescription opioidswere linked to the 2016 version of the morphine milligram equivalentconversion table from the National Center for Injury Preventionand Control.3Population estimates were based on the 2015 CountyVintage single-year of age bridged-race estimates from the NationalCenter for Health Statistics and used to calculate age-adjusted rates. Adaily high dose opioid prescription was defined as having greater thanor equal to 90 morphine milligram equivalent. Since this is a unit-daymeasure with patients experiencing multiple daily high dose opioiddays, the Prentice, William, and Peterson (PWP) recurrent eventmodel was used to estimate the number of high-dose opioid days forKansas patients by gender and age groups.4,5Start time was the firstprescription date with a high-dose opioid and stop time was the nexthigh-dose opioid date during a study period from January 1, 2014to Feb 29, 2016. The PWP model is a statistical model that allowsfor the estimation of covariates on an event history (i.e. total timewith prescription opioids, specifically high-dose opioids). Analysiswas completed with a stratified Cox-proportional hazard model,sandwich covariance for dependent observations, and statisticalsignificance was assessed with a Wald Chi-square. PROC PHREGin SAS/STAT(R) 14.1 was used since it has a new FAST option forfitting large proportional counting process hazard model.ResultsThe age-adjusted rate of daily high-dose opioid patients was3.2 patients per 100 Kansas population-year (95% CI: 3.1 – 3.2).Kansas patients aged 85 and older had the highest age-specific rateof 11.7 (95% CI: 11.5 –11.9). Preliminary recurrent event analysisshows on average nearly a quarter of approximately 50 millionSchedule II opioid patient days were high-dose opioid patient daysamong 785,514 Kansan patients with any prescribed opioid history.In an initial result stratified by the number of high-dose opioid daysand adjusting only for age, males on average had approximately 7%higher hazard of recurrent Schedule II high-dose opioid prescriptiondays than females (β: 0.07, S.E: 0.002, p<0.0001). Kansas patientsaged 45 to 54 compared to Kansas patients 85 and older on averagehad approximately 14% higher hazard of recurrent Schedule II high-dose opioid prescription days (β: 0.14, S.E: 0.007, p<0.0001).ConclusionsThis work demonstrates the application of survival analysistechniques to estimate the population at risk for high-dose opioids,which varies by the length of the total opioid prescription history. Earlyresults from the recurrent event analysis showed that Kansas maleand patients aged 45 to 54 years had the longest history of high-doseopioids. Annual cross-sectional population estimates may incorrectlyestimate the estimated risk of high-dose prescription opioids sinceit assumes all patients have the same prescription history. PDMPsare longitudinal databases. Survival analysis methods like recurrentevent models can leverage the longitudinal structure to more preciselyestimate risk statistics. Future work includes incorporation of healthoutcomes data and further prescription covariates to assess the timingand intensity of opioid potency escalation.

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Abstract

ntroductionInfluenza is a contagious disease that causes epidemics in manyparts of the world. The World Health Organization estimates thatinfluenza causes three to five million severe illnesses each year and250,000-500,000 deaths [1]. Predicting and characterizing outbreaksof influenza is an important public health problem and significantprogress has been made in predicting single outbreaks. However,multiple temporally overlapping outbreaks are also common.These may be caused by different subtypes or outbreaks in multipledemographic groups. We describe ourMultiple Outbreak DetectionSystem(MODS) and its performance on two actual outbreaks.This work extends previous work by our group [2,3,4] by using model-averaging and a new method to estimate non-influenza influenza-likeillness (NI-ILI). We also apply MODS to a real dataset with a doubleoutbreak.MethodsMODS is part of a framework for disease surveillance developedby our group. In this framework, a natural language processing systemextracts symptoms from emergency department patient-care reports.These features are combined with laboratory results and passed to acase detection system that infers a probability distribution over thediseases each patient may have. These diseases include influenza,NI-ILI, and other (appendicitis, trauma, etc.). This distribution isexpressed in terms of the likelihoods of the patients' data. These aregiven to MODS which searches a space of multiple outbreak models,computes the likelihood of each model, and calculates the expectednumber of influenza cases day-by-day. This work differs from pastwork in three important ways. First, we address the problem ofdetecting and characterizing multiple, overlapping outbreaks. Second,we do not rely on simple counts, but use likelihoods given evidencein the free-text portion of patient-care reports as well as laboratoryfindings. Third, we explicitly account for non-influenza influenza-like illnesses. This is important because some forms of influenza-likeillness (such as respiratory syncytial virus) are contagious and exhibitoutbreak activity. This research was approved by the University ofPittsburgh and Intermountain Healthcare IRBs.ResultsWe conducted a set of experiments with simulated outbreaks.MODS is able to detect a single outbreak six to eight weeks beforethe peak. It is also able to recognize a second outbreak approximatelyhalfway between peaks for simulated double outbreaks. Weconducted experiments using real outbreaks and compared ourresults to thermometer sales [5]. Using data from Allegheny CountyPennsylvania for the 2009-2010 influenza season, on September1 MODS predicted an outbreak with a peak on October 5. Thethermometer peak was October 21. The figure "Prediction on October1 for Allegheny County" compares MODS' prediction on October 1to thermometer sales. Using data from Salt Lake City Utah for the2010-2011 influenza season, on November 1 MODS predicted anoutbreak with peak on December 7. The first thermometer peak wasDecember 29. On January 20 MODS predicted a second outbreakwith peak on February 9. The second thermometer peak was March5. The figure "Prediction on January 20 for Salt Lake City" comparesMODS' prediction on January 20 to thermometer sales.ConclusionsWe have built aMultiple Outbreak Detection Systemthat candetect and characterize overlapping outbreaks of influenza. Althoughthe system currently predicts outbreaks of influenza, it is built on ageneral Bayesian framework that can be extended to other diseases.Future work includes incorporating multiple forms of evidence,modeling other known contagious diseases, and detecting outbreaksof new previously unknown diseases.Prediction on October 1 for Allegheny County 2009-2010Prediction on January 20 for Salt Lake City 2010-2011

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Abstract

ObjectiveTo develop and evaluate syndrome definitions for the identificationof acute unintentional drug overdose events including opioid, heroin,and unspecified substances among emergency department (ED) visitsin Virginia.IntroductionNationally, deaths due to opioid overdose have continuallyincreased for the past 15 years1. Deaths specifically related to heroinincreased more than four-fold between 2002 and 20142. Hospitalinpatient discharge data provide information on non-fatal overdoses,but include a significant lag in reporting time3. Syndromic ED visitdata provide near real-time identification of public health issues andcan be leveraged to inform public health actions on the emergingthreat of drug overdose.MethodsVirginia Department of Health (VDH) developed two syndromedefinitions in 2014 to capture acute unintentional drug overdoseevents among syndromic ED visit data. Syndrome 1 captured visitsfor overdose, whether or not a specific substance was mentioned.Syndrome 2 captured only visits for heroin overdose. Definitionswere based on free-text terms found within the chief complaintand standardized text or International Classification of Diseases(ICD) codes within the diagnosis field. In 2016, both definitionswere revised to identify additional inclusion and exclusion criteriaaccording to CDC guidance documentation and syndrome definitionsused by other state jurisdictions.Microsoft SQL was used to modify both definitions based on thenewly identified chief complaint and diagnosis criteria. Record leveldata were analyzed for their adherence to established criteria using aniterative evaluation process.The scope of Syndrome 1 (2016) was narrowed from the 2014version by excluding visits for non-opioid substances, heroin, andnon-acute indicators. It included chief complaint and diagnosisterms related to opioids, unspecified substance overdose, narcotics,and Narcan or naloxone, and excluded terms related to suicide,alcohol overdose alone, withdrawal, detoxification, rehab, addiction,constipation, chronic pain, and any specified non-opioid drug ormedication. Syndrome 2 (2016) included chief complaint or diagnosisterms mentioning heroin overdose and excluded suicide, withdrawal,detoxification, rehab, and addiction. Visits with mention of suicide,rehab, or addiction were identified during the evaluation process,resulting in the exclusion of these terms in the revised query.From January 1, 2015 to July 31, 2016, the number of visitscaptured by the revised syndrome definitions was compared to thenumber captured by the 2014 definitions. Correlation coefficientswere calculated using SAS 9.3.ResultsThe revised Syndrome 1 found 4296 fewer ED visits(29% decrease) for acute unintentional drug overdose betweenJanuary 1, 2015 and July 31, 2016 compared to the 2014 definition.Despite the drop in volume, the monthly trends were similar forthe 2014 and 2016 definitions (correlation coefficient = 0.95,p < 0.001). For the same time period, the revised Syndrome 2 definitionreturned 108 fewer visits (6% decrease) for acute unintentional heroinoverdose. The monthly trends were also similar for the 2014 and 2016definitions (correlation coefficient = 0.98, p < 0.001).ConclusionsBoth revised syndrome definitions improved specificity incapturing overdose visits as Syndrome 1 (2016) identified 29% fewervisits and Syndrome 2 (2016) identified 6% fewer visits found to beunrelated to the desired overdose criteria.When developing the revised syndrome definitions, VDH decidedto exclude non-acute drug-related visits. Terms such as addiction,detoxification, rehab, withdrawal, chronic pain, and constipation wereindicative of habitual drug use or abuse instead of acute overdose andwere thus excluded. In narrowing the scope of Syndrome 1, VDHalso identified and excluded visits for specified drug and medicationoverdose. Together, these expanded exclusion criteria resulted ingreater specificity with both updated syndromes.These revised syndrome definitions enable VDH to better trackopioid and heroin overdose trends in near real-time and overextended time periods which can be used to inform public healthactions. Limitations include the inconsistency of diagnosis codingamong syndromic data submitters, which may lead to geographicunderrepresentation of unintentional drug overdose visits based onthe location of health care systems. VDH will continue to evaluate andrefine these overdose syndrome definitions as this emerging healthissue evolves.

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Abstract

ObjectiveThe transition from ICD-9-CM to ICD-10-CM requires evaluationof syndrome mappings to obtain a baseline for syndromic surveillancepurposes. Two syndrome mappings are evaluated in this report.IntroductionThe Department of Defense conducts syndromic surveillanceof health encounter visits of Military Health System (MHS)beneficiaries. Providers within the MHS assign up to 10 diagnosiscodes to each health encounter visit. The diagnosis codes are groupedinto syndrome and sub-syndrome categories. On October 1, 2015,the Health and Human Services-mandated transition from ICD-9-CM to ICD-10-CM required evaluation of the syndrome mappingsto establish a baseline of syndrome rates within the DoD. The DoDdata within the BioSense system currently utilizes DoD ESSENCEsyndrome mappings. The Master Mapping Reference Table (MMRT)was developed by the CDC to translate diagnostic codes across theICD-9-CM and ICD-10-CM encoding systems to prepare for thetransition. The DoD ESSENCE and MMRT syndrome definitions arepresented in this analysis for comparison.MethodsDoD data was pulled from the BioSense Platform through aRStudio server on October 11, 2016, querying data from October1, 2014 to September 30, 2016. This time period provides twelvemonths of ICD-9-CM data and twelve months of ICD-10-CM data.The ICD codes were binned to both DoD ESSENCE syndromes andMMRT macro syndromes for comparison. Although a patient visitmay contain up to 10 ICD codes, only the first four were includedfor this analysis. Providers are trained to prioritize diagnosis codesby position. Only 2.2% of visits had greater than 4 diagnostic codes.Each ICD code in a visit is binned to an applicable syndrome. Thetotal number of visits includes visits that binned and did not bin toa syndrome. Multiple syndromes may be assigned to one patient'shealth encounter visit if multiple ICD codes are binned. Additionally,more than one code per visit may bin to the same syndrome; however,only unique syndromes are counted in the total syndrome rate. Thetotal syndrome rate was calculated by total unique syndrome visitsas the numerator and total number of visits during the ICD-9-CM orICD-10-CM time period as the denominator. The rates per 1000 totalvisits were calculated.ResultsAmong the DoD ESSENCE syndromes, the ICD-9-CM ratefor ILI was 36.3 per 1,000 compared to the ICD-10-CM rate of38.6 per 1,000. The ICD-9-CM rate for neurological was 18.1 per1,000 compared to the ICD-10-CM rate of 0.2 per 1,000.Among the MMRT syndromes, the ICD-9-CM rate for ILI was16.7 per 1,000 compared to the ICD-10-CM rate of 38.4 per 1,000.The ICD-9-CM rate for mental disorders was 73.8 per 1,000 comparedto the ICD-10-CM rate of 73.2 per 1,000.ConclusionsThis analysis provides baseline rates of MMRT syndromes andsub-syndromes for syndromic surveillance during the ICD-9-CM toICD-10-CM transition. These data will serve for future comparisonand tracking of syndrome-specific trends for military-relevant healththreats.

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Abstract

ObjectiveOur objective was to determine if the detection performance ofcurrent surveillance algorithms to detect call clusters is improved bystratifying by exposure category.IntroductionThe Centers for Disease Control and Prevention (CDC) uses theNational Poison Data System (NPDS) to conduct surveillance ofcalls to United States poison centers (PCs) to identify clusters ofreports of hazardous exposures and illnesses. NPDS stores basicinformation from PC calls including call type (information requestonly or call reporting a possible chemical exposure), exposure agent,demographics, clinical, and other variables.CDC looks for anomalies in PC data by using automated algorithmsto analyze call and clinical effect volume, and by identifying callsreporting exposures to pre-specified high priority agents. Algorithmsanalyzing call and clinical effect volume identify anomalies when thenumber of calls exceeds a threshold using the historical limits method(HLM). Clinical toxicologists and epidemiologists at the AmericanAssociation of Poison Control Centers and CDC apply standardizedcriteria to determine if the anomaly is a potential incident of publichealth significance (IPHS) and then notify the respective healthdepartments and PCs as needed. Discussions with surveillance systemusers and analysis of past IPHS determined that call volume-basedsurveillance results in a high proportion of false positive anomalies.A study assessing the positive predictive value (PPV) of thisapproach determined that fewer than four percent of anomalies over afive-year period were IPHS.1A low PPV can cause an unnecessarywaste of staff time and resources. We hypothesized that first stratifyingcall volume by exposure category would reduce the number of falsepositives. With the help of medical toxicologists, we created 20toxicologically-relevant exposure categories to test this hypothesis.MethodsTo compare cluster detection performance between the twoapproaches, we used a historical testbed of hourly exposure callcounts with and without initial stratification by exposure categoryfrom 10 selected PCs from Jan 1, 2006 - Jul 31, 2015. We ran theHLM for both non-stratified and stratified testbeds to estimate themonthly number of anomalies triggered (i.e., alert burden). Our targetsignals to assess detection performance consisted of call samples fromthree large public health events: the 2009 Salmonella food poisoningevent from contaminated peanut butter, the 2012 Hurricane Sandy-associated carbon monoxide poisonings in New Jersey, and the 2014Elk River contaminated water spill in West Virginia (WV). Foreach event, we chose 30 random calls one thousand times to obtain1000 random sets of inject clusters. Each inject cluster was iterativelyadded into the testbed with and without initial stratification byexposure category. We then applied the HLM for each iteration to seeif the algorithm identified the inject cluster. The sensitivity for eachapproach for each PC was calculated as the proportion of iterationswhere the algorithm identified the inject cluster. We reported mediansensitivities from the ten PCs for each of the time windows of 1, 2,4, 8, and 24 hours.ResultsFigure 1 summarizes results for the WV event with markersshowing anomaly burden (x-axis) and sensitivity (y-axis) using thestratified (Δ) and the non-stratified (o) approach by different timewindows (hrs). The results from the other two events are not shownbut established similar patterns. Anomaly burden is shown as theestimated monthly anomaly count for each approach. For example,markers linked by the arrow show that with a 4-hour time window,the stratified approach achieves nearly perfect sensitivity with ~10anomalies as the monthly anomaly burden while sensitivity of thenon-stratified approach is below 20% with ~40 monthly anomalies.The stratified approach gave improved overall sensitivity across alltime windows, and reduced anomaly burden for 1-, 2-, and 4-hourtime windows.ConclusionsWe found a consistent detection advantage (higher sensitivityand lower anomaly burden) for the stratified vs traditional non-stratified approach for 1-, 2-, and 4-hour time windows. Furtherresearch should focus on refining the stratified approach and thespecific surveillance parameters (such as time windows) that increasealgorithm performance.Figure 1: Detection performance comparison: stratified vs non-stratifiedapproach; 2014 Elk River contaminated water spill in West Virginia scenario

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

Abstract

ObjectiveOur objective was to compare the effectiveness of applying thehistorical limits method (HLM) to poison center (PC) call volumeswith vs without stratifying by exposure type.IntroductionThe Centers for Disease Control and Prevention (CDC) uses theNational Poison Data System (NPDS) to conduct surveillance ofcalls to United States PCs. PCs provide triage and treatment advicefor hazardous exposures through a free national hotline. Informationon demographics, health effects, implicated substance(s), medicaloutcome of the patient, and other variables are collected.CDC uses automated algorithms to identify anomalies in both purecall volume and specific clinical effect volume, and to identify callsreporting exposure to high priority agents. Pure and clinical effectvolume anomalies are identified when an hourly call count exceeds athreshold based on historical data using HLM.1Clinical toxicologistsand epidemiologists at the American Association of Poison ControlCenters and CDC apply standardized criteria to determine if theanomaly identifies a potential incident of public health significance(IPHS) and to notify the respective health departments and localPCs as needed. Discussions with NPDS users and analysis of IPHSshowed that alerting based on pure call volume yielded excessivefalse positives. A study using a 5-year NPDS call dataset assessed thepositive predictive value (PPV) of the call volume-based approach.This study showed that less than 4% of anomalies were IPHS.2A low PPV can cause unnecessary waste of staff time and resourcesanalyzing false positive anomalies.As an alternative to pure call volume-based detection where allcalls to each PC are aggregated for anomaly detection, we consideredseparating calls by toxicologically-relevant exposure categories formore targeted anomaly detection. We hypothesized that this stratifiedapproach would reduce the number of false positives.MethodsWe derived our exposure categories based on the criteria that thecategories must: 1) relate to hazardous exposures of public healthimportance, 2) reflect categories based on clinical effects andtreatment modalities, 3) avoid high priority exposures that may betriggered by single calls, 4) be compatible with exposure substanceidentification codes currently used by PCs and NPDS, and 5) includeenough calls for meaningful tracking. We queried all calls reportingexposures to the proposed categories between January 1, 2009and July 31, 2015 for ten PCs. We applied the HLM method afterstratifying by exposure category and tabulated the number of alertstriggered for each category during the study period. We then appliedthe HLM method for the ten PCs on all combined exposure calls torepresent the traditional non-stratified approach. We compared thecombined alert burden generated by stratifying by exposure categorywith the alert burden for the non-stratified approach for varying timewindows (1-, 2-, 4-, 8- and 24-hours). We conducted analysis in R.ResultsWe derived a total of 20 exposure categories, including chemicals(n=4), drugs of abuse (n=6), pesticides (n=3), gas/fume/vapors (n=2),contaminated food/water (n=1), and others (n=4). Call counts during2015 for these categories ranged from approximately 5,000 to 90,000.Table 1 shows the total number of alerts triggered for each methodby time windows. There was a marked reduction of alert burdenwhen first stratifying by exposure category for time windows shorterthan eight hours compared to the alert burden for the non-stratifiedapproach.ConclusionsStratification of call volume by exposure category and timewindow suggests potential improvement over traditional non-stratified approach by having a lower alert burden. Further workshould focus on refining the exposure categories, refining the timewindow for surveillance, and assessing other detection performancemetrics, such as sensitivity.Table 1: Alert burden comparison for the non-stratified vs stratified approach

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

Abstract

ObjectiveTo improve understanding of the relative burden of differentcausative respiratory pathogens on respiratory syndromic indicatorsmonitored using syndromic surveillance systems in England.IntroductionPublic Health England (PHE) uses syndromic surveillance systemsto monitor for seasonal increases in respiratory illness. Respiratoryillnesses create a considerable burden on health care services andtherefore identifying the timing and intensity of peaks of activity isimportant for public health decision-making. Furthermore, identifyingthe incidence of specific respiratory pathogens circulating in thecommunity is essential for targeting public health interventionse.g. vaccination. Syndromic surveillance can provide early warningof increases, but cannot explicitly identify the pathogens responsiblefor such increases.PHE uses a range of general and specific respiratory syndromicindicators in their syndromic surveillance systems, e.g. “allrespiratory disease”, “influenza-like illness”, “bronchitis” and“cough”. Previous research has shown that “influenza-like illness”is associated with influenza circulating in the community1whilst“cough” and “bronchitis” syndromic indicators in children under 5are associated with respiratory syncytial virus (RSV)2, 3. However, therelative burden of other pathogens, e.g. rhinovirus and parainfluenzais less well understood. We have sought to further understand therelationship between specific pathogens and syndromic indicators andto improve estimates of disease burden. Therefore, we modelled theassociation between pathogen incidence, using laboratory reports andhealth care presentations, using syndromic data.MethodsWe used positive laboratory reports for the following pathogens as aproxy for community incidence in England: human metapneumovirus(HMPV), RSV, coronavirus, influenza strains, invasivehaemophilusinfluenzae, invasivestreptococcus pneumoniae, mycoplasmapneumoniae, parainfluenza and rhinovirus. Organisms were chosenthat were found to be important in previous work2and were availablefrom routine laboratory testing. Syndromic data included consultationswith family doctors (called General Practitioners or GPs), calls to anational telephone helpline “NHS 111” and attendances at emergencydepartments (EDs). Associations between laboratory reports andsyndromic data were examined over four winter seasons (weeks40 to 20), between 2011 and 2015. Multiple linear regression was usedto model correlations and to estimate the proportion of syndromicconsultations associated with specific pathogens. Finally, burdenestimates were used to infer the proportion of patients affected byspecific pathogens that would be diagnosed with different symptoms.ResultsInfluenza and RSV exhibited the greatest seasonal variation andwere responsible for the strongest associated burden on generalrespiratory infections. However, associations were found with theother pathogens and the burden ofstreptococcus pneumoniaewasimportant in adult age groups (25 years and over).The model estimates suggested that only a small proportion ofpatients with influenza receive a specific diagnosis that is coded toan “influenza-like illness” syndromic indicator, (6% for both GPin-hours consultations and for emergency department attendances),compared to a more general respiratory diagnosis. Also, patients withinfluenza calling NHS 111 were more likely to receive a diagnosisof fever or cough than cold/flu. Despite these findings, the specificsyndromic indicators remained more sensitive to changes in influenzaincidence than the general indicators.ConclusionsThe majority of patients affected by a seasonal respiratory pathogenare likely to receive a non-specific respiratory diagnosis. Therefore,estimates of community burden using more specific syndromicindicators such as “influenza-like illness” are likely to be a severeunderestimate. However, these specific indicators remain importantfor detecting changes in incidence and providing added intelligenceon likely causative pathogens.Specific syndromic indicators were associated with multiplepathogens and we were unable to identify indicators that were goodmarkers for pathogens other than influenza or RSV. However, futurework focusing on differences between ages and the relative levels ofa range of pathogens may be able to provide estimates for the mix ofpathogens present in the community in real-time.

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

Abstract

ObjectiveWe present the multidimensional tensor scan (MDTS), a newmethod for identifying emerging patterns in multidimensionalspatio-temporal data, and demonstrate the utility of this approachfor discovering emerging geographic, demographic, and behavioraltrends in fatal drug overdoses.IntroductionDrug overdoses are an increasingly serious problem in the UnitedStates and worldwide. The CDC estimates that 47,055 drug overdosedeaths occurred in the United States in 2014, 61% of which involvedopioids (including heroin, pain relievers such as oxycodone, andsynthetics).1Overdose deaths involving opioids increased 3-foldfrom 2000 to 2014.1These statistics motivate public health to identifyemerging trends in overdoses, including geographic, demographic,and behavioral patterns (e.g., which combinations of drugs areinvolved). Early detection can inform prevention and response efforts,as well as quantifying the effects of drug legislation and other policychanges.The fast subset scan2detects significant spatial patterns of diseaseby efficiently maximizing a log-likelihood ratio statistic over subsetsof data points, and has recently been extended to multidimensionaldata (MD-Scan).3While MD-Scan is a potentially useful tool for drugoverdose surveillance, the high dimensionality and sparsity of the datarequires a new approach to estimate and represent baselines (expectedcounts), maintaining both accuracy and efficient computation whensearching over subsets.MethodsThe multidimensional tensor scan (MDTS) is a new approach tosubset scanning in multidimensional data. In addition to detectingthe spatial area (subset of locations) and time window affected byan emerging outbreak, MDTS can also identify the affected subsetof values for each observed attribute. For example, given the drugoverdose surveillance data described below, MDTS can identify theaffected genders, races, age ranges, and which drugs were involved.MDTS finds subsets of the attribute space with higher than expectedcase counts, first using a novel tensor decomposition approachto estimate the expected counts. MDTS then iteratively applies aconditional optimization step, optimizing over all subsets of valuesfor each attribute conditional on the current subsets of values for allother attributes3, and using the linear-time subset scanning property2to make each conditional optimization step computationally efficient.The resulting approach has high power to detect and characterizeemerging trends which may only affect a subset of the monitoredpopulation (e.g., specific ages, genders, neighborhoods, or users ofparticular combinations of drugs).ResultsWe used MDTS to analyze publicly available data from theAllegheny County, PA medical examiner's office and to detectemerging overdose patterns and trends. The dataset consists of~2000 fatal accidental drug overdoses between 2008 and 2015.For each overdose victim, we have date, location (zip code), agedecile, gender, race, and the presence/absence of 27 commonlyabused drugs in their system. The highest-scoring clusters discoveredby MDTS were shared with Allegheny County's Dept. of HumanServices and their feedback obtained.One set of potentially relevant findings from our analysisinvolved fentanyl, a dangerous and potent opioid which has been aserious problem in western PA. In addition to identifying two well-known, large clusters of overdoses—14 deaths in January 2014 and26 deaths in March-April 2015—MDTS was able to provide additionalinformation about each cluster. For example, the first cluster waslikely due to fentanyl-laced heroin, while the second was more likelydue to fentanyl disguised as heroin (only 11 victims had heroin intheir system). Moreover, the second cluster was initially confinedto the Pittsburgh suburb of McKeesport and a typical demographic(white males ages 20-49), before spreading across the county. Ouranalysis demonstrated that prospective surveillance using MDTSwould have identified the cluster as early as March 29th, enablingtargeted prevention efforts. MDTS also discovered a previouslyunidentified, highly localized cluster of fentanyl-related overdosesaffecting an unusual and underserved demographic (elderly blackmales near downtown Pittsburgh). This cluster occurred in January-February 2015, and may have been related to the larger cluster offentanyl-related overdoses that occurred two months later. Finally,we identified multiple overdose clusters involving combinationsof methadone and Xanax between 2008 and 2012, and observeddramatic reductions in these clusters corresponding to the passageof the Methadone Death and Incident Review Act (October 2012),which increased state oversight of methadone clinics and prescribingphysicians.ConclusionsRetrospective analysis of Allegheny County overdose datasuggests high potential utility for a prospective overdose surveillancesystem, which would enable public health users to identify emergingpatterns of overdoses in their early stages and facilitate targeted andeffective health interventions. The MDTS approach can also be usedfor other multidimensional public health surveillance tasks, such asSTI surveillance, where the patterns or outbreaks of interest may havedemographic, geographic, and behavioral components.

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

Abstract

ObjectiveWe present the support vector subset scan (SVSS), a new methodfor detecting localized and irregularly shaped patterns in spatial data.SVSS integrates the penalized fast subset scan3with a kernel supportvector machine classifier to accurately detect disease clusters that arecompact and irregular in shape.IntroductionNeill's fast subset scan2detects significant spatial patterns ofdisease by efficiently maximizing a log-likelihood ratio statisticover subsets of locations, but may result in patterns that are notspatially compact. The penalized fast subset scan (PFSS)3providesa flexible framework for adding soft constraints to the fast subsetscan, rewarding or penalizing inclusion of individual points into acluster with additive point-specific penalty terms. We propose thesupport vector subset scan (SVSS), a novel method that iterativelyassigns penalties according to distance from the separating hyperplanelearned by a kernel support vector machine (SVM). SVSS efficientlydetects disease clusters that are geometrically compact and irregular.MethodsSpeakman3observes that for a fixed value of relative riskq, thelog-likelihood ratio for the exponential family of expectation-basedscan statistics can be written as an additive set function over all dataelements. This property enables addition of element-specific penaltyterms to the log-likelihood ratio, interpreted as the prior log-odds ofincluding a data point in the cluster. We propose an iterative methodfor setting the penalty terms which leads to spatially compact clusters,alternately running PFSS to obtain an optimal subset and traininga kernel SVM to maximize the margin between points within andoutside of the subset. On each iteration of PFSS, penalties are assignedbased on distance to the SVM decision boundary. We apply randomrestarts across the penalty space to approach a global optimum in thenon-convex SVSS objective function.ResultsWe demonstrate detection of disease clusters in mosquito poolstested for West Nile Virus (WNV), using data made publicly availableby the Chicago Department of Public Health through the City ofChicago Data Portal. In comparison to the circular scan1, whichdetects circular patterns with elevated WNV, SVSS has improvedpower to detect disease clusters that are elongated or irregularin shape. For example, the top WNV cluster detected by SVSSroughly conforms to sections of two major rivers in North Chicago,overlapping significant portions of the forest preserves adjacent tothese rivers. The unconstrained fast subset scan2has high detectionpower for subtle and irregular disease clusters, but finds patterns thatare spatially sparse and intermingled with non-anomalous points.SVSS rewards patterns with spatial coherence, detecting clustersthat are compact and separated from non-anomalous points whilemaintaining power to detect slight but significant increases in detectedrates of WNV.ConclusionsSVSS introduces soft spatial constraints to the fast subset scan2in the form of penalties to the log-likelihood ratio statistic, learnediteratively based on distance to a high-dimensional SVM decisionboundary. These constraints give SVSS greater power to detectspatially compact and irregular patterns of disease.Clusters of West Nile Virus detected by three scanning algorithms.

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

Abstract

ObjectiveTo improve the ability of syndromic surveillance systems to detectunusual events.IntroductionSyndromic surveillance systems are used by Public Health England(PHE) to detect changes in health care activity that are indicative ofpotential threats to public health. By providing early warning andsituational awareness, these systems play a key role in supportinginfectious disease surveillance programmes, decision making andsupporting public health interventions.In order to improve the identification ofunusualactivity, wecreated new baselines to modelseasonally expectedactivity inthe absence of outbreaks or other incidents. Although historicaldata could be used to model seasonality, changes due to publichealth interventions or working practices affected comparability.Specific examples of these changes included a major change in theway telehealth services were provided in England and the rotavirusvaccination programme introduced in July 2013 that changed theseasonality of gastrointestinal consultations. Therefore, we needed toincorporate these temporal changes in our baselines.MethodsWe used negative binominal regression to model daily syndromicsurveillance, allowing for day of week and public holiday effects.To account for step changes in data caused by changes in healthcaresystem working practices or public health interventions we introducedspecific independent variables into the models. Finally, we smoothedthe regression models to provide short term forecasts of expectedtrends.The new baselines were applied to PHE’s four syndromicsurveillance systems for daily surveillance and public-facing weeklybulletins.ResultsWe replaced traditional surveillance baselines (based on simpleaverages of historical data) with the regression models for dailysurveillance of 53 syndromes across four syndromic surveillancesystems. The improved models captured current seasonal trends andmore closely reflected actual data outside of outbreaks.ConclusionsSyndromic surveillance baselines provide context forepidemiologists to make decisions about seasonal disease activity andemerging public health threats. The improved baselines developedhere showed whether current activity was consistent with expectedactivity, given all available information, and improved interpretationwhen trends diverged from expectations.

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

Abstract

ObjectiveThis study assesses the utilization of triage notes from emergencydepartments (EDs) and urgent care centers (UCCs) for active casefinding in ESSENCE-FL during the Zika response.IntroductionThe Florida Department of Health (DOH) utilizes the ElectronicSurveillance System for the Early Notification of Community BasedEpidemics (ESSENCE-FL) as its statewide syndromic surveillancesystem. ESSENCE-FL comprises of chief complaint data from231 of 240 EDs, representing 96 percent of the total number of EDsin Florida. Historically, syndromic surveillance has categorizedpatient chief complaint data into syndromes for the purpose of diseasesurveillance or outbreak detection. Triage notes are much longer free-text, pre-diagnostic data that capture the presenting symptoms andcomplaints of a patient.MethodsTriage notes are being collected from 24 EDs, representing tenpercent of total reporting EDs, and seven UCCs, representing 17%of total reporting UCCs. Triage notes were made a searchable fieldin ESSENCE-FL during Zika enhanced surveillance efforts, whichfacilitated additional case finding of Zika.During the period of February 3, 2016 – July 25, 2016, a free-textquery was created to run against the concatenated chief complaint-discharge diagnosis (CCDD) and triage note fields:^zika^,or,^ziki^,or,^zica^,or,^zeeka^,or,^zeeca^,or,^microcep^,or,^zyka^Additional queries were created to detect foreign travel visits ofinterest within the CCDD and triage note fields. Results of thesequeries were analyzed and communicated to county and regionalepidemiologists daily for investigation.ResultsThe triage note specific queries identified 18 Zika triage note and11 foreign travel triage note visits of interest. All of these visits werereviewed and investigated by county epidemiologists. These triagenote queries identified one case of Zika that had not been previouslyreported to public health. Of note, seven additional cases of Zikainfection were identified using the CCDD field in ESSENCE-FL (fiveof the seven flagged in both the CCDD and triage note field).ConclusionsResults from this analysis provide evidence that triage notes withinsyndromic surveillance systems play a role in active case finding whenemerging diseases arise. However, only 31 out of 272 total reportingfacilities are submitting triage note to ESSENCE-FL, representingonly 11% of reporting facilities.Relying on chief complaint and discharge diagnosis data onlywould have resulted in an undetected case of Zika that would havenot been captured by our free-text Zika query.The increased detection of Zika cases allows for public healthintervention, including mosquito control response, which in turnreduces the chance of Zika spreading locally in Florida. Triagenotes often provide pertinent information for determining when aflagged CCDD needs to be investigated further. Making triage notesa required data element for Meaningful Use compliance would benefitcase finding conducted through 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

ObjectiveTo investigate whether aberration detection methods for syndromicsurveillance would be more useful if data were stratified by age band.IntroductionWhen monitoring public health incidents using syndromicsurveillance systems, Public Health England (PHE) uses the ageof the presenting patient as a key indicator to further assess theseverity, impact of the incident, and to provide intelligence on thelikely cause. However the age distribution of cases is usually notconsidered until after unusual activity has been identified in the all-ages population data. We assessed whether monitoring specific agegroups contemporaneously could improve the timeliness, specificityand sensitivity of public health surveillance.MethodsFirst, we examined a wide range of health indicators from the PHEsyndromic surveillance systems to identify for further study thosewith the greatest seasonal variation in the age distribution of cases.Secondly, we examined the identified indicators to ascertain whetherany age bands consistently lagged behind other age bands. Finally,we applied outbreak detection methods retrospectively to age specificdata, identifying periods of increased activity that were only detectedor detected earlier when age-specific surveillance was used.ResultsSeasonal increases in respiratory indicators occurred first inyounger age groups, with increases in children under 5 providingearly warning of subsequent increases occurring in older age groups.Also, we found age specific indicators improved the specificity ofsurveillance using indicators relating to respiratory and eye problems;identifying unusual activity that was less apparent in the all-agespopulation.ConclusionsRoutine surveillance of respiratory indicators in young childrenwould have provided early warning of increases in older age groups,where the burden on health care usage, e.g. hospital admissions, isgreatest. Furthermore this cross-correlation between ages occurredconsistently even though the age distribution of the burden ofrespiratory cases varied between seasons. Age specific surveillancecan improve sensitivity of outbreak detection although all-agesurveillance remains more powerful when case numbers are low.

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

Abstract

ObjectiveWe aimed to describe the theoretical basis and the potentialapplications of the test-negative design for estimating influenzavaccination effectiveness in sentinel influenza surveillance.IntroductionThe test-negative design is a variation of the case-control study,in which patients are enrolled in outpatient clinics (and/or hospitals)based on a clinical case definition such as influenza-like illness (ILI).Patients are then tested for influenza virus, and VE is estimated fromthe odds ratio comparing the odds of vaccination among patientstesting positive for influenza versus those testing negative, adjustingfor potential confounding factors. The design leverages existingdisease surveillance networks and as a result, studies using it areincreasingly being reported.MethodsWe sought to examine the theoretical basis for this design usingcausal analysis including directed acyclic graphs. We reviewedstudies that used this design and examined the study populations andsettings, the methodologic choices including analytic approaches, andthe estimates of influenza VE provided. We conducted simulationstudies to examine specific potential biases.ResultsWe show how studies using this design can avoid or minimizebias, and where bias may be introduced with particular study designvariations. A purported advantage of the test-negative designis to minimise selection bias by health-care seeking behaviourand we demonstrate why residual bias may occur. Anotherpurported advantage of the test-negative design is minimization ofmisclassification of the exposure; however we show how this sourceof bias may persist and how exposure misclassification may bea greater cause for concern not dealt with by the study design. Inour review, we found great variation in estimates, but consistencybetween interim and final VE estimates from the same locations,and consistency between VE estimates from inpatient and outpatientstudies in the same locations, age groups and years. One outstandingissue is the potential bias due to non-collapsibility.ConclusionsOur work provides a starting point for further consideration of thevalidity of the test-negative design, which is an efficient approachfor routine monitoring of influenza VE that can be implemented inexisting surveillance systems without substantial additional resources.Harmonization of analytic approaches may improve the potential forpooling VE 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

ObjectiveTo comparatively analyze Google, Twitter, and Wikipedia byevaluating how well change points detected in each web-based sourcecorrespond to change points detected in CDC ILI data.IntroductionTraditional influenza surveillance relies on reports of influenza-like illness (ILI) by healthcare providers, capturing individualswho seek medical care and missing those who may search, post,and tweet about their illnesses instead. Existing research has shownsome promise of using data from Google, Twitter, and Wikipediafor influenza surveillance, but with conflicting findings, studies haveonly evaluated these web-based sources individually or dually withoutcomparing all three of them1-5. A comparative analysis of all threeweb-based sources is needed to know which of the web-based sourcesperforms best in order to be considered to complement traditionalmethods.MethodsWe collected publicly available, de-identified data from the CDCILINet system, Google Flu Trends, HealthTweets.org, and Wikipediafor the 2012-2015 influenza seasons. Bayesian change point analysiswas the method used to detect change points, or seasonal changes,in each of the web-data sources for comparison to change pointsin CDC ILI data. All analyses was conducted using the R package‘bcp’ v4.0.0 in RStudio v0.99.484. Sensitivity and positive predictivevalues (PPV) were then calculated.ResultsDuring the 2012-2015 influenza seasons, a high sensitivity of 92%was found for Google, while the PPV for Google was 85%. A lowsensitivity of 50% was found for Twitter; a low PPV of 43% wasfound for Twitter also. Wikipedia had the lowest sensitivity of 33%and lowest PPV of 40%.ConclusionsGoogle had the best combination of sensitivity and PPV indetecting change points that corresponded with change points found inCDC data. Overall, change points in Google, Twitter, and Wikipediadata occasionally aligned well with change points captured in CDCILI data, yet these sources did not detect all changes in CDC data,which could indicate limitations of the web-based data or signify thatthe Bayesian method is not adequately sensitive. These three web-based sources need to be further studied and compared using otherstatistical methods before being incorporated as surveillance data tocomplement traditional systems.Figure 1. Detection of change points, 2012-2013 influenza seasonFigure 2. Detection of change points, 2013-2014 influenza seasonFigure 3. Detection of change points, 2014-2015 influenza season

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

Abstract

ObjectiveTo explain the utility of using an automated syndromic surveillanceprogram with advanced natural language processing (NLP) to improveclinical quality measures reporting for influenza immunization.IntroductionClinical quality measures (CQMs) are tools that help measure andtrack the quality of health care services. Measuring and reportingCQMs helps to ensure that our health care system is deliveringeffective, safe, efficient, patient-centered, equitable, and timely care.The CQM for influenza immunization measures the percentage ofpatients aged 6 months and older seen for a visit between October1 and March 31 who received (or reports previous receipt of) aninfluenza immunization. Centers for Disease Control and Preventionrecommends that everyone 6 months of age and older receive aninfluenza immunization every season, which can reduce influenza-related morbidity and mortality and hospitalizations.MethodsPatients at a large academic medical center who had a visit toan affiliated outpatient clinic during June 1 - 8, 2016 were initiallyidentified using their electronic medical record (EMR). The 2,543patients who were selected did not have documentation of influenzaimmunization in a discrete field of the EMR. All free text notes forthese patients between August 1, 2015 and March 31, 2016 wereretrieved and analyzed using the sophisticated NLP built withinGeographic Utilization of Artificial Intelligence in Real-Timefor Disease Identification and Alert Notification (GUARDIAN)– a syndromic surveillance program – to identify any mention ofinfluenza immunization. The goal was to identify additional cases thatmet the CQM measure for influenza immunization and to distinguishdocumented exceptions. The patients with influenza immunizationmentioned were further categorized by GUARDIAN NLP intoReceived, Recommended, Refused, Allergic, and Unavailable.If more than one category was applicable for a patient, they wereindependently counted in their respective categories. A descriptiveanalysis was conducted, along with manual review of a sample ofcases per each category.ResultsFor the 2,543 patients who did not have influenza immunizationdocumentation in a discrete field of the EMR, a total of 78,642 freetext notes were processed using GUARDIAN. Four hundred fiftythree (17.8%) patients had some mention of influenza immunizationwithin the notes, which could potentially be utilized to meet the CQMinfluenza immunization requirement. Twenty two percent (n=101)of patients mentioned already having received the immunizationwhile 34.7% (n=157) patients refused it during the study time frame.There were 27 patients with the mention of influenza immunization,who could not be differentiated into a specific category. The numberof patients placed into a single category of influenza immunizationwas 351 (77.5%), while 75 (16.6%) were classified into more thanone category. See Table 1.ConclusionsUsing GUARDIAN's NLP can identify additional patients whomay meet the CQM measure for influenza immunization or whomay be exempt. This tool can be used to improve CQM reportingand improve overall influenza immunization coverage by using it toalert providers. Next steps involve further refinement of influenzaimmunization categories, automating the process of using the NLPto identify and report additional cases, as well as using the NLP forother CQMs.Table 1. Categorization of influenza immunization documentation within freetext notes of 453 patients using NLP

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

Abstract

ObjectiveWe apply an empirical Bayesian framework to perform changepoint analysis on multiple cattle mortality data streams, accountingfor delayed reporting of syndromes.IntroductionTaking into account reporting delays in surveillance systems isnot methodologically trivial. Consequently, most use the date of thereception of data, rather than the (often unknown) date of the healthevent itself. The main drawback of this approach is the resultingreduction in sensitivity and specificity1. Combining syndromicdata from multiple data streams (most health events may leave a“signature” in multiple data sources) may be performed in a Bayesianframework where the result is presented in the form of a posteriorprobability for a disease2.MethodsWe used a historical national database on Swiss cattle mortality tomodel daily baseline counts of two syndromic time series3. Reportingdelay was defined as the number of days between reported occurrenceand reporting date. The cumulative probability distribution of theestimated reporting delays was used to calculate for each day theproportion of cases that were reported either on the same day or witha delay of 1 to 14 days.We evaluated outbreak detection performance under threescenarios: (A) delayed data reporting occurs but is not accountedfor; (B) delayed data reporting occurs and is accounted for; and (C)absence of delayed data reporting (i.e. an ideal system). Outputsare presented as the value of evidence (V) in favour of an ongoingoutbreak accumulated overnpoints in time (30 days in this case).At each timet, V is defined as the ratio between the posterior andprior odds for H1versus H0:[insert equation 1 here]Using sensitivity, time to detection and in-control run length,performance of the (V-based) system on large and small non-specificoutbreaks was measured.ResultsThe evolution of V based on the information available on the 1st,5th and 10th day after the onset of an outbreak can be visualised inFig. 1. After 5 days, V shows evidence in favour of an outbreak forboth syndromes combined, as well as for on-farm deaths alone, only inthe “Delay aware” and “No delay” scenarios. The development of Vfor the perinatal deaths alone highlights the importance of consideringmultiple syndromic data streams for outbreak detection, as it speaksin favour of an outbreak at a later stage than on-farm deaths alone orboth syndromes combined.ConclusionsOur empirical Bayes approach is an attractive alternative tomultivariate CUSUM algorithms offering a logical approach toweighting variables and incorporating additional information such asdelayed reporting, and a performance on a comparable level to anideal (no delay) system. Outbreaks are detected earlier and with onlya marginal loss of specificity compared to a system where reportingdelay is present but unaccounted for.We also found that the accumulation of evidence from severaldays resulted in a significantly better outbreak detection timeliness,for a given specificity; or a similar timeliness, but higher specificity,compared to an algorithm4that only looks for days with unusual highnumber of counts.Fig. 1: Evolution of V over three time points (t) for the three scenarios.Outbreak starts at t=651. Number of observed perinatal (circle) and on-farmdeaths (cross), V for both (solid grey) and individual syndromes (dotted greyand black respectively), prior probability that an outbreak is ongoing (greydashed) and posterior probability that an outbreak is ongoing given theevidence (black dashed). Horizontal grey solid line shows V=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

IntroductionTechnology that combines traditional manipulations with databasesand complete visualization of geographic (spatial) analysis employingmaps has been developed in order to explore the possibilities forGeographical Information Systems (GIS) to be used in sanitaryand epidemiological surveillance system based on the analysis ofmorbidity and identification of influence of hazardous chemicalenvironmental factors on human health.MethodsGraphical analytic method of information processing allowedvisual establishing of mathematically determined cause-and-effectrelationships between levels of air chemical pollution and morbiditylevels for purulent bacterial meningitis.ResultsCalculated average annual contaminations of atmosphere of 20administrative rayons and seven cities of Lviv oblast with carbonoxide, lead, sulfur dioxide, and dust during the period 2006-2014were the objects of the study. During a year, 1,920 air samples werecollected per each ingredient for each rayon and city according tolaboratory data of facilities of the State Sanitary and EpidemiologicalService in Lviv oblast. Average annual levels of the chemicalsubstances were determined within the M.A.C. in all rayons and cities.However, 4-6% of individual samples in the rayons and 8-10% ofindividual samples in the cities exceeded the allowed concentrations,which imposed a real ecological danger.Fig. 1.Levels of carbon oxide air contamination within rayons ofLviv oblastMorbidity intensity rates for purulent bacterial meningitis weredetermined for the same period according to statistical reports oninfectious disease morbidity in Lviv oblast. In different years, humanmorbidity fluctuated from 0.7 to 2.3 per 100 thousand of populationin the oblast.The study found the correlation between the concentrations ofcarbon monoxide, lead, sulfur dioxide, and dust in the air and levels ofincidence of bacterial meningitis in people in the cities of Lviv oblastwith 1,092 thousand inhabitants, which compose 42.3% of all oblastpopulation. Correlation coefficients are r = 0.78 (p<0.001), r = 0.70(p<0.001), r = 0.51 (p<0.005), and r =0.68 (p<0.02), respectively.Fig. 2.Correlation dependencies between air contamination andpopulation morbidity rates for purulent bacterial meningitis withinrayons of Lviv oblast.The search for a correlation between chemical contaminationof atmosphere and the morbidity level the rayon population of theoblast for purulent bacterial meningitis testified the existence of astatistically significant dependence between the level of morbidityfor all population layers and atmosphere contamination with sulfurdioxide, lead, carbon monoxide, and dust. The correlation coefficientsare r = 0.62 (p<0.002), r = 0.52 (p<0.005), r = 0.63 (p<0.005), r = 0.56(p<0.05), correspondingly.The study found the correlation between the concentrationsof sulfur dioxide, and lead in the air of Lviv oblast and levels ofincidence of purulent bacterial meningitis in children. Correlationcoefficients are r = 0.55 (p<0.05) and r = 0.57 (p<0.001), respectively.ConclusionsUsing GIS approach, the study resulted in the development ofmedical-geographical maps of administrative rayons of Lviv oblast.The maps include peculiarities for each year of surveillance. Cause-and-effect relationships between the levels of the anthropogenicpollution of the air basin of Lviv oblast and morbidity levels forpurulent bacterial meningitis for the oblast population have beenspatially and temporally visualized as a study result.

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

Abstract

ObjectiveHFMD incidence varies between geographic regions at thetownship in Beijing. The objective of this study was to examinespatial heterogeneity for the association between HFMD incidenceand demographic and socioeconomic factors.IntroductionHand-foot-mouth disease (HFMD) is a common childhood illnessand the drivers of HFMD incidence are still not clear [1]. In mainlandChina, continuing and increasing HFMD epidemics have beenrecorded since 2008, causing millions of infections and hundreds ofdeaths annually. In Beijing, 28,667 cases were reported in 2015 andthe incidence was 133.28/100,000. The variations in Beijing HFMDepidemics over population, space, and time that have been revealed[2] emphasize the need for further research about risk factors ofHFMD occurrence. This study aims to explore local effects on HFMDincidence led by potential factors.MethodsHFMD Data. Beijing HFMD data during 2008–2012 period wereprovided by the Beijing Center for Disease Prevention and Control.HFMD incidence adopted in this study was the annual average valueduring the five years.Predictor variables. Potential risk factors obtained from the caserecords (demographic, occupation, health-seeking behavior) andspatial POIs (points of interest) consisted of 22 variables involvingresidence, restaurant, education, medical facilities, business facilities,infrastructure. The scale of different kinds of POIs (1/100,000) wasnoted by calculating the ratio of the number of POIs to the populationat certain township or street committee.Model Specification. Some initial associations between HFMDincidence and 8 predictor variables (population density, shoppingmall, supermarket, pharmacy, kindergarten, middle school, parkinglot, health seeking behavior) were revealed using Pearson correlationanalysis and the exploratory regression. An ordinary least squares(OLS) model was fitted to diagnose the residual normality anddependence. Geographically weighted regression (GWR) was chosento model the relationship, compare the difference from OLS regressionand measure how much improvement the local model gained.ResultsGWR model with residual independence (Moran’s I = 0.0214,p = 0.3405) and lower AICc, performing much better than OLSmodel with residual dependence (Moran’s I=0.1271, p = 0.0000)and higher AICc. Prediction accuracy by GWR (local R2rangingfrom 0.42 to 0.90, R2=0.88) was higher than that by OLS (R2=0.57).The higher local R2values clustered in the east of Fangshan andUrban-Rural Transition Area. Higher coefficient for intercept mainlyoccurred in north-western and south-eastern portion of Beijing.The coefficients for predictors showed shifting patterns from positiveto negative at different township. The local effects led by supermarketand shopping mall showed similar spatial pattern, as well as thoseled by kindergarten and middle school. The scale of pharmacy waspositively related to HFMD incidence in the west of Daxing and thejunction part of Chaoyang and Tongzhou.ConclusionsThis study quantitatively assessed local risk factors of BeijingHFMD occurred in China using GWR model which outperformedOLS regression. The findings could provide valuable information foradequate disease intervention measures and regional policy.

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

Abstract

ObjectiveOur objective is to describe the environmental conditions associatedwith confirmedCoccidioides immitisgrowth and accumulation sitesin south central Washington in an effort to understand the ecology andidentify additional potential sites across this emerging endemic zone.IntroductionCoccidioidomycosis, commonly referred to as Valley Fever, iscaused by the soil-borne saprophytic fungusC. immitisandposadasii.These species have historically been found in the desert southwest andMexico; however, in 2010 there were three coccidioidomycosis casesidentified in central Washington. Colonization of soils byC. immitishas been confirmed at exposure sites associated with these cases1.Multiple studies have identified a relationship between environmentalconditions andC. immitisgrowth areas2,3,4, but these relationshipshave not been evaluated in Washington. The Washington StateDepartment of Health has been conducting environmental surveillancein an effort to understand the geographic distribution ofC. immitisincentral Washington and the associated risk to humans and animals.Here we describe our environmental surveillance efforts and presentpreliminary findings related to environmental conditions ofC. immitisgrowth areas in central Washington.MethodsWe collected soil samples at potential human exposure sites incentral Washington, as identified through clinical surveillance andpatient interviews. Soil samples were also collected from areasnot associated with human cases by looking for similar soils inareas of interest Soil samples are analyzed by the U.S. Centers forDisease Control and Prevention using real-time PCR that detectsCoccidioides-specific targets. We employed data from the USDA SoilSurvey Geographic (SSURGO) database to describe environmentalconditions associated with positive samples. We used our findingsto identify un-sampled regions of central Washington that couldpotentially supportC. immitisgrowth.ResultsWe detectedCoccidioidesin 13 soil sampling sites at fivelocations withing the region. These detections included locations notpreviously described in central Washington. We identified a bandstretching across central Yakima and Benton counties with similarsoil characteristics to our positive sample sites, which suggests theseregions could potentially support the growth ofC. immitis.ConclusionsCoccidioidomycosis is emerging in south central Washington, andthe ecology and geographic distribution of the pathogen are poorlyunderstood. We found thatC. immitispresents a risk to humans andanimals across a larger region of central Washington than previouslydescribed and highlights a need for continued environmentalsurveillance. The potential growth sites we identified also providea valuable tool for human and veterinary health care providers andpublic health practitioners to understand and mitigate disease risk.

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Abstract

ObjectiveTo assess the use of medical claims records for surveillance andepidemiological inference through a case study that examines howecological and social determinants and measurement error contributeto spatial heterogeneity in reports of influenza-like illness across theUnited States.IntroductionTraditional infectious disease epidemiology is built on thefoundation of high quality and high accuracy data on disease andbehavior. Digital infectious disease epidemiology, on the other hand,uses existing digital traces, re-purposing them to identify patterns inhealth-related processes. Medical claims are an emerging digital datasource in surveillance; they capture patient-level data across an entirepopulation of healthcare seekers, and have the benefits of medicalaccuracy through physician diagnoses, and fine spatial and temporalresolution in near real-time.Our work harnesses the large volume and high specificity ofdiagnosis codes in medical claims to improve our understanding ofthe mechanisms driving spatial variation in reported influenza activityeach year. The mechanisms hypothesized to drive these patterns areas varied as: environmental factors affecting transmission or virussurvival, travel flows between different populations, population agestructure, and socioeconomic factors linked to healthcare access andquality of life. Beyond process mechanisms, the nature of surveillancedata collection may affect our interpretation of spatial epidemiologicalpatterns [1], particularly since influenza is a non-reportable diseasewith non-specific symptoms ranging from asymptomatic to severe.Considering the ways in which medical claims are generated, biasesmay arise from healthcare-seeking behavior, insurance coverage, andmedical claims database coverage in study populations.MethodsUsing aggregated U.S. medical claims for influenza-like illness(ILI) from the 2001-2002 through 2008-2009 flu seasons [2],we developed a Bayesian hierarchical modeling framework toestimate the importance of both ecological and social determinantsand measurement-related factors on observed county-level variationof influenza disease burden across the United States. Integrated NestedLaplace Approximation (INLA) techniques for Bayesian inferencewere used to render our questions computationally tractable due tothe high spatial resolution of our data (Figure 1) and the multiplicityof models in our analysis [3]. Linking data from a variety of publiclyavailable sources, we determined the strength, directionality, andconsistency of these factors over multiple flu seasons.ResultsWe found that measurement-related factors – healthcare-seekingbehavior, insurance coverage, and medical claims database coverage– were strong predictors of greater ILI intensity across seasons.Secondarily, poverty and specific humidity were negatively associatedwith ILI intensity for several seasons. Finally, by incorporatingmechanistic and measurement factors into our model, our modelpredictions present an improved map of influenza-like illness in theUnited States for the flu seasons in our study period.ConclusionsWe present a flexible modeling approach that applies to differentmedical claims diagnosis codes and disease surveillance data anddemonstrates the utility of Bayesian hierarchical models for large-scale ecological analyses. Our results increase our knowledge of thespatial distribution of influenza and the underlying processes thatdrive these patterns, promote finer spatial targeting for differenttypes of interventions, and enable the interpolation of burden in areasdifficult to surveil through traditional public health. Moreover, theyhighlight the relative contributions of surveillance data collectionand ecological processes to spatial variation in disease, and highlightthe importance of considering measurement biases when usingsurveillance data for epidemiological inference.

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

Abstract

ObjectiveTo develop a mosquito surveillance module to collect mosquitoinformation testing for West Nile, East Equine Encephalitis (EEE)and Zika viruses using national standards. To provide a common setof data for local health departments (LHDs) and state users to reportand share information. To monitor the type of mosquito species thatcarry diseases.IntroductionThere were several stand-alone vector surveillance applicationsbeing used by the New York State Department of Health (NYSDOH)to support the reporting of mosquito, bird, and mammal surveillanceand infection information implemented in early 2000s in responseto West Nile virus. In subsequent years, the Electronic ClinicalLaboratory Reporting System (ECLRS) and the CommunicableDisease Electronic Surveillance System (CDESS) were developedand integrated to be used for surveillance and investigations of humaninfectious diseases and management of outbreaks.An integrated vector surveillance system project was proposedto address the migration of the stand-alone vector surveillanceapplications into a streamlined, consolidated solution to supportoperational, management, and technical needs by using the nationalstandards with the existing resources and technical environment.MethodsA mosquito surveillance module was designed to link with CDESS,an electronic disease case reporting and investigation system, to allowLHDs to enter mosquito trap sites and mosquito pool informationobtained from those traps. The mosquito test results are automaticallytransmitted to ECLRS through public health lab Clinical LaboratoryInformation Management System (CLIMS) using ELR standards. Byutilizing these standards, the ECLRS was enhanced to add a new non-human specimen table and existing processes were used to obtainmosquito laboratory results and automatically transfer them to thesurveillance system the same way that human results are transferred.The new mosquito surveillance module also utilizes the existingCDESS reporting module, thereby allowing users the flexibility toquery and extract data of their choosing. The minimum infectionrate (MIR) report calculates the number of infected pools with anarbovirus divided by the total number of specimens tested*1000; atrap report shows number of mosquitoes trapped by species type,location and trap type; and a lab test result report shows the numberof pools that tested positive and the percentage of positive pools bydisease.ResultsThe mosquito surveillance module was rolled out in May 2016to all 57 LHDs. A non-human species lookup table was created toallow public health lab to report the test results using Health Levelseven (HL7) v 2.5.1 standards. As of August 31, 2016 there were4,545 pools tested. A total of 201 (4.4%) pools were positive for WestNile and the MIR was 1.2. There were no pools positive for EEEor Zika virus. Various reports have been created for monitoring thesurveillance of mosquitoes trapped and tested for mosquito-bornediseases.ConclusionsThe integration of mosquito surveillance module within CDESSallows LHDs and the State to monitor mosquito-borne disease activitymore efficiently. The module also increases NYDOH's ability toprovide timely, accurate and consistent information to the local healthdepartments and healthcare practitioners regarding mosquito-bornediseases.

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

Abstract

ObjectiveA framework and toolbox for creating point-and-click dashboardapplications (at no cost) for monitoring several facets of syndromicsurveillance data was created. These tools (and associateddocumentation) are being made available freely online for othersurveillance practitioners to adopt.IntroductionPublic health surveillance largely relies on the use of surveillancesystems to facilitate the identification and investigation ofepidemiologic concerns reflected in data. In order to support publichealth response, these systems must present relevant information, andbe user-friendly, dynamic, and easily-implementable. The abundanceof R tools freely-available online for data analysis and visualizationpresents not only opportunities, but also challenges for adoptionin that these tools must be integrated so as to allow a structuredworkflow. Many public health surveillance practitioners do not havethe time available to 1) scavenge for tools, 2) align their functionsso as to create a relevant set of visuals, and 3) integrate these visualsinto a dashboard that allows a streamlined surveillance workflow.An openly-available, structured framework that allows simpleintegration of analytic capabilities packaged into readily-implementable modules would simplify the creation of relevantdashboard visuals by surveillance practitioners.MethodsR is a statistical computing application, known for its versatilityand ability to create powerful visualizations. Shiny is an R packagethat allows the creation of interactive, easy-to-use point-and-clickapplications. We looked to R and its Shiny package extension asa candidate solution. However, creating a Shiny application fromscratch requires knowing enough of the R programming languageso as to be able to appropriately design and link several chunks ofcode that interact with one another to generate the desired output.To address this barrier, we sought to create a structured processby which one can easily browse a library of defined code snippets(each of which enables an analytic tool relevant to syndromic dataanalysis and visualization) and then integrate snippets of interest intoa dashboard application in a way that requisite experience with R isminimized.ResultsWe first collected several analytic tools that support syndromicdata analysis and have been developed for R; examples includeheatmaps, change-point detection, outlier detection, tables, maps, etc.We then packaged them into snippets of code (one for each analytictool) in a way that facilitates integration of the analytic tool into adashboard application. A fake syndromic dataset was created as wellfor inclusion in a demo dashboard application that is available forsharing.ConclusionsThe online community of R users makes new tools for data analysisand visualization available every day. The abundance of options canbe overwhelming and the process of integrating pieces of code canbe time-consuming. This places a constraint on adoption of thesetools by epidemiologists working at all levels of government. Thepresent project alleviates this problem considerably by reducing thetool searching process through the introduction of a library of relevanttools for syndromic data analysis and visualization that can be easilyintegrated into a dashboard application that allows for streamlinedsyndromic surveillance activities.Our next step is to partner with interested jurisdictions to help themadopt this framework and associated tools. Given sufficient interest,we would set up a process for others to add their own modules to thislibrary, perhaps through the online platform for collaborative codedevelopment and sharing, GitHub.

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Abstract

ObjectiveTo describe how flexible surveillance systems can be rapidlyadapted and deployed, and increase the efficiency and accuracy ofsurveillance, during responses to outbreaks and all hazard emergentevents.IntroductionGeorgia Department of Public Health (DPH) epidemiologists haveresponded to multiple emergent outbreaks with diverse surveillanceneeds. During the 2009 H1N1 influenza response, it was necessaryto electronically integrate multiple reporting sources and viewpopulation-level data, while during the 2014–2015 West African Ebolaepidemic, it was necessary to easily collect and view individual leveldata from travelers to facilitate early detection of potential importedEbola disease. DPH in-house information technology (IT) staffwork closely with epidemiologists to understand and accommodatesurveillance needs. Through this collaboration, IT created a robustelectronic surveillance and outbreak management system (OMS) toaccommodate routine reporting of notifiable diseases and outbreakinvestigations, and surveillance during emergent events.MethodsOMS was created within the State Electronic Notifiable DiseaseSurveillance System (SendSS); a secure, HIPAA-compliant, Oracleand web-based platform which collects data on all notifiable diseasesin Georgia. This flexible platform has multi-functionality includingdynamic web-based surveys that link to case records or outbreaks,online case reporting, electronic laboratory reporting, contact tracing,visual dashboards summarizing outbreak data, electronic alerts, andindividual accounts for users with varying privileges to limit access tospecific modules. These features can be customized for any emergentevent.ResultsSendSS and OMS are widely used by state and districtepidemiologists. Individual case and outbreak management activitiesinclude but are not limited to: notifiable disease and conditioncases; all disease clusters; animal bites surveillance including biteinvestigation and laboratory results; and syndromic surveillance dataautomatically collected from 90 emergency facilities. OMS has beenrapidly modified to facilitate efficient epidemiologic responses toemergent events such as: integrating multiple reporting sources duringthe H1N1 outbreak; shelter surveillance during hurricanes Katrinaand Rita in 2005; active monitoring of >2,500 travelers in Georgiaduring the Ebola response; tracking cases investigations during theZika response, and future monitoring of poultry workers if highly-pathogenic avian influenza occurs in Georgia.ConclusionsThe flexible and customizable features of SendSS and OMSaccommodate the changing needs of epidemiologists to monitora variety of diseases. Rapid implementation has enabled DPHepidemiologists to respond efficiently to emergent events usinglimited human resources, achieving immediate situational awarenessby incorporating multiple data sources into user friendly dashboardsand notifications, and easily sharing information among state andfederal stakeholders to facilitate rapid risk assessment and response asneeded. The success of these systems illustrates the return on DPH’spreparedness investment in retaining technical staff to work withepidemiologists to meet urgent surveillance needs.

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Abstract

ObjectiveThe objective of this study was to evaluate several aspects of theelectronic disease reporting system and its abilities used in Georgia.Also, the study assessed if the system abilities are tailored to thenational surveillance requirements. User attitudes (system strengthand weaknesses) toward the system was also surveyed.IntroductionThe Ministry of Health of Georgia accepted the ElectronicIntegrated Disease Surveillance System (EIDSS) as an officialdisease reporting system in 2012. The Georgian government adoptedelectronic reporting for both veterinary and human diseases in2015. We conducted a comparative assessment of progress in theimplementation of electronic reporting.MethodsA face-to-face initial survey was conducted in 2012, a follow-upsurvey (through telephone interviews) was performed in 2016. Theinitial survey was conducted in regions that had EIDSS installedand the follow-up survey was conducted in all regions. Standardizedquestionnaires were used and data was analyzed in Epi Info.ResultsOut of 450 trained EIDSS users, 32% were interviewed in theinitial survey and 25% (of 550) EIDSS trained users were interviewedin the follow-up survey. Of 147 respondents in the initial survey and138 in the follow-up survey, 44% and 79%, believed that they wereusing EIDSS effectively, respectively. The follow-up survey showeda 23% increase in respondents who acknowledge an improvement ofthe electronic reporting; acceptance of EIDSS increased from 80.3%to 97.8%. Of those interviewed in the follow-up survey, 19.7%mentioned that the main success in development of the system is dueto improved collaboration between institutes. However, 17.36% of therespondents in the follow-up survey reported non-sufficient qualitydata.ConclusionsOur study suggests that the acceptance and use of EIDSS hasnoticeably improved, indicating the successful implementation ofelectronic reporting. Recommendations have been made to furtherimprove the data quality by conducting regular data cleaning andadditional user training. We recommend the continuation of EIDSStraining.

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

Abstract

ObjectiveThis session will provide an overview of the current systemsfor influenza surveillance; review the role of schools in influenzatransmission; discuss relationships between school closures, schoolabsenteeism, and influenza transmission; and explore the usefulnessof school absenteeism and unplanned school closure monitoring forearly detection of influenza in schools and broader communities.IntroductionInfluenza surveillance is conducted through a complex networkof laboratory and epidemiologic systems essential for estimatingpopulation burden of disease, selecting influenza vaccine viruses,and detecting novel influenza viruses with pandemic potential (1).Influenza surveillance faces numerous challenges, such as constantlychanging influenza viruses, substantial variability in the number ofaffected people and the severity of disease, nonspecific symptoms,and need for laboratory testing to confirm diagnosis. Exploringadditional components that provide morbidity information mayenhance current influenza surveillance.School-aged children have the highest influenza incidence ratesamong all age groups. Due to the close interaction of children inschools and subsequent introduction of influenza into households,it is recognized that schools can serve as amplification points ofinfluenza transmission in communities. For this reason, pandemicpreparedness recommendations include possible pre-emptive schoolclosures, before transmission is widespread within a school system orbroader community, to slow influenza transmission until appropriatevaccines become available. During seasonal influenza epidemics,school closures are usually reactive, implemented in response tohigh absenteeism of students and staff after the disease is alreadywidespread in the community. Reactive closures are often too late toreduce influenza transmission and are ineffective.To enhance timely influenza detection, a variety of nontraditionaldata sources have been explored. School absenteeism was suggestedby several research groups to improve school-based influenzasurveillance. A study conducted in Japan demonstrated that influenza-associated absenteeism can predict influenza outbreaks with highsensitivity and specificity (2). Another study found the use of all-causes absenteeism to be too nonspecific for utility in influenzasurveillance (3). Creation of school-based early warning systemsfor pandemic influenza remains an interest, and further studies areneeded. The panel will discuss how school-based surveillance cancomplement existing influenza surveillance systems.

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

Abstract

ObjectiveTo create a forum and database for FDA and CDC epidemiologists,laboratorians, and outbreak scientists for tracking recent food andenvironmental surveillance sampling isolates identified throughReportable Food Registries reports and regulatory inspectionalfindings, and analyzing them for matches to clinical isolates for earlyoutbreak detection.IntroductionIdentifying, solving, and stopping foodborne outbreaks in theU.S. requires the collaboration and coordination of multiple federalagencies and centers as well as state and local authorities. FDA'sCoordinated Outbreak Response and Evaluation (CORE) Networkis responsible for outbreak surveillance, response, and post-responseactivities related to incidents involving multiple illnesses linked toFDA-regulated food. CORE collaborates with CDC to obtain data onfoodborne illnesses and illness clusters and with FDA Centers andfield staff to obtain laboratory and inspectional information relatedto contaminated foods and foodborne illness outbreaks. CORE'sSignals and Surveillance team coordinates isolate tracking activitiesamong several organizations within FDA and CDC and the isolatedatabase was developed for timely information sharing and earlysignal detection.MethodsThe isolate tracking database combines information fromestablished laboratory, inspectional, and regulatory programs;investigators across FDA and CDC evaluate the information forearly outbreak signals. PulseNet is a national laboratory network thatcompares the Pulsed-field Gel Electrophoresis (PFGE) patterns ofclinical and non-clinical bacterial isolates and identifies increases innumbers of isolates with matching PFGE patterns as outbreak clusters.Foodborne outbreak investigational partners, including the CDC andFDA, utilize the CDC/Palantir Technologies-developed platform, theSystem for Enteric Disease Response, Investigation, and Coordination(SEDRIC), to evaluate clinical, food, and environmental isolates.CORE provides additional firm-identifying metadata for new foodand environmental isolates from FDA, contract lab, and ReportableFood Registry (RFR)-reported samples and analyzes them for PFGEpatterns matching those of recent clinical isolates. FDA laboratoriansprovide early information about food and environmental isolatesthat are in queue for PFGE and whole genome sequence analyses,trend analysis for recently completed isolates, and genetic clusteringwith clinical and other isolates. The RFR is a FDA-hosted platformfor industries and public health officials to report when there is areasonable probability that a human or animal food that is regulatedby FDA will cause serious adverse health consequences. The RFRcoordinator tracks patterns of adulteration in food, and gathersinformation from FDA district investigators on the availability ofpathogen isolates for FDA analysis, from FDA inspections of firms,and from investigations into the root-cause of contamination. Eachpathogen detection is evaluated for associations to current outbreakclusters.ResultsThe isolate tracking activities have provided investigatorswith information for hypothesis development, identified trends inlaboratory and inspectional findings, aided in the identification ofcausal food sources in illness clusters, and provided early laboratoryand inspectional information to outbreak investigations. Within thepast year, isolate tracking activities identified early indicators of thepresence ofListeria monocytogenesin frozen foods before a multistateoutbreak of listeriosis was linked to frozen vegetables; identifiedearly indicators of the presence ofSalmonellain pistachios beforeidentification of a multistate outbreak ofSalmonellaMontevideo andSalmonellaSenftenberg; further characterized the microbial hazardsof cucumber and pepper contamination through FDA's enhancedsurveillance sampling program; and expanded the forum's scope toinclude animal foods and their link to human and animal illnesses.ConclusionsThe database and forum provides a platform for informationsharing, and collaboration between agencies, offices, and centersby informing the participating groups about early signals ofcontamination and emerging food risk trends.

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

Abstract

ObjectiveThis roundtable will provide a forum for national, state, and localmanagers of syndromic surveillance systems to discuss how theyidentify, monitor, and respond to changes in the nature of their data.Additionally, this session will focus on the strengths and weaknessof the syndromic surveillance systems for supporting programevaluation and trend analysis. This session will also provide a forumwhere subject matter experts can discuss the ways in which this deepunderstanding of their data can be leveraged to forge and improvepartnerships with academic partners.IntroductionAs syndromic surveillance systems continue to grow, newopportunities have arisen to utilize the data in new or alternativeways for which the system was not initially designed. For example,in many jurisdictions syndromic surveillance has recently becomepopulation-based, with 100% coverage of targeted emergencydepartment encounters. This makes the data more valuable for real-time evaluation of public health and prevention programs. There hasalso been increasing pressure to make more data publicly available –to the media, academic partners, and the general public.

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

Abstract

ObjectiveTo characterize and describe influenza-associated pediatric deathsin the United States over five influenza seasons, 2010–11 through2014–15.IntroductionCommunity influenza infection rates are highest among children.In children, influenza can cause severe illness and complicationsincluding, respiratory failure and death. Annual influenza vaccinationis recommended for all persons aged≥6 months. In 2004, influenza-associated deaths in children became a notifiable condition.MethodsDeaths that occurred in children aged <18 years with laboratory-confirmed influenza virus infection were reported from states andterritories to the Centers for Disease Control and Prevention on astandard case report form. We used population estimates from theU.S. Census Bureau, 2011 to 2015, to calculate age group-adjustedincidence. We used Wilcoxon-rank-sum test to compare medians andchi-square and Mantel-Haenszel chi-square to compare differencesbetween proportions of two groups.ResultsFrom October 2010 through September 2015, 590 influenza-associated pediatric deaths were reported. The median age at timeof death was 6 years (interquartile range, 1–12 years). Half of thechildren (285/572) had at least one underlying medical condition.Neurologic conditions (26%) and development delay (21%) weremost commonly reported. The average annual incidence rate was0.16 per 100,000 children (95% confidence interval [CI]: 0.15–0.17)and was highest among children aged <6 months (0.75, 95% CI,0.60–0.94 per 100,000 children), followed by children aged6–23 months (0.34, 95% CI, 0.28–0.41 per 100,000 children). Only21% (87/409) of pediatric deaths in children≥6 months had evidenceof full influenza vaccination. Vaccination coverage was lower inchildren aged 6–23 months (15%) and 5–8 years (17%) than withthose aged 2–4 years and 9–17 years (25%, p<0.01). The majorityof children aged <2 years who died had no underlying medicalconditions (63%, 105/167); this proportion was significantly higherthan that in children aged≥2 years (45%, 182/405, p<0.01).Overall 65% (383) of pediatric deaths had influenza A virusdetected, and 33% had influenza B virus detected. Children infectedwith influenza B virus had a higher frequency of sepsis/shock(41%, 72/174), acute respiratory distress syndrome (ARDS, 33%,58/174), and hemorrhagic pneumonia/pneumonitis (8%, 14/174) thanchildren infected with either influenza A(H1N1) pdm09 or influenzaA(H3N2) virus (p=0.01, 0.03, 0.03, respectively).Overall 81% (421/521) of children had an influenza-associatedcomplication; the most commonly reported were pneumonia (40%),sepsis/shock (31%) and ARDS (29%). Among those with testingreported, invasive bacteria coinfections were identified in 43%(139/322);β-hemolyticStreptococcus(20%) andStaphylococcusaureus(17%) were reported most frequently.Most children (39%, 212/548) died within 3 days of symptomonset, 28% died 4–7 days after onset, and 34% died≥8 days afteronset. The median days from illness onset to death for children withan underlying condition was significantly longer than the time forpreviously healthy children (7 versus 4 days, p<0.01).ConclusionsEach year, a substantial number of influenza-associated deathsoccur among U.S. children, with rates highest among those aged<2 years. While half of the deaths were among children withunderlying conditions, the majority of children <2 years who diedwere previously healthy. Vaccination coverage was very low.Influenza vaccination among pregnant women, young children andchildren with high-risk underlying conditions should be encouragedand could reduce influenza-associated mortality among children.

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

Abstract

ObjectiveTo enable coordination of Swaziland Ministry of Health units forpublic health surveillance (PHS).IntroductionIn the Kingdom of Swaziland, a baseline assessment found thatmultiple functional units within the Ministry of Health (MoH) performPHS activities. There is limited data sharing and coordination betweenunits; roles and responsibilities are unclear. The Epidemiology andDisease Control Unit (EDCU) is mandated to coordinate efforts andstrengthen PHS through implementing Integrated Disease Surveillanceand Response (IDSR) to fulfill requirements of International HealthRegulations (2005) (IHR[2005]), and the Global Health SecurityAgenda (GHSA).MethodsA baseline assessment that included key informant interviewsof unit representatives was conducted. Data flows were developed.Results were disseminated at a facilitated stakeholder workshop withunit representatives. A database was then built containing all distinctactivities found within the IDSR Technical Guidelines (2010), IHR[2005], GHSA Action Packages, the baseline assessment, a previousCDC IDSR assessment, and suggestions from the stakeholderworkshop. Activities were categorized by IDSR function (identify,report, analyze, investigate, prepare, respond, provide feedback,and evaluate) and designated as an ongoing “role” or a one-timeimplementation activity. A document containing all PHS roles waspresented at a facilitated consensus workshop; unit representativesdiscussed and designated a lead unit/agency for each role.One-time implementation activities were assigned a lead actor, targetcompletion date, and compiled into a 3-year IDSR Roadmap to guideimplementation.ResultsA Roles and Responsibilities Framework was developed thatpresents a consensus on lead units for all roles within an IDSR-basedPHS system that fulfills requirements of IHR [2005] and GHSA.This document enables coordination by EDCU. The IDSR Roadmapprovides time-bound activities with assigned actors to implementIDSR. EDCU is using these documents to guide coordination ofmultiple MOH units already performing PHS activities.ConclusionsCoordinating well-established programs that already collectepidemiological data increases efficiency and enables more completeepidemiologic analysis. Stakeholder engagement and clarity of rolesis critical for EDCU to coordinate PHS. Consolidating activitiesfor IDSR, IHR [2005], and GHSA in guiding documents enables astreamlined approach for public health surveillance strengthening.Future work aims to achieve data sharing through an electronicplatform and introduce data standards for interoperability among datasets.K

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

Abstract

ObjectiveDescribe and explain the transition of the syndromic surveillanceprogram at the Houston Health Department (HHD) from being alocally managed and aging system to an ESSENCE system governedby a regional Consortium of public health agencies and stakeholdersin the 13-county area of the southeast Texas.IntroductionSyndromic surveillance systems are large and complex technologyprojects that increasingly require large investments of financial andpolitical capital to be sustainable. What was once a minor surveillancetool in the mid-2000s has evolved into a program that is regardedas valuable to public health yet is increasingly difficult to maintainand operate for local health departments. The Houston HealthDepartment installed a syndromic surveillance system (SyS) sixyears before Meaning Use became known to healthcare communities.The system chosen at the time was the Real-time Outbreak DiseaseSurveillance System (RODS) which, at the time and for its purpose,was a suitable platform for syndromic surveillance. During the past13 years however, maintaining, operating, and growing a SyS by alocal health department has become increasingly difficult. Inclusionin Meaningful Use elevated the importance and profile of syndromicsurveillance such that network growth, transparency of operations,ease of data sharing, and cooperation with other state systems inTexas became program imperatives.MethodsWith support from the informatics group at Tarrant County PublicHealth (TCPH) in the form of mentoring, HHD devised a two prongstrategy to re-invigorate the syndromic program. The first was toreplace RODS with ESSENCE from Johns Hopkins Applied PhysicsLaboratory (JH/APL). The second was to strengthen the regionalnetwork by creating a governance structure that included outsideagencies and stakeholders. The product of this second effort wasthe creation of the Syndromic Surveillance Consortium of SoutheastTexas (SSCSeT) on the Communities of Practice model1usingparliamentary procedure2.ResultsAcquiring ESSENCE and forming SSCSeT were necessary stepsfor the continuing operation of the SyS. The Consortium includesmembers from local health jurisdictions, health care providers, healthpolicy advocates, academicians, and data aggregators. Created asa democratic society, SSCSeT wrote its constitution and by-laws,voted in officers, formed working groups and has begun developingpolicies. The Consortium is cooperating with the Texas Departmentof State Health Services (DSHS) as well as TCPH. Having ESSENCEwill ensure the HHD-SyS will conform to standards being developedin the state and provide a robust syndromic platform for the partnersof the Consortium.ConclusionsSyndromic systems operated by local health departments canadapt to regulatory changes by growing their networks and engagingregional stakeholders using the Communities of Practice model.

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

Abstract

ObjectiveThe objective of this project is to advance the science of biosurveillance by providing a user curated cataloging system, to be used across health department and other users, that advances daily surveillance operations by better characterizing three key issues in available surveillance systems: duplication in biosurveillance activities; differing perspectives and analyses of the same data; and inadequate information sharing.IntroductionA variety of government reports have cited challenges in coordinating national biosurveillance efforts at strategic and tactical levels. The General Accountability Office (GAO), an independent nonpartisan agency that investigates how the federal government funding and performs analysis at the request of congressional committees or by public mandate, has published 64 reports on biosurveillance since 2005. The aim of this project is to better characterize these issues by collecting and analyzing a sample of publicly documented biosurveillance systems, and making our data and results available for the public health community to review and evaluate. This study openly publishes the data files of information collected (i.e. CSV, XLS), the Python NLP scripts, and a freely available web-based application developed in R Shiny that filters against the 227 biosurveillance systems and activities to promote a more transparent understanding of how public health practitioners conduct surveillance activities.MethodsCollected and reviewed data on 424 systems, of which 227 systems and activities met our criteria; Implemented a new approach to develop a standard framework for data collection using natural language processing (NLP); Openly published all data files publicly on Github and developed an online analytics application; and Convened a workshop of experts from across federal, state, not-for-profit, academic and commercial entities in November 2015 in Washington, D.C., to review the methodology and results of this study.ResultsThe results of this project include a fully functional web application and code (available through Github) for the continued expansion, categorization and analysis of surveillance systems. Unique findings currently rendered through the 227 surveillance systems include: Out of 227 systems, 20 were established in the year 2006, alone, with an increase in systems established following 1990; 68% of all systems catalogued are focused solely on human surveillance; 45% of all cataloged systems used statistical analysis and only 4% are using Natural Language Processing; and 43% of all biosurveillance systems in our inventory reported using “health department” data as a data source.ConclusionsWe believe this project is the first step for public health practitioners and researchers to contribute to a transparent inventory of systems and activities. Results provide meaningful metadata on an over focus on human surveillance, over-reliance on a single data source (health departments) and a lack of advanced data science practices being applied to systems in the field. The value of this project 1) provides a starting point for the development of a standard framework of categories to use for cataloging biosurveillance systems, 2) offers openly available data and code on Github [3] for others to integrate into their research, and 3) introduces a set of methodological issues to consider in a biosurveillance inventorying exercise.

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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 develop a comprehensive model characterization framework to describe epidemiological models in an operational context. 2. To apply the framework to characterize “operational” models for specific infectious diseases and provide a web-based directory, the biosurveillance analytics resource directory (BARD) to the global infectious disease surveillance community. Introduction Epidemiological modeling for infectious disease is useful for disease management and routine implementation needs to be facilitated through better description of models in an operational context. A standardized model characterization process that allows selection or making manual comparisons of available models and their results is currently lacking. Los Alamos National Laboratory (LANL) has developed a comprehensive framework that can be used to characterize an infectious disease model in an operational context. We offer this framework and an associated database to stakeholders of the infectious disease modeling field as a tool for standardizing model description and facilitating the use of epidemiological models. Such a framework could help the understanding of diverse models by various stakeholders with different preconceptions, backgrounds, expertise, and needs, and can foster greater use of epidemiological models as tools in infectious disease surveillance. Methods We define, “operational” as the application of an epidemiological model to a real-world event for decision support and can be used by experts and non-experts alike. The term “model” covers three major types, risk mapping, disease dynamics and anomaly detection. To develop a framework for characterizing epidemiological models we collected information via a three-step process: a literature search of model characteristics, a review of current operational infectious disease epidemiological models, and subject matter expert (SME) panel consultation. We limited selection of operational models to five infectious diseases: influenza, malaria, dengue, cholera and foot-and-mouth disease (FMD). These diseases capture a variety of transmission modes, represent high or potentially high epidemic or endemic burden, and are well represented in the literature. We also developed working criteria for what attributes can be used to comprehensively describe an operational model including a model’s documentation, accessibility, and sustainability. To apply the model characterization framework, we built the BARD, which is publicly available (http://brd.bsvgateway.org). A document was also developed to describe the usability requirements for the BARD; potential users (and non-users) and use cases are formally described to explain the scope of use. Results 1. Framework for model characterization The framework is divided into six major components (Figure 1): Model Purpose, Model Objective, Model Scope, Biosurveillance (BSV) goals, Conceptual Model and Model Utility; each of which has several sub-categories for characterizing each aspect of a model. 2. Application to model characterization Models for five infectious diseases—cholera, malaria, influenza, FMD and dengue were characterized using the framework and are included in the BARD database. Our framework characterized disparate models in a streamlined fashion. Model information could be binned into the same categories, allowing easy manual comparison and understanding of the models. 3. Development of the BARD Our model characterization framework was implemented into an actionable tool which provides specific information about a model that has been systematically categorized. It allows manual categoryto- category comparison of multiple models for a single disease and while the tool does not rank models it provides model information in a format that allows a user to make a ranking or an assessment of the utility of the model. Conclusions With the model characterization framework we hope to encourage model developers to start describing the many features of their models using a common format. We illustrate the application of the framework through the development of the BARD which is a scientific and non-biased tool for selecting an appropriate epidemiological model for infectious disease surveillance. Epidemiological models are not necessarily being developed with decision makers in mind. This gap between model developers and decision makers needs to be narrowed before modeling becomes routinely implemented in decision making. The characterization framework and the tool developed (BARD) are a first step towards addressing this gap. Keywords epidemiological models; database; decision support

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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 Here we use novel methods of phylogenetic transmission graph analysis to reconstruct the geographic spread of MERS-CoV. We compare these results to those derived from text mining and visualization of the World Health Organization's (WHO) Disease Outbreak News. Introduction MERS-CoV was discovered in 2012 in the Middle East and human cases around the world have been carefully reported by the WHO. MERS-CoV virus is a novel betacoronavirus closely related to a virus (NeoCov) hosted by a bat, Neoromicia capensis. MERS-CoV infects humans and camels. In 2015, MERS-CoV spread from the Middle East to South Korea which sustained an outbreak. Thus, it is clear that the virus can spread among humans in areas in which camels are not husbanded. Methods Phylogenetic analyses We calculated a phylogenetic tree from 100 genomic sequences of MERS-CoV hosted by humans and camels using NeoCov as the outgroup. In order to evaluate the relative order and significance of geographic places in spread of the virus, we generated a transmission graph (Figure 1) based on methods described in 1. The graph indicates places as nodes and transmission events as edges. Transmission direction and frequency are depicted with directed and weighted edges. Betweenness centrality, represented by node size, measures the number of shortest paths from all nodes to others that pass through the corresponding node. Places with high betweenness represent key hubs for the spread of the disease. In contrast, smaller nodes at the periphery of the network are less important for the spread of the disease. Web scraping and mapping Due to the journalistic style of the WHO data, it had to be structured such that mapping software can ingest the data. We used Import.io to build the API. We provided the software a sample page, selected the data that is pertinent, then provided a list of all URLs for the software. We used Tableau to map the information both geographically and temporally. Results Geographic spread of Mers-CoV based on transmissions identified in phylogenetic data Most important among the places in the MERS-CoV epidemic is Saudi Arabia as measured by the betweenness metric applied to a changes in place mapped to a phylogenetic tree. In figure 1, the circle representing Saudi Arabia is slightly larger compared to other location indicating its high importance in the epidemic. Saudi Arabia is the source of virus for Jordan, England, Qatar, South Korea, UAE, Indiana, and Egypt. The United Arab Emirates has a bidirectional connection with Saudi Arabia indicating the virus has spread between the two countries. The United Arab Emirates also has high betweenness. The United Arab Emirates is between Saudi Arabia and Oman and Between Saudi Arabia and France. South Korea, and Qatar have mild betweeness. South Korea is between Saudi Arabia and China. Qatar is between Saudi Arabia and Florida. Other locations (Jordan, England, Indiana, and Egypt) have low betweenness as they have no outbound connections. Visualization of geographical transmissions in WHO Data Certain articles include the infected individuals' countries of origin. ln constrast, many reports are in a lean format that includes a single paragraph that only summarizes the total number of cases for that country. If we build the API in a manner that recognizes features in the detailed reports, we can generate a map that draws lines from origin to reporting country and create visualizations. However, since only some of the articles contain this extra information, mapping in this manner will miss many of the cases that are reported in the lean format. Conclusions Our goal is to develop methods for understanding syndromic and pathogen genetic data on the spread of diseases. Drawing parallels between the transmissions events in the WHO data and the genetic data has shown to be challenging. Analyses of the genetic information can be used to imply a transmission pathway but it is hard to find epidemiological data in the public domain to corroborate the transmission pathway. There are rare cases in the WHO data that include travel history (e.g. "The patient is from Riyadh and flew to the UK"). We conclude that epidemiological data combined with genetic data and metadata have strong potential to understand the geographic progression of an infectious disease. However, reporting standards need to be improved where travel history does not impinge on privacy. A transmission graph for MERS-CoV based on viral genomes and place of isolation metadata. The direction of transmission is represented by the arrow. The frequency of transmission is indicated by the number. The size of the nodes indicates betweenness.

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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 introduce Soda Pop, an R/Shiny application designed to be a disease agnostic time-series clustering, alarming, and forecasting tool to assist in disease surveillance "triage, analysis and reporting" workflows within the Biosurveillance Ecosystem (BSVE) [1]. In this poster, we highlight the new capabilities that are brought to the BSVE by Soda Pop with an emphasis on the impact of metholodogical decisions. Introduction The Biosurveillance Ecosystem (BSVE) is a biological and chemical threat surveillance system sponsored by the Defense Threat Reduction Agency (DTRA). BSVE is intended to be user-friendly, multi-agency, cooperative, modular and threat agnostic platform for biosurveillance [2]. In BSVE, a web-based workbench presents the analyst with applications (apps) developed by various DTRAfunded researchers, which are deployed on-demand in the cloud (e.g., Amazon Web Services). These apps aim to address emerging needs and refine capabilities to enable early warning of chemical and biological threats for multiple users across local, state, and federal agencies. Soda Pop is an app developed by Pacific Northwest National Laboratory (PNNL) to meet the current needs of the BSVE for early warning and detection of disease outbreaks. Aimed for use by a diverse set of analysts, the application is agnostic to data source and spatial scale enabling it to be generalizable across many diseases and locations. To achieve this, we placed a particular emphasis on clustering and alerting of disease signals within Soda Pop without strong prior assumptions on the nature of observed diseased counts. Methods Although designed to be agnostic to the data source, Soda Pop was initially developed and tested on data summarizing Influenza-Like Illness in military hospitals from collaboration with the Armed Forces Health Surveillance Branch. Currently, the data incorporated also includes the CDC's National Notifiable Diseases Surveillance System (NNDSS) tables [3] and the WHO's Influenza A/B Influenza Data (Flunet) [4]. These data sources are now present in BSVE's Postgres data storage for direct access. Soda Pop is designed to automate time-series tasks of data summarization, exploration, clustering, alarming and forecasting. Built as an R/Shiny application, Soda Pop is founded on the powerful statistical tool R [5]. Where applicable, Soda Pop facilitates nonparametric seasonal decomposition of time-series; hierarchical agglomerative clustering across reporting areas and between diseases within reporting areas; and a variety of alarming techniques including Exponential Weighted Moving Average alarms and Early Aberration Detection [6]. Soda Pop embeds these techniques within a user-interface designed to enhance an analyst's understanding of emerging trends in their data and enables the inclusion of its graphical elements into their dossier for further tracking and reporting. The ultimate goal of this software is to facilitate the discovery of unknown disease signals along with increasing the speed of detection of unusual patterns within these signals. Conclusions Soda Pop organizes common statistical disease surveillance tasks in a manner integrated with BSVE data source inputs and outputs. The app analyzes time-series disease data and supports a robust set of clustering and alarming routines that avoid strong assumptions on the nature of observed disease counts. This attribute allows for flexibility in the data source, spatial scale, and disease types making it useful to a wide range of analysts Soda Pop within the BSVE. Keywords BSVE; Biosurveillance; R/Shiny; Clustering; Alarming Acknowledgments This work was supported by the Defense Threat Reduction Agency under contract CB10082 with Pacific Northwest National Laboratory References 1. Dasey, Timothy, et al. "Biosurveillance Ecosystem (BSVE) Workflow Analysis." Online journal of public health informatics 5.1 (2013). 2. http://www.defense.gov/News/Article/Article/681832/dtra-scientistsdevelop- cloud-based-biosurveillance-ecosystem. Accessed 9/6/2016. 3. Centers for Disease Control and Prevention. "National Notifiable Diseases Surveillance System (NNDSS)." 4. World Health Organization. "FluNet." Global Influenza Surveillance and Response System (GISRS). 5. R Core Team (2016). R: A language and environment for statistical computing. R Foundation for Statistical Computing, Vienna, Austria. 6. Salmon, Maëlle, et al. "Monitoring Count Time Series in R: Aberration Detection in Public Health Surveillance." Journal of Statistical Software [Online], 70.10 (2016): 1 - 35.

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

Abstract

ObjectiveTo identify gaps in current U.S. animal data collection andsurveillance systems, describe how surveillance of animal populationscan provide important early warnings of emerging threats to humanpopulations from infectious disease epidemics, and explain thebenefits of integrating human and animal surveillance data into acommon linked system.IntroductionSince the majority of emerging infectious diseases over the pastseveral decades have been zoonotic, animal health surveillance isnow recognized as a key element in predicting public health risks.Surveillance of animal populations can provide important earlywarnings of emerging threats to human populations from bioterrorismor naturally occurring infectious disease epidemics. This studyinvestigated current animal data collection and surveillance systems,isolated major gaps in state and national surveillance capabilities, andprovided recommendations to fill those gaps.MethodsInitially, an extensive literary review was performed to betterunderstand what is currently available for Animal Health DiseaseSurveillance in the United States and recognize the gaps. Afterthis review meetings were arranged with numerous animal healthand public health surveillance experts to isolate their surveillancepriorities: Department of Homeland Security (DHS), USDA AnimalPlant Health Inspection Service (APHIS), U.S. Army VeterinaryCorps, University Laboratories/Veterinary Teaching Hospitals, TheNational Capitol Region (NCR) ESSENCE Public Health SteeringCommittee, Maryland Arbovirus, Zoonotic, and Vector DiseaseGroup, and the Maryland State Veterinarian.A key animal disease surveillance stakeholder group that hasbeen underrepresented in prior requirements assessments is privatepractitioners. Preliminary discussions with key practitioners revealedclearly that there are monumental gaps in animal health surveillanceand it frequently limits their ability to rapidly respond to potentialdisease risks within their animal population of concern. To betterunderstand these gaps and potential ways to improve surveillance inthis area, a voluntary survey was developed and sent out to membersof the Maryland Veterinary Medical Association, Virginia VeterinaryMedical Association, and the District of Columbia Academy ofVeterinary Medicine.ResultsThrough this comprehensive study three current U.S. animal healthdisease surveillance gaps were isolated: integrated human and animalhealth surveillance, real-time animal health data collection, andcompanion animal surveillance.The survey was also well received and had almost 160 participants.Key issues addressed in the survey included: Animal Medical Records– availability, capabilities, and concerns, Zoonotic disease exposureand reporting, and support for development of integrated human-animal disease surveillance tools.Key Findings:- Almost 90% of responding practitioners reported havingencountered a zoonotic disease in practice.- Although less than 50% have reported a zoonotic disease to thestate or federal government.- Almost 70% of veterinarians in the National Capital Region(NCR) who participated in the survey also reported that they do nothave access to a surveillance system.- Veterinarian's responses to the question: "What is your opinionof the current status of local, regional, or national zoonotic diseasesurveillance and the use of animal data for surveillance?":"I think it is difficult to find up to date local and regional data.Email alerts etc. would be nice, rather than having to search forinformation that frequently isn't current.""I feel that many zoonotic diseases go unreported due to the lackof ease of reporting them and there is no communication betweenthe human and veterinary medical communities as far as reportablediseases affecting both people and animals.""With the proliferation of tick borne disease, closer surveillance ofanimal cases would benefit human medicine. We knew exactly whenLyme hit our area. It was three years later before VA Dept. of Healthsent out a letter outlining the prevalence of disease in southwest VAhuman cases."ConclusionsLinking the systems that report human and animal diseases wouldenable health professionals to swiftly identify and respond to zoonoticdisease outbreaks. Since funding for animal health surveillance islimited, integrating animal data into existing, well-established humanhealth surveillance systems would reduce the resources neededwhile still providing the advanced capabilities that are availablefor human health surveillance. The need for integrated surveillancehas been recognized by regulatory officials, but concerns regardingfunding, data acquisition, data confidentiality, and identification ofdesired stakeholders must still be addressed. The sometimes disparateinterests of large industry, private practitioners, and state governmentsmake gaining access to large centralized pools of animal health dataa challenge. By using existing human health surveillance systems asa platform to develop integrated human-animal surveillance systemsand by working with experts in the human surveillance field, theseconcerns can be ameliorated. This would lead to more advancedintegrated health surveillance capabilities and heighten the nation'sability to quickly detect and respond to emerging zoonotic diseases.

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

Abstract

ObjectiveA preliminary serological survey was carried out to assess thelikelihood of Influenza A (IA) infection in wild boars and begin tocharacterize the role of wild boars in the epidemiology of the IA virus.IntroductionDomestic swine have been viewed as important for the adaptationand spillover of IA from birds into human populations as they aresensitive to both avian and mammalian (including human) influenzaviruses [1]. However, in much of Eurasia and North America wildswine are geographically widespread, abundant and often come inclose contact with humans in rural and agricultural settings. Untilrecently, little attention has been paid to this as an alternate routefor IA transmission to human and domestic populations and itssignificance is not clear.Therefore, the monitoring of the exposure of wild mammals toIA was viewed as essential as potential vectors impacting domesticanimals and public health.MethodsFrom September to December 2014, wild boar sera were collectedby professional hunters in 4 Oblasts of Ukraine: Volyn, Rivne,Zhytomyr, and Chernihiv. Blood was collected from jugular veins.Sera were collected in Eppendorf type tubes, separated from wholeblood without centrifugation and stored at -20C until serologicallytested. To detect antibodies to IA, a blocking ELISA was used.Serum samples were tested using commercial test kits “InfluenzaA Ab Test” (IDEXX, USA). Specific antibodies in wild boarserum samples were detected based on manufacturer’s instructions.Briefly, sera were diluted 1:10, and incubated in test wells for60 minutes at room temperature, followed by three washes. Anti-IAHorseradish Peroxidase HRP conjugate was then added and incubatedfor 30 minutes at room temperature. Following three washes,3",5,5’-tetramethylbenzidine (TMB), as a substrate, was addedand incubated for 15 minutes. Absorbencies were measured at 650A using a iMark Microplate Absorbance Reader and data wereanalyzed using Microsoft Excel. Based on the manufacturer’sinstructions, a serum sample was considered positive if the sample/negative control ratio (S/N) did not exceed a threshold of 0.60.Statistical analyses were performed with the program “StatisticsCalculator”.ResultsSera from 120 wild boars that were shot in 2014 were tested. Thirtyboars from each of 4 Oblasts were collected in the north central andnorthwestern regions of Ukraine. Antibodies against IAV weredetected using ELISA in 27 samples (22.5 %), (Table 1). Antibodiesto IA virus were detected in at least some of the wild boars from all ofthe 4 Oblasts. The highest percentages of seropositive samples weredetected in wild boar from Volyn and Zhytomyr Oblasts (Fig. 1).The prevalence differences were statistically significant only betweensamples from Volyn and Chernihiv Oblasts (P<0.05). The averageS/N value of all positive serum samples was 0.36±0.03.ConclusionsThis preliminary survey of IA antibodies in wild boar populationsof northern Ukraine indicates a substantial presence of exposure toIAV throughout the region.Infection of wild boar populations provides an alternative oradditional route for spillover from wild populations to domesticanimals and humans. This potential has received relatively littleattention until recently, likely in part because feral swine populationshave not been viewed as a serious challenge in most regions of theworld where the natural history of IA has received serious study.Table 1Seroprevalence of IA virus in wild boars in UkraineFigure 1Serological surveillance of wild boars for IA virus innorthern Ukraine

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

Abstract

ObjectiveThe performance of comparative analysis of sensitivity and resultsof detection of avian influenza virus by real time polymerase chainreaction (PCR-RT) and loop-mediated isothermal amplification of thenucleic acids (LAMP) was the main goal of the study.IntroductionAs part of this surveillance study for Avian Influenza both activeand passive surveillance samples were tested using PCR and alsoutilized to validate the LAMP method. Active surveillance samplesinclude pathological material and tracheal and cloacal swabs fromill poultry, which were subsequently assessed for avian influenzaduring diagnosis, and birds collected by hunters. Passive surveillanceincluded environmental samples such as sand and bird faeces.Active surveillance samples were taken mostly from poultry farmsacross Ukraine, where infected birds are required to be diagnosedby State Scientific Research Institute of Laboratory Diagnosticsand Veterinary Sanitary Expertise (SSRILDVSE) by Ukraine Law.Passive surveillance samples were taken primarily during the annualbird migration season. Development of simple, sensitive, and cheapmethods for diagnostics of avian influenza is a very important taskfor practical veterinary medicine. LAMP is one of such methods.The technique is based on isothermal amplification of nucleic acids.It does not require special conditions and equipment (PCR cyclers),therefore it is cheaper in comparison with PCR. Accurate diagnosisis necessary for determining the risk associated with avian influenzain Ukraine and along the Dnipro River during the migratory season.MethodsFor the research, we used PCR-RT commercial kit Bird-Flu-PCR(Ukrzoovetprompostach, Ukraine), LAMP (the protocol has beenoptimized and patented by SSRILDVSE), QIAamp®Viral RNA MiniKit. For the study, we used pathological and biological materials frombirds, which were sent to the SSRILDVSE from all regions of Ukraineaccording to the 2013–2014 State monitoring plan.Set up of the real time PCR reactions and parameters ofamplifications are indicated in the instruction to the kit.The following protocol was used to set up the RT-LAMP: 2.5µL10 X Thermopol buffer, 1 mmol/L betaine, 5 mmol/L MgSO4,1.4 mmol/L - BNTP, 12.5µmol/L SYBR GREEN, 0.5 mmol/LMnCL2, up to 25µL Nuclease-free water, 8 U Bsm DNA polymerase,0.1µM/1 of F3, 0.1µM/1 of B3, 0.8µM/1 of FIP, 0.8µM/1 of BIP,0.4µM/1 of LF, 0.4 of LB, 2µL cDNA.During our work, we used the following optimal temperature andtime for the amplification – 59°C and 60 minutes.The sensitivity of diagnostic kit Bird-Flu-PCR and RT- LAMP wasdetermined by testing cDNA of the reference strain of AIV H5N1,which was provided to us by NSC Institute for Experimental andClinical Veterinary Medicine (Kharkiv, Ukraine). For the standard,we employed concentration in the range of 10.0-0.01 ng/sample.ResultsTable 1.This table shows the reproducibility results obtained by bothmethods. However, taken into account absence of highly pathogenicavian influenza virus circulating in Ukraine during the studied period,it was not possible to confirm these results with protocols of positivesamples.Table 2.It has been established that the sensitivity of PCR-RT kit Bird-Flu-PCR is 0.01 ng/sample for gene M and 0.1 ng/sample for subtypeH5N1.Fig. 1. Visual detection of LAMP products with differentconcentrations of cDNA of avian influenza virus (ng per sample):1 – 10; 2 – 5; 3 – 1.0; 4 – 0.1; 5–7 – 0.01; 8–9 – 0.1; 10 – negative.We have examined the LAMP results using electrophoresis forthe confirmation of visual detection and correct interpretation of theresults (Fig. 2).Fig.2. Electrophoresis results for LAMP products. M –molecular weight marker; 1 – 10.0; 2 – 5.0; 3 – 1.0; 4 – 0.1; 5–7– 0.01; 8 - negative control.It has been established that the sensitivity of LAMP is0.1 ng/sample. Slightly lower sensitivity of LAMP in comparisonto PCR-RT can be explained by visual detection of the products ofthe LAMP reaction.Conclusions1. Sensitivity of both methods is high.2. LAMP is a perspective screening method for the diagnosis ofviral infectious diseases supported by confirmation of positive resultsby PCR-RT.

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

Abstract

ObjectiveTo evaluate the occurrence ofCryptosporidiumspecies in ediblefrogs (Ranaspp) sold at the Hanwa frog market Zaria, Kaduna State,Nigeria.IntroductionSinceCryptosporidiumcan be transmitted by ingestion of infectedfood animals and poorly treated water and by direct contact1it ispossible for infection to occur through ingestion of under cookedfrogs and through handling and processing of infected frogs.In Burkina Faso frogs caught are sold to market-women who treatthe frogs by emptying their bowels and frying in oil before sellingthem, this is not always the case for the Nigerian frog markets wherefrogs are sometimes smoked or dried without necessarily been fried,before consumption2. This may pose a health risk for transmission ofcryptosporidiosis from infected frogs.Presence ofCryptosporidiumoocysts in frogs may by implicationreveal theCryptosporidiumstatus of water bodies from varioussources where the frogs were caught. Water management programmesfor treatment ofCryptosporidiumis difficult as the oocyst is resistantto several disinfectants including chlorine1. The consumption ofsuch treated water in urban areas and untreated water in mostrural communities may expose a great proportion of Nigerians tocryptosporidiosis. Owing to the number of HIV/AIDS patientswho commonly suffer from cryptosporidial enteritis and cough, thecontrol of cryptosporidiosis in animals and man is of public healthsignificance.MethodsA cross-sectional study was conducted between February andApril, 2016 using intestinal contents from wild capturedRanaspeciesof frogs (n=117), sourced from 8 different locations, from the frogcentral collection, sales and processing point at Hanwa in Zaria. Theintestinal contents from the frogs were examined by staining flotationand sedimentation smears with modified Ziehl-Neelsen stainsfollowed by microscopy and micrometry of the oocysts.ResultsOverall, 35.9% of frogs sampled from the Hanwa frog marketwere positive forCryptosporidiumoocysts. There were moreCryptosporidiumoocysts detected by sedimentation test (28.2%) thanflotation test (23.9%). Although there was no significant statisticalassociation between sex of frogs and oocyst detection ($\chi2=0.5349$,p>0.05); sex wise, female frogs (40%) and frogs within the weightrange 170-219g were more infected withCryptosporidium(66.7%).Oocysts size ranging between 6.10μm -7.00μm, had the highestfrequency of 10 (23.8%). By size 28.2% of the oocysts detectedsuggest infection withC. parvumandC. maleagridis.ConclusionsWe present the first report ofCryptosporidiumoocysts in wildedible frogs (Ranaspp) sold at the Hanwa frog market Zaria, KadunaState, Nigeria. Frog consumption is on the increase in Nigeria, butbaseline information on associated zoonoses is rare. A cross-sectionalstudy conducted between February and April, 2016 using intestinalcontents from wild captured frogs (n=117), sourced from 8 differentlocations using the modified Ziehl-Neelsen stains and micrometryrevealed 35.9% were positive forCryptosporidiumoocysts.Of the oocysts detected 28.2% suggest infection withC. parvumandC. maleagridis,this may constitute a health risk for humans.

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

Abstract

IntroductionAnthrax is an acute especially dangerous infectious disease ofanimals and humans.Bacillus anthracisis a potential bioterrorismtool. In Ukraine, there are favorable natural conditions for the spreadof anthrax. There are 13.5 thousand of constantly anthrax-troubledpoints. Anthrax epidemic situation in Ukraine could be characterizedas unstable. Because of the continuing reform of Ukrainian humanhealth entities, the State Sanitary Epidemiological Service (SSES) haslost its control functions and is remaining in an uncertain state, whichincreases possible risks.MethodsEpidemiological analysis of official data has been performedusing information from the following sources: State SanitaryEpidemiological Service of Ukraine (SSES), State Veterinary andPhytosanitary Service of Ukraine, and analytical materials fromSI UCDCM. Collected papers Distribution and EpidemiologicalCharacteristics of Major Human Infectious Diseases in Ukraine(Kyiv Research Institute of Epidemiology, Microbiology andParasitology, 1976) were also used during the study. Materials werecompiled for the period from 1945 to 2015.ResultsIn the early XX century, more than 10,000 cases of anthrax inhumans were annually registered in tsarist Russia. In 1913, 1,473cases of anthrax in animals were recorded only in Kherson province(currently, Kherson oblast of Ukraine). The morbidity among humansincreased again during the WWII. In the late 40s, massive epizooticanthrax among animals was eliminated and morbidity among peoplesignificantly reduced because of planned government measures,strengthened veterinary, sanitary, and epidemiological surveillance.Since 1950, significant reduction of incidence of human anthrax hasbeen being recorded in Ukraine.Since 1964, certification and mapping of persistent anthrax-troubled points in Ukraine have been being performed.Compulsory vaccination of people against anthrax was cancelledand compulsory vaccination of all livestock was introduced in 1990.The period from 1976 to 1993 is characterized as epidemically safe.Single cases of the disease in human were registered with intensityrates of 0.01 – 0.002 per 100,000 population (excluding 1985).No human cases were registered during the certain years: 1978, 1982,1987, 1988.The epidemic situation complicated during the period 1994-2001. The following outbreaks were registered:Table 1. Total number of disease cases/ including the numberof cases during outbreaks within regionsThe main reason for the complication of the epidemiologicalsituation was weakening of epidemiological and veterinarysurveillance during the economic crisis characterizing this period.Epizootiological outbreaks arose from incomplete anti-anthraxvaccination of agricultural animals and from violation of veterinary-sanitary rules for their keeping as well. More than 80% of humaninfection cases happened resulting compelled cattle slaughtering,while the rest 20% resulted from meat product distribution andconsumption without corresponding sanitary-veterinary expertise.Six human cases of anthrax were registered during 2002-2015.Fig. 1. Dynamics of anthrax cases in humans in Ukraine during1945 – 2015 (absolute numbers)Table 2. Chronology of anthrax epidemiological surveillancemilestones in UkraineConclusionsRelative wellbeing regarding anthrax in Ukraine persists owing tothe implementation of ruled veterinary-sanitary activities and statesanitary epidemiological surveillance in meat- and leather-processingindustries as well as because of active food control.The main risks, which could trigger complication in the currentepidemiological situation with anthrax, are the following:1) Uncertainty in the system of sanitary-epidemiological andveterinary surveillance, which resulted from the reformation of theState Sanitary-Epidemiological and State Veterinary services.2) Existence of favorable conditions for anthrax agent circulation(considerable number of persistent anthrax-troubled points in allregions).3) Economic instability in the country.4) Uncontrolled epidemic situation in the zone of the Anti-terroristoperation (Donetsk and Luhansk oblasts).

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

Abstract

ObjectiveThe purpose of this study was to describe the epidemiology ofvisceral leishmaniasis in Georgia and to define new control measures.IntroductionVisceral leishmaniasis (VL) is a zoonotic, protozoal infection thatis endemic in Georgia, which commonly affects young children.In recent years, the incidence of VL has increased sharply and thegeographic distribution has increased. Recently, VL moved to highlypopulated areas as new foci appeared from 2010-2015, during which,610 laboratory confirmed cases of VL were registered in Georgia.The majority of cases were found in East Georgia (94.2%) and 5.8%of cases in West Georgia (representing new foci of VL in Georgia).MethodsBlood samples from 2,100 individuals suspected to have VL weretested using the rk39 based VL rapid diagnostic test, an enzyme-linkedimmunosorbent assay (ELISA). Also, 1,575 randomly selected dogs(stray and pet) and 77 wild canids were tested for VL using the sameELISA. Confirmed human cases were followed up for 9-12 months.ResultsThe most affected age group was 0-5 years (72.2%). Of thepatients, 13.9% were HIV positive and lethal outcomes were observedin 2.1%of patients. Mortality was associated with delayed diagnosisand HIV co-infection. Relapse developed in 6.4% of cases. AmongHIV positive patients, secondary prophylaxis was conducted withliposomal amphotericin B, which decreased the number of relapses by76% in 12-24 month follow-ups. A high incidence of VL in humanswas associated with a high prevalence of leishmaniasis in stray anddomestic dogs. Leishmania antibodies were found in 23.7% of strayand domestic dogs and 2.6% of wild animals screened in Tbilisi.ConclusionsOverall, the VL situation in Georgia is concerning and new controlmeasures are needed. Our study revealed a high prevalence of VLin humans and dogs in East Georgia. Early and accurate diagnosis/treatment and effective control measures should be conductedregularly to prevent the spread of VL in Georgia. In addition,secondary prophylaxis in HIV infected patients is also recommended.

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

Abstract

ObjectiveTo implement a systematic and uniform approach to evaluatingdata sources for syndromic surveillance within the United StatesDepartment of Agriculture (USDA) Animal and Plant HealthInspection Services (APHIS) Veterinary Services (VS) group.IntroductionUSDA-APHIS-VS utilizes several continuous data streams toincrease our knowledge of animal health and provide situationalawareness of emerging animal health issues. In addition, USDA-APHIS-VS often conducts pilot projects to see if regular data accessand analysis are feasible, and if so, if the information generated isuseful. Syndromic surveillance was developed for three goals: asyndromic monitoring system to identify new diseases, as an emergingdisease early warning system, and to provide situational awarenessof animal health status. Current efforts focus on monitoring diversedata, such as laboratory accessions or poison center calls, groupedinto syndromic or other health indicator categories, and are notintended to identify specific pre-determined diseases or pathogens.It is essential to regularly evaluate and re-evaluate the effectiveness ofour surveillance program. However, there are difficulties when usingtraditional surveillance evaluation methods, since the objectives andoutcomes of monitoring novel data streams from pilot projects arenot easily measurable. An additional challenge in the evaluation ofthese data streams is the identification of a method that can adapt tovarious context and inputs to make objective decisions. Until recently,assessment efforts have looked at the feasibility of regular analysisand reporting, but not at the utility of the information generated, northe plausibility and sustainability of longer term or expanded efforts.MethodsMethods for surveillance evaluation, syndromic surveillanceevaluation, and specifically for animal health syndromic surveillanceevaluation were researched via a literature review, exploration ofmethods used in-house on traditional surveillance systems, andthrough development over time of criteria that were seen as key tothe development of functioning, sustainable systems focusing onanimal health syndromic surveillance. Several methods were adaptedto create an approach that could organize information in a logicalmanner, clarify objectives, and make qualitative value assessmentsin situations where the quantitative aspects of costs and benefits werenot always straight forward. More than 25 articles were reviewed todetermine the best method of evaluation.ResultsThe RISKSUR Evaluation Support Tool (EVA) provided themajority of the methodology for the evaluations of our data sources.The EVA tool allows for an integrated approach for evaluation, andflexible methods to measure effectiveness and benefits of various datastreams. The most useful and common factors found to evaluate pilotdata sources of interest were how well the information generated bythe data streams could provide early detection of animal health events,and how well and how often situational awareness information onanimal health was generated. The EVA tool also helps identify andorganize criteria that are used to assess the objectives, and assignvalue.ConclusionsThe regular evaluation of syndromic surveillance data streamsin animal health is necessary to make best use of resources andmaximize benefits of data stream use. It is also useful to conductregular interim assessments on data streams in pilot phase to becertain key information for a final evaluation will be generated duringthe project. The RISKSUR EVA tool was found to be very flexibleand useful for allowing estimates of value to be made, even whenevaluating systems that do not have very specific, quantitativelymeasurable objectives. This tool provides flexibility in the selectionof attributes for evaluation, making it particularly useful whenexamining pilot project data streams. In combination with additionalreview methodologies from the literature review, a systematic anduniform approach to data stream evaluation was identified for futureuse.

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

Abstract

ObjectiveThe purpose of this study was to detect the presence of circulatingSalmonellaspp. on backyard production systems (BPS) with poultryor swine breeding in central ChileIntroductionCharacteristics and conditions of backyard production systems(BPS) transform them into potential maintainers of priority zoonoticagents, likeSalmonellaspp., highly important agent because of itsimpact in animal and public health (1).MethodsA stratified and proportional random sampling approach wasperformed (2), based on 15 provinces from the study area (regions ofValparaiso, Metropolitana and LGB O'Higgins). 329 BPS sampled(equivalent to 1,744 samples). Stool content inoculated in test tubeswith peptone water (APT, Difco®) supplemented with Novobiocin(Sigma®), incubated for 18 to 24 hours at 37° C. Subcultured onmodify semisolid Rappaport Vassiliadis (MSRV, Oxoid®) agarsupplemented with Novobiocin, incubated for 24 to 48 hours at 41.5° C.Samples compatible with growth and/or diffusion were sub-culturedby exhaustion on Xylose Lysine Deoxychocolate (XLD, Difco®) agarand then incubated for 24 hours at 37° C (3). Confirmation made byconventional PCR forinvAgenes (4). Serotypes were predicted usinga combination of PCR and sequencing, aimed directly at genes codingfor O, H1 and H2 antigens (5).Results1,744 samples were collected belonging to the 329 BPS. 15 positiveBPS (4.6%) detected. Serotypes detected correspond toSalmonellaTyphimurium (21.7%), followed bySalmonellaEnteritidis (13.0%)andSalmonellaInfantis (13.0%),SalmonellaHadar or Istanbul(8.7%),Salmonella[z42] or Tenessee (4.4%),SalmonellaKentucky(4.4) and unknown (34.8%) (Table 1).ConclusionsThis is the first evidence of serotypes ofSalmonellaspp. circulatingat a regional level in BPS from central Chile. A relevant pathogen forpublic health.

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

Abstract

ObjectiveThe purpose of this study was to identify zoonotic influenzaviruses in swine and poultry populations in Georgia and to definetheir pandemic potential.IntroductionAquatic birds are the main reservoirs of influenza viruses,however pigs represent an essential host in virus ecology as they aresusceptible to both avian and human influenza viruses. Circulatingzoonotic influenza (A/H7N9, A/H5N1, and A/H3N2v) viruses couldmutate into forms easily transmissible from human-to-human andbecome a public health concern. Georgia is located along routes usedby migrating birds where different species of aquatic birds are found.In 2006, highly pathogenic influenza virus A/H5N1 was detected intwo wild swans in Adjara (western Georgia). Moreover, in the frameof wild bird surveillance, various subtypes of influenza A viruseswere detected in mallard and gulls in Georgia (Lewis, 2013). Thusdomestic animals in Georgia have a potential chance to contractinfluenza viruses from wild birds.MethodsThe Kakheti region, the leading region in cattle breeding andpoultry production in Georgia, was selected for study. Villages wereselected for door-to-door visits to search for ill backyard animalsshowing influenza-like symptoms. In case of identification of a sickanimal, samples were obtained for laboratory investigations; samplecollection forms were filled out to generate epidemiological data.Cloacal and tracheal swabs were taken from poultry; and pharyngealand nasal swabs were collected from pigs. Each specimen wasscreened for influenza A matrix gene by real-time RT-PCR using aprotocol from the Centers for Disease Control Prevention.ResultsEighty four villages in the Kakheti region were surveyed fordomestic animals with influenza-like illness symptoms. In total,164 specimens were collected from 112 backyard animals in55 households (107 samples were from 55 poultry and 57 sampleswere from 57 pigs). All samples tested negative for Influenza A virusby real time RT-PCR. The questionnaire data revealed that the agerange of both pigs and poultry varied from one month to two years;median and mode were both 1 year. Chickens and ducks primarilyfreely ranged in backyards (67%), while half the number of pigs werekept in closed premises. Equally, 61% of pigs and poultry had contactwith other pigs or poultry within the premises.ConclusionsIn spite of the negative findings, we cannot exclude the circulationof influenza viruses in domestic animals in Georgia. Especially,considering the fact that a domestic duck with influenza A/H10virus was identified during veterinarian training in 2010 in Grigoleti(Black sea cost of Georgia) manifesting no clinical symptoms.Therefore, larger scale studies, including swabbing more backyardanimals without any clinical symptoms are necessary to identify inter-species virus transmission in the country.

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

Abstract

ObjectiveAnalysis of brucellosis monitoring in agricultural animals inUkraine to control epizootic situation and prevent possible brucellosisin humans.IntroductionBrucellosis is one of the most widespread zoonosis in the world.Only 17 countries informed WHO that their territory is free frombrucellosis. About 500 thousand cases of brucellosis in humansare registered in the world each year. The problem of brucellosishas remained actual to agriculture and health care for many years.Almost all agricultural animals are highly susceptible to brucellosis.Socio-economic significance of brucellosis problem is determined bypeculiarities of the course of the disease and the main contingent thatcan be infected, namely the working population that is connected withboth professional factors and social reasons. Brucellosis is a chronicinfectious disease. The disease in animals has the following signs:abortions and retention of secundines, orchitis, unviable litter andsterility. Brucellosis is included to the list of quarantine diseases dueto its social threat.MethodsStudies of blood sera of cattle, small ruminants, horses and pigsfrom different Ukrainian regions that were selected during the annualspring clinical examination in 2013-2015. The following serologicalmethods were used for the studies: complement-fixation test (CFT),agglutination reaction (AR), Rose Bengal test (RBT), prolongedcomplement fixation test (PCFT).ResultsCurrently, Ukraine is free from brucellosis of animals. The lastbrucellosis case in pigs was registered in 2008 in Odesa Oblast.The last case of brucellosis in cattle in Ukraine was registered in 1992.According to the Ministry of Health, a case of brucellosis inhumans is registered in Ukraine almost every year.Annual serological brucellosis studies of servicing bulls, cows,heifers older than one year, horses, stud rams, ewes, boars and sowsare held once a year in Ukraine.During 2013-2015, the monitoring serological brucellosis studies ofblood sera from cattle, small ruminants, horses and pigs from differentfarms in 25 oblasts of Ukraine were conducted at State Laboratoriesof Veterinary Medicine and State Scientific and Research Institute ofLaboratory Diagnostics and Veterinary and Sanitary Expertise.Table 1. Serological research resultsIn 2013, seropositive results were obtained in AR Crimea – sixcases in cattle, Dnipropetrovsk oblast - 12, Kyiv oblast – 31, Sumyoblast – 118, and Luhansk oblast – 25 using AR and RBT techniques.In small ruminants, seropositive results were determined in Luhanskoblast – 26 animals (AR). Testing pigs by RBT showed the followingpositive results: 82 animals in Dnipropetrovsk oblast, 16 in Luhansk,and 1 in Sumy oblast. Twenty seven horses were detected positive byRBT in Luhansk oblast.Fig. 1. Brucellosis monitoring results, 2013In 2014, seropositive results in cattle were received in Kyiv (20),Dnipropetrovsk (28), Sumy (66), Chernihiv (37) and Zhytomyr (2)oblasts using AR, RBT, and CFT. AR tests were positive for onesmall ruminant in Dnipropetrovsk and for three in Sumy oblasts. Fiveseropositive pigs were found in Sumy oblast using RBT.Fig. 2. Brucellosis monitoring results, 2014In 2015, seropositive results (AR, RBT, and CFT) in cattle wereobtained in Sumy (8 animals), Dnipropetrovsk (34), and Chernihiv(10) oblasts. For small ruminants, one seropositive animal was foundin Dnipropetrovsk and three in Sumy oblasts using AR. EmployingRBT, one pig was diagnosed in Dnipropetrovsk oblast. Two horseswere found positive using RBT and AR in Sumy oblast.Fig. 3. Brucellosis monitoring results, 2015The seropositive animals were destroyed. Bacteriological studieswere not conducted.Conclusions1. During the studies of blood sera of agricultural animals fromdifferent Ukrainian regions, positive results were obtained in 7 oblastsof Ukraine indicating a possible circulation of the causative agent ofbrucellosis.2. Studies need the in-depth analysis that must includebacteriological testing of seropositive animals.

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

Abstract

ObjectiveTo determine the vaccination status of owned dogs, assess therabies antibody titre of vaccinated dogs and risk factors associatedwith vaccination of dogs in Abuja, Nigeria.IntroductionRabies is a zoonotic disease of high public health importance1.There have been documented reports of rabies in vaccinateddogs2. Rabies is enzootic in domestic dogs in Nigeria. Hence,annual vaccination campaigns of dogs are advocated with the aimof rabies elimination. Vaccination status, type of vaccination andthe immunogenicity of the various rabies vaccines used in AbujaNigeria has not been studied. To date, no effective medical therapyhas been established for rabies3. Most human rabies deaths occurin the developing countries and though effective and economicalcontrol measures are available their application in developingcountries is hampered by a range of economic, social and politicalfactors. It is widely recognized that the number of deaths officiallyreported in most developing countries greatly underestimates the trueincidence of disease, with several factors contributing to widespreadunderreporting3. Preventive vaccination against rabies virus is ahighly effective method for preventing rabies in humans and animals3but do people vaccinate and how long does the immunity conferredby the vaccine remain protective in the dogs in Abuja?. Rabies hashigh financial expenditure burden on any country where it is endemicmainly associated with costs incurred on post-exposure prophylaxis(determined by the type of vaccine, vaccine regimen and route ofadministration as well as the type of immunoglobulin used).MethodsDog serum samples (n=276) were collected from Abuja the FederalCapital Territory (FCT) Nigeria, from 5 locations (Phase 1, 2, 3,Gwagwalada and Kubwa) based on availability and owners consent.Rabies antibody serum titer was determined using an indirect enzymelinked immuno-sorbent assay. Face to face structured questionnaireswere used to obtain demographic and zoographic information fromthe dog owners. Associations between the demographic variables,vaccination status and rabies antibody titer of each dog were assessedusingχ2analysis.ResultsOf the dogs sampled, 229 (83%) had certified antirabies vaccinationrecord. The dogs sampled, which were vaccinated from Phase I, II,III and the satellite towns were; 109/118 (92.37%), 32/33 (96.97%),48/49 (97.96%) and 40/76 (52.63%), respectively. A total of 276serum samples were collected, processed and analyzed during thisstudy. Out of the 276 dogs sampled, 239 (86.6%) had rabies antibodytitre≥0.6EU/ml whilst 37 (13.4%) had less than 0.6EU/ml. Therewas a marked decline in rabies antibody titre with increase in time.Out of the 228 exotic breeds of dogs sampled, 218 (95.6%) werevaccinated whilst 11 (22.9%) of the 48indigenous breed of dogssampled were vaccinated. All the exotic breed of dogs had rabiesantibody titre≥0.6EU/ml whilst 37 (77.1%) of the indigenousbreed of dogs had less than 0.6 EU/ml levels of rabies antibody titre.All dogs within 6 months to 1 year and greater than 10 years of agehad≥0.6EU/ml rabies antibody titre whilst dogs within 1-5 years had1 (0.5%) and 36(69.2%) dogs of age 6-10 years had rabies antibodytitre < 0.6EU/ml. Twelve (7.6%) of the males and 25 (21.2%) of thefemales had less than 0.6EU/ml rabies antibody titre. All the dogsacquired by importation and from breeders had rabies antibody titre≥0.6EU/ml whilst 37 (27.2%) of the dogs acquired from friends hadless than 0.6EU/ml rabies antibody titre.Significant associations were observed between breed (χ2= 203,df = 1, P-value < 0.05), age (χ2= 172, df = 3, P-value < 0.05), sex(χ2= 10.75, df = 1, P-value < 0.05), source (χ2= 43.99, df = 2, P-value< 0.05), rabies vaccination status (χ2= 276.00, df = 2, P-value < 0.05)and the rabies antibody prevalence of sampled dogs.ConclusionsThis cross-sectional study shows that not all dog owners vaccinatetheir dogs and that the vaccines conferred protection beyond12 months. The Preventive vaccination against rabies virus is ahighly effective method for preventing rabies in humans and animals.Policies to enhance mass mandatory annual vaccination to achieve70% coverage should be implemented in order to eradicate rabies.

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

Abstract

ObjectiveThe purpose of this study was to describe anthrax foci alongthe Georgia-Azerbaijan border and to describe control measures inidentified areas.IntroductionAnthrax is endemic in the South Caucasus region. There is alack of understanding of the regional epidemiology of the causativepathogen,Bacillus anthracis, and the trans-boundary factors relatedto its persistence.MethodsTo increase the local and regional understanding of anthraxecology, ecological risk factors, and the genetic relationships anddistribution among Georgian and AzerbaijaniB. anthracisstrains, aregional study of the ecology of anthrax foci was conducted in Georgiaand Azerbaijan. Six regions in Georgia (that border Azerbaijan)were selected for environmental sampling based on historical data.Soil samples were collected in Lagodekhi and Sagarejo and testedat the Laboratory of the Ministry of Agriculture using standardbacteriological and molecular biology methods.ResultsA total of 185 soil samples were collected. Bacteriological testsrevealed four positive samples from Kakheti (two from Lagodekhi,Gelati; two from Dedoplistskaro), from which, cultures were isolatedand confirmed by PCR. Georgian scientists continue collecting andtesting soil samples. After sample collection and bacteriologicaltesting is completed, the molecular characteristics of the pathogenwill be examined.ConclusionsThis study will assist in the formulation of targeted public healthinterventions aimed at increasing knowledge of the disease withinspecific demographics. Public health interventions can focus onlivestock surveillance and control in identified areas.

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

Abstract

ObjectiveThe purpose of this research was to study the seroprevalence ofzoonotic diseases among farm animals in the Kvemo Kartli regionof Georgia.IntroductionZoonotic diseases are an important cause of human morbidityand mortality; around 75% of recently emerging human infectiousdiseases are zoonoses. Herein we report the first seroprevalence studyto include a range of emerging or re-emerging zoonotic pathogens ofeconomic concern (including:Bacillus anthracis, Coxiella burnetii,Francisellaspp.,Brucellaspp., and Crimean-Congo hemorrhagicfever virus (CCHFV)) affecting domestic animals (e.g., cattle, sheep,goat, and dog) in Georgia.MethodsCattle (n=177) from Gardabani, Marneuli, and Tsalka(Kvemo Kartli region) were sampled for the study as were small ruminantsand dogs (n=30).Bacillus anthracis, Brucellaspp., CCHFV, andC. burnetii(Phase I) were detected using ELISA methods.Francisellatularensiswas detected using a microscopic agglutination test (MAT).ResultsOf the cattle sampled, 11 were positive forF. tularensis, 39 werepositive forBrucellaspp., and seven were positive forC. burnetii. Allsamples were negative for CCHFV. Three goat samples were positiveforC. burnetii, one goat sample and one dog sample were positive forF. tularensis.ConclusionsDomestic animals serve as a source of disease that can spreadto humans through vectors or direct contact. In Georgia, domesticanimals were not previously studied for exposure to zoonotic diseases,with the exception of cattle, which were surveyed for brucellosis.In particular, the finding ofF. tularensisseropositive animals isnovel in Georgia, as this region was considered free of the pathogen.Screening studies of domestic/farm animals for zoonotic pathogenssuch as this can serve as a source of baseline data for regional riskassessments and to better inform One Health measures.

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

Abstract

ObjectiveThe main focus of this study was to study the spread of botulism inGeorgia and the biological characteristics of the strains ofClostridiumbotulinumisolated from territories in the country.IntroductionAccumulation ofC. botulinumin soil occurs through excretion ofbacterial spores from the intestines of humans, animals, birds andfish. In Georgia, during the winter season, the population consumeshomemade vegetable preserves, which are made of locally produced(as well as imported) vegetables. Historical surveys confirmed that thepresence ofC. botulinumin the soil is widespread. Some researchersconsiderC. botulinuma characteristic component of soil flora.MethodsSoil samples were collected from areas, where from 2001-2002cases of botulism caused by homemade vegetable preserves (producedfrom vegetables cultivated in those areas) were registered. Soilsamples were collected from Kakheti, Shida Kartli, Kvemo Kartli,Samtkhe-Javakheti, and Samegrelo regions. Standard bacteriologyand PCR were used to confirm the presence ofC. botulinumfrom soilsamples. Separation of strains and their examination was conducted inaccordance with the scheme provided by the CDC Atlanta ReferenceLaboratory (USA), which was later tested by NCDC. Toxigenicityand toxin production of strains were tested using a biotest on whitemice.ResultsIn total, 258 soil samples were tested, from which, 40 (15.5%)cultures ofC. botulinumtype B were obtained. Toxigenicity andtoxin production were confirmed through biotests. These resultsconfirm the presence ofC. botulinumin agricultural lands, whichcauses contamination of vegetables cultivated on those lands, whichare used for the preparation of homemade preserves, causing botulismin humans.ConclusionsFor the purpose of finding solutions to botulism, it is essentialto verify the ecology of the pathogen through establishing theprevalence of bacteria in different soil types. It was shown that someareas of Georgia, where vegetable growing is greatly developed, andwhich, are the main sources of crops, are highly contaminated withC. botulinum. In Georgia, land used for agriculture is contaminatedwithC. botulinum.C. botulinumtype B was isolated from 40 culturesobtained from 258 soil samples, which represents contamination in15.5% of sampled areas. These results suggest that vegetables andmelons may be highly contaminated as well. All cases ofC. botulinumin humans that were researched were connected to homemade cannedvegetables.

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

Abstract

IntroductionUkraine’s ability to respond to the spread of viruses that causepandemics and reduce economic losses from influenza, can bestrengthened only in the presence of a developed surveillance networkincluding the monitoring of virus circulation in humans. Specialistsof Dnipropetrovsk Oblast have great experience in virologicalsurveillance on the circulation of influenza virus A/California/H1N1and timely determination of the etiology of outbreaks caused by thevirus.MethodsLaboratory diagnostics of influenza was performed usingserological methods, PCR, and virological studies in the cell culture.During the last seven epidemic seasons, including the flu pandemicof 2009-2010, most of samples came from four health-care facilitiesof Dnipropetrovsk, which were determined as basic hospitals forthe sentinel center. Patients with severe acute respiratory infections(SARI) were examined. Nasopharyngeal washouts and swabs werecollected into cryo-tubes with a transport medium. The samples werestored at hospitals in Dewar flasks.The delivery of the samples to the laboratory was performedaccording to cold-chain rules. After sample preparation stage, thesamples were tested for the presence of influenza A/B virus RNA byPCR using Bio-Rad CFX-96 cycler and the following commercialtest-kits AmpliSens® Influenza virus A/B-FL, AmpliSens® Influenzavirus A/H1-swine, and AmpliSens® Influenza virus A-type-FL.All positive samples with detected RNA of influenza virusA/H1-swine were tested using MDSK cell cultures (Canine KidneyEpithelial Cells). Flu viruses caused cytopathic changes in the cellcultures in the form of poppy-sand-like degeneracy not earlier thanin 72 hours after the infection of the cells followed by cell monolayerfragmentation.Fig. 1 MDSK cell cultureFig. 2 MDSK cell culture 72 hours after infection with influenzavirus A (H1N1)Express immunochromatic tests «Cito test influenza A+B» oragglutination test (AT) using erythrocyte suspension of human 0 (I)group blood were used for the determination of haemagglutinatingagents.ResultsDuring the seven epidemic seasons, 5,467 people were examinedfor flu and acute respiratory viral infections. During the swine flupandemic in 2009-2010, 1,217 severely ill patients were tested.Positive results were found in 50% of cases (607 persons). Fromthose, pandemic influenza virus (RNA of influenza A/H1-swinevirus) was detected in 100% of positive cases.Fig.3 Data on the determined pandemic flu virus strains(RNA of influenza A/H1-swine virus) using PCR duringepidemiological seasons from 2009 to 2016 in DnipropetrovskOblast, UkraineFrequency of pandemic influenza virus detection declined to zeroin the following epidemic seasons (2010-2011 and 2011-2012).However, incidence of the virus variant (influenza A/H1-swine)began to grow slowly during the last four epidemic flu seasonsfrom separate cases (6 in 2012-2013, 1 in 2012-2013) to 26 cases in2014-2015. During the last epidemic season (2015-2016), the numberof pandemic influenza cases increased dramatically to 166, accounting29% of all examined persons.Fig. 4 Results of isolation of pandemic strains of influenzaviruses in cell culture MDSK flu epidemic seasons from 2009-2010to 2015-2016 in Dnipropetrovsk Oblast, UkraineMost of the virus isolates were sent for confirmation and furtheridentification to the Ukrainian Center for Influenza and to theworld influenza centers (Atlanta, USA and London, UK) in order tosupport Ukraine’s participation in the worldwide pandemic influenzasurveillance. The world flu centers confirmed the isolates to beinfluenza virus strain A/California/(H1N1)/07/2009.Conclusions1. Circulation of the pandemic type of influenza virus A/California/(H1N1)/07/2009 among the population of Dnipropetrovsk oblast isof sporadic character.2. The return of the virus A/California/(H1N1)/07/2009 after the2009-2010 pandemic occurred during the last 2015-2016 epidemicseason.3. Application of PCR can significantly shorten the examination ofpatients with severe course of influenza, but cannot help with virusisolation.4. The use of express immunoassay tests accelerates theidentification of viruses isolates.5. The employment MDSK cell culture for influenza virusisolation allows obtaining of a spectrum of influenza strainscirculating during an epidemic period including the strainA/California/(H1N1)/07/2009.

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

Abstract

Objectiveto show the instability of an epizootic situation on rabies casesof animals in the Republic of Azerbaijan, on the example of thecases analysis in Electronic Integrated Disease Surveillance System(EIDSS) electronic reporting systemIntroductionRabies is an infectious disease which was and remains to be oneof the most serious diseases of all species of hematothermal animalsand humans, in many regions of the world. The epizootic situation onrabies in the Republic of Azerbaijan has been unfavorable for manyyears, which is confirmed by scientific data and the veterinary casesreporting in the EIDSS system. This system was introduced in thecountry in 2009 and is the electronic System of disease control. Theprogram allows to provide monitoring and prevention of diseaseswithin the concept “One World - One Health System” by integrationof systems of observation of animal diseases, human diseases, anddisease carriers.MethodsOn the basis of the data on rabies cases entered in special formsand also aggregative data collected on anti-rabies vaccination, theanalysis of information on quantity of cases and their prevalence onadministrative and territorial units (rayons) of the country is carriedout. The graphical analysis (charts and the map) on the basis ofnecessary criteria are constituted in the analyses module, visualizationof the AVR reporting and in the Microsoft Excel program.ResultsThe analysis of the rabies cases confirmed at the Virologydepartment of the Republican Veterinary Laboratory shows thatrabies has been identified in 36 cases in 2015, 25 cases in January- June, 2016, in total 61 cases has been registered for the periodof “January 2015 – June 2016”. An epizootologically unfavorablesituation is revealed in 27 regions. The most unfavorable situation isthe northwest regions of the country, the most part of which is coveredwith mountainy-forest area with domination of wild fauna. Specificstructure of animals: dogs – 31 cases in 19 areas (51%), cattle – 21cases in 12 areas (34%), a small cattle-1 case (2%), wild animals(specify types) - 8 cases in 8 areas (13%) that is visually shown oncharts 1 and 2. The cattle were bitten by wolves and jackals.ConclusionsThus, prevalence of rabies cases of different species of animalsin the country, once again proves natural and focal character of thedisease: the reservoir of rabies is in the wild nature and geographicalconditions impact the spread of rabies.Cases of rabies in animals are registered annually. In 2015,vaccination captured about 250000 dogs, and 244400 dogs werevaccinated in the first 6 months of 2016. Despite a huge group ofvaccinations, restriction of rabies spread isn’t observed and thetendency is trending to the increase of rabies case indicators amongstthe dogs.It is necessary to pay close attention to preventive vaccination ofdomestic (including non-productive) animals. If materiel resourcesare available, it is possible to carry out the vaccination of the cattlein the territories adjacent to the forests. In the threatened territorieswith woodlands, there is no alternative to oral vaccinations, whichis confirmed by positive experience of many countries. There is anextreme need of carrying out of oral vaccination of wild carnivorousanimals with obligatory control of the immune status.

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

Abstract

ObjectiveThis study aims to analyze the evolution of the epidemiologicalbehavior of rabies in Chile during the period 2003 to 2013, throughthe epidemiological characterization of a number of variables anddescription of spatial and temporal patterns of animal cases.IntroductionRabies is a zoonotic disease caused by an RNA virus from thefamily Rhabdoviridae, genus Lyssavirus. Worldwide distributed,control of rabies has been considered to be particularly amenable toa “One Health” strategy (1). In Chile, rabies was considered endemicin domestic dog population until the late 1960s, when a surveillanceprogram was established, decreasing the number of human casesrelated to canine variants until the year 1972 (2). Rabies is recognizedas a endemic infection in chiropterans of Chile and prompted thesurveillance of the agent in this and other species (3).MethodsAn epidemiological characterization of the registered cases fromthe National Program for Prevention and Control of Rabies wascarried. During the period 2003-2013, 927 cases were reported.Descriptive statistics and descriptive mapping, recording origin of thesample, number of cases per region, animal reservoir implicated andviral variant were performed. A spatial autocorrelation analysis wascarried using Moran’s I indicator for the detection of spatial clusters(4), using the Local Indicators of Spatial Association (LISA) statistics(5), at national and regional level of aggrupation (north, central andsouth zone). Temporal descriptive analysis was carried.Results927 positive cases were recorded. 920 (99.2%) cases came frompassive surveillance, while 7 (0.8%) cases by active surveillance, totalpositivity was 77.02% and 1.37% respectively. Positivity was reportedmainly in the central zone (88.1%), mainly in Valparaiso (19.1%),Metropolitana (40.6%) (Figure 1), Maule (11.8%) regions concentratedin urban centers. Main positive reservoirs were bats (99.8%),specificallyTadarida brasiliensisand viral variant 4 was the mostcommonly diagnosed. LISA test gives a Moran’s I indicator of 0.1537(p-value = 0.02) for the central zone (Table 1). Rabies tend to decreasein fall and winter season (2.9 cases vs 13 cases during summer).ConclusionsWildlife rabies in bats remains endemic in Chile, concentrated inurban areas. The main reservoirs are insectivorous bats. There is asignificant spatial autocorrelation of animal rabies cases in the centralzone of Chile. Results are relevant to the design of preventive andcontrol measures.

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Abstract

ISDS Annual Conference Proceedings 2017. This is an Open Access article distributed under the terms of the Creative Commons Attribution-Noncommercial 3.0 Unported License (http://creativecommons.org/licenses/by-nc/3.0/), permitting all non-commercial use, distribution,and reproduction in any medium, provided the original work is properly cited.38(page number not for citation purposes)ISDS 2016 Conference AbstractsIdentification of Sufferers of Rare Diseases UsingMedical Claims DataJieshi Chen* and Artur DubrawskiAuton Lab, Carnegie Mellon University, Pittsburgh, PA, USAObjectiveTo identify sufferers of a rare and hard to diagnose diseases bydetecting sequential patterns in historical medical claims.IntroductionPatients who suffer from rare diseases can be hard to diagnose forprolonged periods of time. In the process, they are often subjectedto tentative treatments for ailments they do not have, risking anescalation of their actual condition and side effects from therapiesthey do not need. An early and accurate detection of these caseswould enable follow-ups for precise diagnoses, mitigating the costsof unnecessary care and improving patients' outcomes.MethodsA sequential rule learning algorithm1was applied to a medical claimdataset of about 1,700 patients, who are pre-selected to have medicalhistories indicative of Gaucher Disease (GD) but only 25 of thesepatients were confirmed positives. About 168,000 medical claimsand 142,000 pharmaceutical claims were featurized into sequencesof asynchronous events and regularly sampled time series as inputsfor the model, such that an occurrence of a certain diagnosis code ina medical claim was counted as one event along the timeline of thepatient's medical history. Similar method was applied to other keyattributes of claims data including procedure codes, National DrugCodes, Diagnosis Related Groupers, etc. These types of events as wellas their temporal statistics, e.g. moving frequencies, peaks, changepoints, etc., formed the input feature space for the algorithm whichwas trained to adjudicate each test case and estimate their likelihoodof having GD. A random forest algorithm was also applied to the samefeature set to comparatively evaluate the utility of sequential aspectsof data. The models were evaluated with 10-fold cross-validation.ResultsFigure 1 shows the Receiver Operating Characteristic (ROC)curves of the temporal rule model with Area Under the Curve scoreexceeding 81% and significantly outperforming the random forestand default models. Considering the practical costs to performfollow-up genetic tests, we prefer a model achieving high positiverecall at low risk of false detection. Our model correctly identifiesmore than 25% of known positive cases well within 0.1% of the falsepositive rate, while the performance of a more popular alternativeis indistinguishable from random. This demonstrates the utility ofsequential structure of medical claims in identifying patients whosuffer from rare diseases.Our algorithm infers from data highly interpretable rules it usesin case adjudication. Figure 2 illustrates one of them. The rootnode of the case adjudication tree (Event.7969) reflects the ICD-9diagnosis code of "Other nonspecific abnormal findings". Amongthe 14 patients that have this particular ICD-9 code present in theirclaim history, 36% are confirmed GD sufferers. Compared to defaultprevalence in our pre-selected data set of 1.47%, this rule lifts theestimated likelihood of GD 25 times. The rule further developsinto two children nodes. The left child node adds the condition ofhaving any outpatient claim observed within 43 claims recordednearby the occurrence of the root node event. It isolates 5 patientsall of whom are GD-positive. The right child shows that 3 patientswithout Event.7969 in their claim history but prescribed NDC62756-0137-02 (Gabapentin by Sun Pharmaceutical Industries Ltd.)are all GD-positive. This is just one example of a simple and easyto implement business rule that is capable of identifying previouslyundiagnosed sufferers of rare diseases.ConclusionsOur model successfully utilizes sequential relationships amongevents recorded in medical claims data and reveals interpretablepatterns that can identify sufferers of rare diseases with highconfidence. The algorithm scales well to large volumes of medicalclaims data and it remains sensitive in despite of a very low prevalenceof target cases in data.ROC diagrams of models trained to identify GD patients shown with decimallogarithmic scale of the false positive rate axis.

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Abstract

ObjectiveTo report the results of the application of New Jersey's SevereWeather Classifier in New Jersey's syndromic surveillance systemduring two extreme weather events.IntroductionHurricane 'Superstorm' Sandy struck New Jersey on October 29,2012, causing harm to the health of New Jersey residents and billionsof dollars of damage to businesses, transportation, and infrastructure.Monitoring health outcomes for increased illness and injury due toa severe weather event is important in measuring the severity ofconditions and the efficacy of state response, as well as in emergencyresponse preparations for future severe weather events. Followingthe experience with Hurricane Sandy, NJDOH initiated a projectto develop a suite of 19 indicators, known as the Severe WeatherClassifier (SWC) in EpiCenter, an online system which collectsemergency department chief complaint data in real-time, to performsyndromic surveillance of extreme weather–related conditions.NJDOH has since used these classifiers in more recent events tomonitor for weather-related visits to storm-affected area emergencydepartments (ED's).In June, 2015, a squall line of damaging thunderstorms, known asa "bow echo," caused downed wires and multi-day power outagesin Camden and Gloucester counties in southern New Jersey. Almostexactly seven months later, in January, 2016, Winter Storm Jonasdropped more than a foot of snow over New Jersey. These eventsprovided an opportunity to assess the indicators within SWC.MethodsThe impact of these storms on ED visits was assessed in EpiCenterby using the SWC sub-classifications for disrupted outpatientmedical care (dialysis and oxygen needs, and medication refills).Rates per 1,000 ED visits were calculated on two weeks of EDvisits by classification for each storm. For the June 2015 bow echostorm, this assessment focused on Gloucester and Camden counties,the two hardest hit by the storm. For Winter Storm Jonas, rates per1,000 ED visits were calculated statewide since all counties wereimpacted.ResultsAfter the June, 2015 bow echo storm, both Camden and Gloucestercounty ED's experienced increases in disrupted medical care, themost notable being for oxygen needs (Figures 1 and 2). Duringand after Winter Storm Jonas, ED visits for oxygen assistance andmedicine refills were the most impacted (Figure 3). It is speculatedthat ED visits for dialysis were not noticeably higher since the stormoccurred over a weekend when, generally, treatments take placeduring weekdays.ConclusionsWhile not every classification in the suite that makes up theSWC would be relevant in every extreme weather event, having the19 various elements available provides tools for state and local usersto monitor storm impacts both locally and at the state level.

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

Abstract

ObjectiveTo create an informatics framework and provide guidanceto help Minnesota’s public health surveillance systems achieveinteroperability and transition to standards-based electronicinformation exchange with external health care providers using thestate’s birth defects registry as an initial pilot program.IntroductionThe Minnesota Department of Health (MDH) needs to be ableto collect, use, and share clinical, individual-level health dataelectronically in secure and standardized ways in order to optimizesurveillance capabilities, support public health goals, and ensureproper follow-up and action to public health threats. MDH programs,public health departments, and health care providers across the stateare facing increasing demands to receive and submit electronic healthdata through approaches that are secure, coordinated, and efficient;use appropriate data standards; meet state and federal privacy laws;and align with best practices. This framework builds upon existinginformatics models and two past studies assessing health informationexchange (HIE) conducted by the MDH Office of Health InformationTechnology (OHIT) to provide MDH surveillance systems with anoutline of the key elements and considerations for transitioning tomore secure, standards-based, electronic data exchange.MethodsDevelopment of the informatics framework incorporatesinformation gathered in several phases. The first phase involvesadditional analysis of data collected from the MDH InformaticsAssessment of Interoperability and HIE1that was conducted in 2015to evaluate the current state of interoperability and HIE readinessacross the agency. The second phase involves a comprehensiveenvironmental scan and literature review of existing standards,practices, models, toolkits, and other resources related to electronicHIE and interoperability. The third phase involves gathering additionalinformation on programmatic needs, workflows, and capabilitiesthrough key informant interviews. Key informants include programmanagers, staff, and content-area experts from select MDH programs,the state’s central information technology organization (MN.IT), andexternal health care provider organizations including hospitals.Minnesota’s birth defects registry, the Birth Defects InformationSystem (BDIS), was selected as the pilot program because it wasidentified in the 2015 MDH Informatics Assessment as having a highlevel of interest in implementing an interoperable and standards-driven approach to electronic health data exchange. The BDIS is alsoexploring options for being designated as an eligible public healthregistry for Meaningful Use. As a pilot program for this project,the BDIS assists in the development and implementation of theinformatics framework.ResultsThe 2015 MDH Informatics Assessment identified and evaluated21 MDH programs with information systems that accept and manageclinical, individual-level health information. Among these 21 MDHprograms, wide variations exist regarding information system size(range, 400 to 10,000,000 individuals), staffing numbers (range, 0.2 to21 FTEs), budgets (range, $20,000 to $1,876,000), and other keycharacteristics. Despite these variations, programs identified similarbarriers and needs related to achieving interoperability and electronicHIE. Areas of need include management and information technologysupport to make interoperability a priority; policies and governance;additional application functionality to support HIE; and additionalskills for the workforce. Results from the environmental scan and keyinformant interviews will be incorporated with additional analyses ofthe 2015 MDH Informatics Assessment to inform the development ofan agency-wide informatics framework to support MDH programs inachieving interoperability.ConclusionsMDH surveillance systems are calling for practical guidance tohelp implement and maintain a more efficient and effective wayto electronically collect, use, and share health data with externaland internal stakeholders. This informatics framework provides anoutline of the key elements and considerations for achieving greaterinteroperability across MDH surveillance systems. Additionalresearch is required to assess how system interoperability and HIEcan improve data quality and advance population health goals.

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Abstract

ObjectiveTo improve data quality and sustain a good quality data collectedby Laboratory Automated Reporting System (LARS), we use a Three-stage Data Quality Correction (3DQC) strategy to ensure data accuracy.IntroductionTo immediately monitor disease outbreaks, the application oflaboratory-based surveillance is more popular in recent years.Taiwan Centers for Disease Control (TCDC) has developed LARS tocollect the laboratory-confirmed cases caused by any of 20 pathogensdaily via automated submitting of reports from hospital laboratoryinformation system (LIS) to LARS since 2014 [1]. LOINC is usedas standardized format for messaging inspection data [1, 2]. Thereare 37 hospitals have joined LARS, coverage rate about 59% of allhospitals in Taiwan. Recently, more than 10,000 of data are collectedweekly and used in monitoring pathogen activity [3]. Therefore, itis important to ensure data quality that the data will lead to valuableinformation for public health surveillance.MethodsA 3DQC strategy was designed to improve data accuracy andcarried out by teamwork among TCDC, Taiwan Association forMedical Informatics (TAMI) and IT Company (Figure 1). In the firststage of 3DQC, IT Company checked data format. In the second stage,TCDC verified information between hospital inspection reports anddata receiving in LARS. In the third stage, TAMI evaluated LOINCmapping and TCDC monitored stability of data transmission. Aftercorrecting the data, hospitals were approved to join LARS.ResultsDuring the first stage of 3DQC, we observed that some problemswith syntax error in data (e.g. incorrect patient identification number,or lack of residence codes). Because some data were stored in Hospitalinformation system (HIS) but not in LIS, an error may occur whilehospital accessed records from HIS. In the second stage, 50-70%of inspection reports provided by each hospital had problems withsemantic information error. For example, a positive result of influenzaA on a screening flu test recorded in LIS but hospital transferred thewrong result with influenza B positive into LARS. In the third stage,we found that 20-30% of terms mismatched to LOINC code. Thisstudy categorized these terms into two groups (1) the Exceptioncodes, which were considered reasonable and (2) the Error codes, andalso reviewed Error codes and made a modified advice for hospitalsto improve LOINC mapping. Through 3DQC strategy, the LOINCmapping rate raised from 40 to 80%, Exception codes mapping was20%, and the total mapping rate was near 95-99% (Figure 2). Sofar, most hospitals have maintained a good quality data even theyformally participate in LARS.ConclusionsThis study suggested that 3DQC can effectively detect problemsand reduce errors of data collected from LARS, and indicated thateffect of 3DQC can be maintained even hospital formally participatesin LARS. Future research will focus on development of automaticprogramming of 3DQC to ensure high-quality data.Figure 1. A Three-stage Data Quality Correction strategy

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Abstract

ObjectiveTo determine whether mass casualty shooting events are capturedvia syndromic surveillance data.IntroductionShootings with multiple victims are a concern for public safetyand public health. The precise impact of such events and the trendsassociated with them is dependent on which events are counted. Somereports only consider events with multiple deaths, typically four ormore, while other reports also include events with multiple victimsand at least one death.1Underreporting is also a concern. Somecommonly cited databases for these events are based on media reportsof shootings which may or may not capture the complete set of eventsthat meet whatever criteria are being considered.Many gunshot wounds are treated in the emergency departmentsetting. Emergency department registrations routinely collected forsyndromic surveillance will capture all of those visits. Analysis ofthat data may be useful as a supplement to mass shooting databases byidentifying unreported events. In addition, clusters of gunshot woundincidents which are not the result of a single shooting event but stillrepresent significant public safety and public health concerns mayalso be identified.MethodsEmergency department registration data was collected fromhospitals via the EpiCenter syndromic surveillance system. Gunshot-related visits were identified based on chief complaint contentsusing EpiCenter's regular expression-based classification system.The gunshot wound classifier attempts to exclude patients with pre-existing wounds and shooting incidents involving weapon classes thatare lesser concerns for public safety, such as nail guns and toy guns.Gunshot-related visits were clustered by day of registration andseparately by facility, by patient home zip code, and by patienthome county. The largest clusters of each type were compared viamanual search against media reports of shootings and against the GunViolence Archive mass shooting database.ResultsA total of 23,132 gunshot-related visits were identified from 635healthcare facilities from 2013 to 2015. From these, the five largestclusters by facility, by zip code, and by county were identified. Theclusters included 112 gunshot wounds in total, ranging in size from4 to 12 with a median of 7.Of the 5 facility clusters, 5 had a corresponding media story and 2were located in the shooting database. Of the 5 zip code clusters, 1 hada corresponding media story and none were located in the shootingdatabase. Of the 5 county clusters, 4 had a corresponding media storyand 1 was located in the shooting database.ConclusionsMultiple gunshot wound patients being treated on the same daywere not necessarily all shot during the same incident or by the sameshooter. The information available in a syndromic surveillance feeddoes not allow for direct identification of the shooter or shooters.Given that limitation, a complete correspondence between clustersidentified in syndromic surveillance data and mass shootings was notexpected. The strong correlation between clusters and media coverageindicates that the news is a reasonable source for shooting data. Thesmaller overlap with the mass shooting database is likely due to themore stringent criteria required for an incident to qualify as a massshooting.It is still notable that the majority of gunshot clusters were notassociated with any particular mass shooting incident. This serves asa reminder that mass shootings represent only a small portion of thetotal gun violence in the United States. Healthcare data representsa significant additional data source for understanding the completeimpact of gun violence on public health and safety.Weekly time series of gunshot-related emergency department visits

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Abstract

ObjectiveTo explore the difference between the reported date of admissionand discharge date using discharge messages (A03), from hospitalemergency departments participating in the Louisiana Early EventDetection System (LEEDS.IntroductionThe Infectious Disease Epidemiology Section (IDEpi) within theOffice of Public Health (LaOPH) conducts syndromic surveillanceof emergency departments by means of the Louisiana Early EventDetection System (LEEDS). LEEDS accepts ADT (admit-discharge-transfer) messages from participating hospitals, predominately A04(registration) and A03 (discharge), to obtain symptom or syndromeinformation on patients reporting to hospital emergency departments.Capturing the data using discharge messages (A03) only could resultin a delay in receipt of data by LaOPH, considering the variability inthe length of stay of a patient in the ED.MethodsEmergency department data from participating hospitals isimported daily to LEEDS and processed for syndrome classification.IDEpi syndromic surveillance messages received for the period ofCDC week 1632 and 1636 (8/8/16-9/8/16) using MS Access andExcel to calculate the difference (in days) between the reported admitdate and discharge date in A03 messages.Results88.1% of the A03 messages submitted in the 4 week analysisperiod exhibited no delay (delay=0 days) between the admit date andthe reported discharge date, compared to only 10.7% showing a delayof one day (delay = 1 day) and 1.06% showing a delay of 2 days ormore (delay≥2 days). Less than 0.2% of the messages had missinginformation regarding discharge date (Table 1).ConclusionsSyndromic surveillance systems operate under a constant need forimprovement and enhancement. The quality of the data, independentof the quality of the system, should always strive to be of the highestpedigree in order to inform disease-specific programs and detectpublic health aberrations. In order to identify these potential concerns,it is imperative that the data be submitted to public health agenciesin a timely manner. Based on this analysis, the lapse in time betweenadmit and discharge results in little to no patient syndromic data delayfor those hospital ED’s that exclusively send A03 messages. Thisstatement is supported by the finding that close to 99% of messagesdemonstrated a delay between admit date and discharge date of oneday or less.Table 1. Delay between reported Admit and Discharge date in A03 messagessubmitted to LEEDS

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Abstract

ObjectiveTo develop a detailed data validation strategy for facilitiessending emergency department data to the Massachusetts SyndromicSurveillance program and to evaluate the validation strategy bycomparing data quality metrics before and after implementation ofthe strategy.IntroductionAs a participant in the National Syndromic Surveillance Program(NSSP), the Massachusetts Department of Public Health (MDPH)has worked closely with our statewide Health Information Exchange(HIE) and National Syndromic Surveillance Program (NSSP)technical staff to collect and transmit emergency department (ED)data from eligible hospitals (EHs) to the NSSP. Our goal is to ensurecomplete and accurate data using a multi-step process beginning withpre-production data and continuing after EHs are sending live datato production.MethodsWe used an iterative process to establish a framework formonitoring data quality during onboarding of EHs into our syndromicsurveillance system and kept notes of the process.To evaluate the framework, we compared data received duringthe month of January 2016 to the most recent full month of data(June 2016) to describe the following primary data quality metricsand their change over time: total and daily average of message andvisit volume; percent of visits with a chief complaint or diagnosiscode received in the NSSP dataset; and percentage of visits with achief complaint/diagnosis code received within a specified time ofadmission to the ED.ResultsThe strategies for validation we found effective includedexamination of pre-production test HL7 messages and the executionof R scripts for validation of live data in the staging and productionenvironments. Both the staging and production validations areperformed at the individual message level as well as the aggregatedvisit level, and included measures of completeness for requiredfields (Chief Complaint, Diagnosis Codes, Discharge Dispositions),timeliness, examples of text fields (Chief Complaint and TriageNotes), and demographic information. We required EHs to passvalidation in the staging environment before granting access to senddata to the production environment.From January to June 2016, the number of EHs sending data tothe production environment increased from 44 to 48, and the numberof messages and visits captured in the production environmentincreased substantially (see Table 1). The percentage of visits witha chief complaint remained consistently high (>99%); howeverthe percentage of visits with a chief complaint within three hoursof admission decreased during the study period. Both the overallpercentage of visits with a diagnosis code and the percentage of visitswith a diagnosis code within 24 hours of admission increased.ConclusionsFrom January to June 2016, Massachusetts syndromic surveillancedata improved in the percentage of visits with diagnosis codes and thetime from admission to first diagnosis code. This was achieved whilethe volume of data coming into the system increased. The timelinessof chief complaints decreased slightly during the study period, whichmay be due to the inclusion of several new facilities that are unable tosend real-time data. Even with the improvements in the timeliness ofthe diagnosis code field, and the subsequent decrease in the timelinessof the chief complaint field, chief complaints remained a more timelyoption for syndromic surveillance. Pre-production and ongoing dataquality assurance activities are crucial to ensure meaningful dataare acquired for secondary analyses. We found that reviewing testHL7 messages and staging data, daily monitoring of productiondata for key factors such as message volume and percent of visitswith a diagnosis code, and monthly full validation in the productionenvironment were and will continue to be essential to ensure ongoingdata integrity.Table 1: ED Data in the Production Environment

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Abstract

ObjectiveWe reviewed CCDs (a type of consolidated clinical dataarchitecture (C-CDA) document) shared by our clinical partner,Planned Parenthood of the Great Northwest and Hawaiian Islands(PPGNHI) since October, 2015. Analyses focuses on:-Completeness-Degree to which the CCD matches program area informationneeds-Differences in EHR generation methods-Presence and location of triggers (based on the ReportableConditions Trigger Codes) that would initiate CCD generation.IntroductionUnder the CDC STD Surveillance Network (SSuN) Part B grant,WA DOH is testing electronic case reporting (eCR) of sexuallytransmitted infections (STI) from a clinical partner.MethodsTwo methods of CCD generation, based on existing EHRcapabilities, were used to create CCDs that were delivered to WADOH using secure file transport protocol (SFTP). PPGNHI uses theNextGen EHR system.The first batch received was extracted using the Medical SummaryUtility. Random selection of cases (25) from lab positive Chlamydia(CT), Gonorrhea (GC) or Syphilis encounters with a follow-up planin the EHR (1/1/2015-3/31/2015). Each CCD contained manuallyselected encounters (related to STI case).Cases are now extracted directly from a patient chart(File-->Generate CCD). Two types of CCDs can be created: singleencounter CCDs and longitudinal encounter CCDs.The CCDs were analyzed for completeness, crossover with theexisting paper case report, and with relevant CDA and C-CDAImplementation Guide (IG) standards.ResultsThis analysis includes four reportable events across 6 CCDs.One event is represented by both a longitudinal CCD and 2 singleencounter CCDs.The CCDs contained most of the basic demographic informationrequested in the paper case report with the exception of “middleinitial”.Information on the important paper case report components“gender of sex partner” and “partner management plan” are not foundin the CCD.The CCD Results section contained lab tests and results that includesite of infection and could confirm diagnosis. The ordered test (panel)is not coded, though the individual tests performed are LOINC coded.The CCD Medications section meets STI program needs forinformation about treatment in a case report. Information isrepresented using RxNorm codes as specified by the C-CDA IG.The CCD Problems section was not present in documents generatedusing the MSU but was present in documents created using File -->Generate CCD from the patient chart. The Problems section andcoded entries (ICD-9-CM and ICD-10) are required for CCDs. TheProblems do not include effective dates, which are not required bythe IG.Pregnancy status, and information about HIV testing (includingprevious positive), are present in the CCD Problems section only ifthe encounter during which testing occurred is included in the CCDsubmitted.Using the CCD in place of the paper case report requiresunderstanding of the clinical workflow and use of EHR. Twoinstances that require specific attention are the “exposure” status ofthe case (known/possibly exposed vs. not shared/not known), andthe “presentation” of the diagnosis (symptomatic vs asymptomatic).For example, the ICD-10 code Z11.3 (encounter for screening forinfections with a predominantly sexual mode of transmission), cannotbe interpreted as a true “screening”, as this diagnosis is recorded forall visits that include STI testing. Similarly, a code for exposureto STIs is sometimes used, but not consistently enough to allowreliable identification of cases in which the patient was tested due toan exposure or possible exposure. Work with our clinical partner tounderstand what inferences can and should be made is an importantpart of evaluating the CCD as a replacement to the paper case report.ConclusionsThe CCDs submitted to DOH show that most information requestedin an STI case report can be found in a CCD with some exceptions,notably “gender of sex partners” and “partner management plan”.Some information is only inconsistently present, for example,exposure status and presentation.Understanding how the CCD could replace the paper case reportrequires working with the reporter to insure that the information isinterpreted on the receiving end in the same way that it is interpretedin the clinical workflow and entered in the EHR.

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Abstract

ObjectiveLANL has built a software program that automatically collectsglobal notifiable disease data—particularly data stored in files—andmakes it available and shareable within the Biosurveillance Ecosystem(BSVE) as a new data source. This will improve the prediction andearly warning of disease events and other applications.IntroductionMost countries do not report national notifiable disease data in amachine-readable format. Data are often in the form of a file thatcontains text, tables and graphs summarizing weekly or monthlydisease counts. This presents a problem when information is neededfor more data intensive approaches to epidemiology, biosurveillanceand public health as exemplified by the Biosurveillance Ecosystem(BSVE).While most nations do likely store their data in a machine-readableformat, the governments are often hesitant to share data openly fora variety of reasons that include technical, political, economic, andmotivational issues [1]. For example, an attempt by LANL to obtaina weekly version of openly available monthly data, reported by theAustralian government, resulted in an onerous bureaucratic reply. Theobstacles to obtaining data included: paperwork to request data fromeach of the Australian states and territories, a long delay to obtaindata (up to 3 months) and extensive limitations on the data's use thatprohibit collaboration and sharing. This type of experience whenattempting to contact public health departments or ministries of healthfor data is not uncommon.A survey conducted by LANL of notifiable disease data reportingin 52 countries identified only 10 as being machine-readable and42 being reported in pdf files on a regular basis. Within the 42 nationsthat report in pdf files, 32 report in a structured, tabular format and10 in a non-structured way.As a result, LANL has developed a tool-Epi Archive (formerlyknown as EPIC)-to automatically and continuously collect globalnotifiable disease data and make it readily accesible.MethodsWe conducted a survey of the national notifiable disease reportingsystems notating how the data is reported in two important dimensions:date standards and case definitions.The development of software to regularly ingests notifiabledisease data frand makes this data available involved four main stepsscraping, extracting, parsing and persisting.For scraping: we would examine website designs and determinereporting mechanisms for each country/website as well as what variesacross the reporting mechanisms. We then designed and wrote codeto automate the downloading of report pdf files, for each country.We stored report pdfs along with appropriate metadata for extractingand parsing.For extracting: we developed software that can extract notifiabledisease data presented in tabular form from a pdf file. We combinedthe methodology of figure placement detection with the in-housedeveloped table extraction and annotation heuristics.For parsing: we determined what to extract from each pdf dataset from the survey conducted. We then parsed the extracted datainto uniform data structures correctly accommodating the dimensionssurveyed and the various human languages. This task involvedingesting notifiable disease data in many disparate formats extractedfrom pdf files and coalescing the data into a standardized format.For persisting: We then store the data in the Epi ArchivePostgreSQL database and make it available through the BSVE.ResultsThe EpiArchive tool currently contains subnational notifiabledisease data from 10 nations. When a user accesses the EpiArchivesite, they are prompted with four fields: country, region, disease,and date duration. These fields allow the user to specify the location(down to the state level), the disease of interest, and the durationof interest. Upon form submission, a time series is generated fromthe users' specifications. The generated time series can then bedownloaded into a csv file if a user is interested in performingpersonal analysis. Additionally, the data from EpiArchive can bereached through an API.ConclusionsLANL as part of a currently funded DTRA effort so that it willautomatically and continuously collect global notifiable diseasedata—particularly data stored in pdf files—and make it available andshareable within the Biosurveillance Ecosystem (BSVE) as a newdata source. This will provide data to analytics and users that willimprove the prediction and early warning of disease events and otherapplications.

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Abstract

ObjectiveTo describe the evaluation process to assess data quality duringdevelopment of an electronic case report application, and to describethe evaluation resultsIntroductionElectronic case reporting (eCR) is defined as the fully or semi-automated generation and electronic transmission of reportabledisease case reports from an electronic health record (EHR) systemto public health authorities, replacing the historically paper-basedprocess1. ECR has been reported to increase the number, accuracy,completeness and timeliness of surveillance case reports2. ChicagoDepartment of Public Health (CDPH) collaborated with Allianceof Chicago (AOC) to develop an application to generate electronicprovider reports (ePR) for chlamydia (CT) and gonorrhea (GC) casesfrom the EHR system managed by AOC and send ePR records to theIllinois National Electronic Disease Surveillance System (I-NEDSS).This application was tested in the EHR database of Health Center A inAOC's network. It is essential to ensure ePR data are accurate, so thatpublic health receives correct information to take actions if needed.Therefore, evaluation is needed to assess ePR records data quality.MethodsCDPH developed a five step evaluation plan to validate ePRrecords data quality. Step 1 was to validate the ePR file format toensure all I-NEDSS required fields are present, required value setswere used, and file format did not vary across files generated. Step 2was to validate the algorithm accuracy. Chart review was conductedto ensure the ePR records do not include non-reportable cases. Step 3was to review ePR records loaded in I-NEDSS to make sure all valuesin ePR raw files appeared correctly on the I-NEDSS front end.After the application passed steps 1 to 3, it moved to step 4, parallelvalidation. The first phase of parallel validation was to review historiccases. Test ePR records for CT and GC cases diagnosed by HealthCenter A in 2015 (n=510) were compared to the same 510 cases'closed surveillance case reports in I-NEDSS. The completeness oftreatment, race, and ethnicity was examined. The application thenmoved into testing daily data feed. Daily ePR records were comparedwith EHR charts and paper provider reports received by CDPHto assess completeness and timeliness. Step 5 was to re-evaluatealgorithms. EPR records were validated against the electroniclaboratory reports (ELR) records, which were used as gold standardsof all reportable CT and GC cases, to find missing cases.ResultsThe first three steps of evaluation occurred from January to April2016. Test ePR files containing historic cases from Health CenterA were vetted weekly. A total of 14 test ePR files were reviewed.This process identified required fields not present (patient address,treatment date, treatment, and race), race value sets not returnedcorrectly, and additional logic statements needed to return correctpregnancy status at the time of diagnosis. These issues were discussedwith the project team, and the application was modified accordingly.The historic case review found ePR data were more complete thanclosed surveillance reports. Compared to closed surveillance reportsin I-NEDSS, 18% (94/510) of the cases had incomplete treatmentinformation in the ePR records compared to 78% (400/510), 0.2%(1/510) of the cases did not have race information in the ePR recordscompared to 47% (240/510), and 0.7% (4/510) of the cases had noethnicity information in the ePR records compared to 50% (253/510).These preliminary evaluation results suggest that eCR improvessurveillance case reports data quality. The daily data feed data qualityevaluation is still on-going, and ePR data quality will be monitoredcontinuously.ConclusionsEvaluation plays an integral role in developing and implementingthe eCR process in Chicago. The stepwise evaluation process ensuresePR data quality meeting public health requirements, so that publichealth will be able to act on more complete information to improvepopulation health.

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

Abstract

ObjectiveTo identify heroin- and opioid-related emergency department visitsusing pre-diagnositc data. To demonstrate the value of clinical notesto public health surveillance and situational awareness.IntroductionOverdoses of heroin and prescription opioids are a growingcause of mortality in the United States. Deaths from opioids havecontributed to a rise in the overall mortality rate of middle-aged whitemales during an era when other demographics are experiencing lifeexpectancy gains.1 A successful public health intervention to reversethis mortality trend requires a detailed understanding of whichpopulations are most affected and where those populations live. Whilemortality is the most relevant metric for this emerging challenge,increased burden on laboratory facilities can create significantdelays in obtaining confirmation of which patients died from opioidoverdoses.Emergency department visits for opioid overdoses can provide amore timely proxy measure of overall opioid use. Unfortunately, chiefcomplaints do not always contain an indication of opioid involvement.Overdose patients are not always conscious at registration whichlimits the amount of information they can provide. Menu-drivenregistration systems can lump all overdoses together regardless ofsubstance. A more complete record of the emergency departmentinteraction, such as that provided by triage notes, could provide theinformation necessary to differentiate opioid-related visits from otheroverdoses.MethodsEmergency department registration data was collected fromhospitals via the EpiCenter syndromic surveillance system. Thisdata included chief complaints, triage notes, discharge disposition,and preliminary diagnosis codes. Data elements were linked across agiven visit using patient identifiers and visit numbers as appropriate.Heroin- and opioid-related indicators were identified in chiefcomplaints and triage notes using regular expressions. These wereseparated into three categories: visits with an indication of overdose,visits for withdrawal symptoms, and visits where opioids murementioned in some other context such as history of use. Thesecategories were designed to be mutually exclusive.Regular expression classification results were compared toclassifications based on opioid-related diagnosis codes.ResultsA total of 2,934,610 ED registrations with triage notes and diagnosiscodes were collected from 82 hospitals between January 1, 2015 andAugust 21, 2016. Of these encounters, 24,012 referenced opioid usein some way; 16,718 mentioned heroin specifically; 3,663 mentionedfentanyl specifically; and 5,350 mentioned opioids generically.Table 1 shows the distribution of heroin-related ED visits acrosscategories and source of the indicator. Column totals are not the sumof individual row amounts; they have been adjusted so that a givenregistration is only counted once.Table 2 shows the overlap of heroin-related ED visits betweensources of indicators. Triage notes showed the least overlap with theother two sources, while chief complaints showed the most.ConclusionsWhile it is possible to find indicators of opioid use or overdosein chief complaint data, that field alone does not provide totalinformation about which ED visits are related to opioids. Triagenotes in particular indicate opioid involvement in a large numberof visits not identified by other data sources. While many of theseare simply mentions of opioids, possibly indicating past history ofuse or even in some cases just that questions about opioid use wereasked, a substantial number of visits with overdose indicators werealso detected solely from triage note data. These results suggest thattriage notes can be a valuable additional data source for more complexhealth concerns such as opioid drug use.Table 1: Heroin-Related ED Visits By Indicator Source and CategoryTable 2: Overlap of Heroin-Related ED Visits between Indicators

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

Abstract

ObjectiveEvaluate the usage of triage note data from EpiCenter, a syndromicsurveillance system utilized by New Jersey Department of Health(NJDOH), to enhance Healthcare-Associated Infections (HAIs)surveillance for infections following a surgical procedure.IntroductionIn New Jersey, Health Monitoring Systems Inc.’s (HMS) EpiCentercollects chief complaint data for syndromic surveillance from 79 of80 emergency departments (ED). Using keyword algorithms, thesevisits are classified into syndrome categories for monitoring unusualhealth events.HAIs are infections that patients acquire while they are receivingtreatment for a health condition in a health care setting. Followingthe 2014 Ebola outbreak in West Africa, the New Jersey Departmentof Health (NJDOH) Communicable Disease Service (CDS) startedrecruiting EDs to include triage note data in addition to chiefcomplaint data to enhance surveillance capability for Ebola and otherHAIs. Research by the University of North Carolina suggests triagenote data improve the ability to detect illness of interest by fivefold1.Currently, there are three NJ EDs with triage note data in EpiCenteralong with ICD 10 codes which can be used for comparison.This pilot study will assess whether infections following a surgicalprocedure can be captured in triage note data along with ICD codes.Also, this evaluation will determine if triage note data can be usedto create HAI custom classifications for syndromic surveillance.These classifications can potentially be used by surveillanceand/or preparedness personnel and local health departments, as wellas hospitals, to better prepare for detecting and preventing HAIs thatare a significant cause of morbidity and mortality in the U.S.2MethodsThree NJ facilities with triage notes information sending toEpiCenter were included in this study. ED visits occurred from10/23/2015 to 10/29/2015 and from 2/2/2016 to 2/10/2016 in thesefacilities with available ICD 10 codes information in EpiCenter wereevaluated.This analysis focused on sepsis and post-surgery infections relatedICD 10 codes: A400, A401, A402, A403, A408, A409, A410, A411,A412, A414, A4150, A4151, A4152, A4158, A418, A419, R571,R578, R579, T811, T81.43. The keywords tested in triage notesare abdominal pain, redness, fev, fver, pyrexia, temp, elev temp,elevated temp, temp elev, hi temp, high temp, temp hi, temp10, temp10, feeling hot, feels hot, feel hot, fuo, febr, cloudy fluid, cfluid,drainage, abscess, wound, tenderness, swelling, erythema, red, pain,post surgery, fever.The sensitivity, specificity and positive predictive value (PPV)of selected keywords applied in the triage notes were evaluated bycomparing to patient’s ICD 10 codes.ResultsThere were 2757 ED visits with triage notes and ICD 10 codes from10/23/2015 to 10/29/2015 and from 2/2/2016 to 2/10/2016. Duringthese time frames, one ED visit matched with both selected keywordsand ICD codes, five matched with ICD 10 codes only, 59 matchedwith keywords only, and 2692 did not match with either keywordsor ICD 10 codes. In Table 1, it indicates that selected keywordshave a high specificity (97.9 %) but with a relatively low sensitivity(16.7 %) and PPV (1.7%).ConclusionsSelected keywords and ICD 10 codes from facilities sending triagenotes were used to evaluate the surveillance system on identifyinginfections following a surgical procedure through analysis of EDtriage note field. We also reviewed all NJ ED data during the samestudy period for other facilities not sending triage notes. It indicatedthat several key ICD codes, e.g. ICD code T81.4, infections followinga surgical procedure, have been included in many facilities. Thisanalysis will be repeated as more EDs participate in EpiCenterwith triage notes and other data fields to refine the keywords and toimprove the sensitivity and PPV.Table 1: Sensitivity, specificity and PPV calculations of selected keywordsapplied in triage notes based on the ICD 10 codes related to infectionsfollowing a surgical procedure.

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

Abstract

ObjectiveTo explore the quality of data submitted once a facility is movedinto an ongoing submission status and address the importance ofcontinuing data quality assessments.IntroductionOnce a facility meets data quality standards and is approved forproduction, an assumption is made that the quality of data receivedremains at the same level. When looking at production data qualityreports from various states generated using a SAS data qualityprogram, a need for production data quality assessment was identified.By implementing a periodic data quality update on all productionfacilities, data quality has improved for production data as a whole andfor individual facility data. Through this activity several root causesof data quality degradation have been identified, allowing processesto be implemented in order to mitigate impact on data quality.MethodsMany jurisdictions work with facilities during the onboardingprocess to improve data quality. Once a certain level of data qualityis achieved, the facility is moved into production. At this point thejurisdiction generally assumes that the quality of the data beingsubmitted will remain fairly constant. To check this assumption inKansas, a SAS Production Report program was developed specificallyto look at production data quality.A legacy data set is downloaded from BioSense production serversby Earliest Date in order to capture all records for visits which occurredwithin a specified time frame. This data set is then run through a SASdata quality program which checks specific fields for completenessand validity and prints a report on counts and percentages of null andinvalid values, outdated records, and timeliness of record submission,as well as examples of records from visits containing these errors.A report is created for the state as a whole, each facility, EHR vendor,and HIE sending data to the production servers, with examplesprovided only by facility. The facility, vendor, and HIE reportsinclude state percentages of errors for comparison.The Production Report was initially run on Kansas data for thefirst quarter of 2016 followed by consultations with facilities on thefindings. Monthly checks were made of data quality before and afterfacilities implemented changes. An examination of Kansas' resultsshowed a marked decrease in data quality for many facilities. Everyfacility had at least one area in need of improvement.The data quality reports and examples were sent to every facilitysending production data during the first quarter attached to an emailrequesting a 30-60 minute call with each to go over the report. Thiscall was deemed crucial to the process since it had been over a year,and in a few cases over two years, since some of the facilities hadlooked at data quality and would need a review of the findings andall requirements, new and old. Ultimately, over half of all productionfacilities scheduled a follow-up call.While some facilities expressed some degree of trepidation, mostfacilities were open to revisiting data quality and to making requestedimprovements. Reasons for data quality degradation included updatesto EHR products, change of EHR product, work flow issues, engineupdates, new requirements, and personnel turnover.A request was made of other jurisdictions (including Arizona,Nevada, and Illinois) to look at their production data using the sameprogram and compare quality. Data was pulled for at least one weekof July 2016 by Earliest Date.ResultsMonthly reports have been run on Kansas Production data bothbefore and after the consultation meetings which indicate a markedimprovement in both completeness of required fields and validityof values in those fields. Data for these monthly reports was againselected by Earliest Date.ConclusionsIn order to ensure production data continues to be of value forsyndromic surveillance purposes, periodic data quality assessmentsshould continue after a facility reaches ongoing submission status.Alterations in process include a review of production data at leasttwice per year with a follow up data review one month later to confirmadjustments have been correctly implemented.

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

Abstract

ObjectiveTo enhance Oregon ESSENCE’s surveillance capabilities byincorporating data from the Oregon Poison Center using limitedresources.IntroductionOregon Public Health Division (OPHD), in collaboration with theJohns Hopkins University Applied Physics Laboratory, implementedOregon ESSENCE in 2012. Oregon ESSENCE is an automated,electronic syndromic surveillance system that captures emergencydepartment data. To strengthen the capabilities of Oregon ESSENCE,OPHD sought other sources of health-outcome information, includingOregon Poison Center (OPC). In the past, Oregon’s surveillance staffmanually monitored OPC data on the National Poison Data Service(NPDS) website. Although functional, it was not integrated intoOregon’s syndromic surveillance system and required epidemiologiststo assess alerts on individual calls. To achieve data integration,OPHD pursued an automated solution to deliver OPC data intoOregon ESSENCE. OPHD’s growing interoperability infrastructurefostered development of a low-cost, reliable solution to automate theintegration of these data sources.MethodsOPC facilitated OPHD’s access to the free-of-charge NPDS webservice with an approval request and a data use agreement. OPHDuses the Rhapsody Integration Engine 6.2.1 (Orion Health, Auckland,NZ) as its primary data transfer and translation mechanism. OPHDleveraged its existing Rhapsody installation to automatically requestdata from the NPDS web service daily. Each request contains customsearch parameters that query calls from the previous day (24 hours).The service returns an XML file containing poison center call datawith multiple nodes of related data. Rhapsody uses a JavaScript ‘filter’to parse each call and its related data. The Oregon ESSENCE backendSQL database contains a parent table for the call and child tables forthe related data (Clinical Effects, Routes, Scenarios, Therapies, andGeneric Codes). Rhapsody inserts data into each of these backendSQL tables.ResultsOregon ESSENCE displays OPC data through its web interface forinterpretation by OPHD’s syndromic surveillance epidemiologists.Integrating NPDS data into Oregon ESSENCE allows OPHD staffto timely monitor data in an automated, routine manner. Syndromicsurveillance staff first assess alerts generated by Oregon ESSENCE.Alerts that require follow-up trigger a call between OPHDepidemiologists and OPC. Oregon is the first state to use the NPDSweb service to upload poison center data into Oregon ESSENCE.ConclusionsOregon’s successful integration of the NPDS web service data intoOregon ESSENCE is the first known of its kind. It leverages OPHD’sgrowing infrastructure of interoperability software applications andstaff expertise to create a cost-effective and sustainable solution thatcan be easily adapted by other public health agencies.

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

Abstract

ObjectiveTo visualize the incidence of notifiable infectious diseasesspatially and interactively, we aimed to provide a friendly interfaceto access local epidemic information based on open data for healthprofessionals and the public.IntroductionTransparency of information on infectious disease epidemicsis crucial for not only public health workers but also the residentsin the communities. Traditionally, disease control departmentscreated official websites for displaying disease maps or epi-curveswith the confirmed case counts. The websites were usually veryformal and static, without interaction, animation, or even the aid ofspatial statistics. Therefore, we tried to take advantage of open dataand use a lightweight programming language, JavaScript, to createan interactive website, named "Taiwan Infectious Disease Map(http://ide.geohealth.tw/)". With the website, we expect to providereal-time incidence information and related epidemiological featuresusing interactive maps and charts.MethodsThis study used infectious-disease-related open data from Taiwan'sopen data platform (http://data.gov.tw) maintained by the TaiwanCDC. It covers 70 types of infectious diseases starting from 2004, andthe latest status is updated every day. We then automatically bridgethis data into our database and calculate the age-adjusted incidencerate by annual census data and 2000 WH0 standard population.The spatial resolution is mostly at the township level, except thatresolution for sexually-transmitted infectious diseases is at the citylevel. The temporal resolution is month and year, except for denguefever, which is by week.We used R software to automatically compute incidence everyday, and also used its package named "spdep" to compute the spatialclusters of the selected infectious diseases online. In addition, weused JavaScript language, PHP, OpenLayers 3 and Highcharts toimplement interactive maps and charts. All the data and graphicalfigures from the charts viewed in this website can be downloadedfreely. The temporal animation slider can be played and paused atany time point. The health education button can directly link to anintroduction to the selected infectious disease maintained by theTaiwan CDC.ResultsThe website of the Taiwan Infectious Disease Map is displayedin Figure 1. The users can select the temporal precision, types ofinfectious diseases, spatial precision and the gender at the beginning.In this case, the left map is the spatial distribution of the cumulativeincidence of tuberculosis (TB) in 2016. The darker red color representshigher incidence. The right top panel is the ranking of TB incidenceamong 368 townships. The right middle panel is the ranking of TBincidence among 22 cities or counties. The right bottom panel is theannual TB incidence from 2004 to the current date. The highest TBincidence was 67.47 per 100,000 in 2004, and this declined sharply to15.92 per 100,000 in 2015.ConclusionsWith this user-friendly web application, the public and localpublic health workers can easily understand the current risk for theirtownships. The application can provide relevant health education forthe public to understand diseases and how to protect themselves. Thespatial clusters, gender distribution, age distribution, epi-curve andtop ten infectious diseases are all practical and important informationprovided from this website to assist in preventing and mitigating nextepidemic.

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

Abstract

ObjectiveTo streamline carbapenem-resistant enterobacteriaceae (CRE)surveillance by integrating electronic laboratory reporting (ELR)data and electronic case reports (eCR) automatically into Illinois'extensively drug-resistant organism (XDRO) registry.IntroductionCRE are drug-resistant bacteria that have a mortality rate of up to50% in those infected1. Several clusters of CRE have been detected inIllinois, often in long-term acute care hospitals2. In response Illinoiscreated the XDRO registry, a mandatory reporting system designedto aid inter-facility communication concerning CRE.Despite being a high priority for control in the US, the casedefinition for CRE has been the subject of debate3. There are over70 Enterobacteriaceae which can have different mechanisms ofcarbapenem resistance3. Criteria for carbapenem resistance includesusceptibility results, and phenotypic or genotypic detection. Thecase definition for the XDRO registry is intentionally more exclusive(specific) than that used by CSTE (Table 1). CSTE utilizes adefinition designed to maximize sensitivity. Illinois' XDRO registry'sdefinition is more specific, meant to reduce unnecessary adoption ofcontact precautions and the negative consequences some patients mayexperience.Currently, case reporting to the XDRO registry is a manual dataentry process, which has important advantages. However, transitioningto automatic ELR integration will streamline the reporting processand minimize data entry effort. Unfortunately, the clinical informationneeded to investigate XDROs is often not captured by ELR. The eCRis a new message type being piloted in Illinois that contains manyclinical data elements. We examined the feasibility of combining ELRand eCR into reports for the XDRO registry. In the construction ofthese reports we examined the impact of using CRE definitions fromCSTE and the XDRO registry.MethodsWe obtained sample HL7 CRE messages from Illinois' ELRdatabase. Using these messages and the HL7 Implementation Guidefor Electronic Laboratory Reporting, we mapped ELR fields to thosein the XDRO registry. Specific codes corresponding to the registryfields were found though a systematic keyword search of LOINC,SNOMED, and sample messages. When there was no match for anXDRO field in ELR, we referred to the HL7 CDA ImplementationGuide for the Electronic Initial Case Report and sample eCRmessages. A collection of fields and codes was created to correspondto both the CSTE and Illinois CRE case definition.ResultsThe XDRO registry has 37 unique fields. Twenty-six can bepopulated from ELR, four can be found in the eCR, and seven aregenerated within the system. In sample ELR and eCR messages all ofthe necessary fields were populated with appropriate text and codes.The mapping process was straightforward for demographic andfacility information, but more complicated for culture and organisminformation. Some XDRO tests do not have corresponding LOINCor SNOMED codes, so we will develop a logic statement to fill thesebased on free-text. Addition of the eCR adds important informationto the registry report, notably encounter type and encounter/admissiondate. We were able to create separate mapping schemas for theCSTE and XDRO registry definitions for CRE. Using each of thesedefinitions, we will quantify how many ELR messages would becommitted to the XDRO registry.ConclusionsBy combining the data captured in ELR and eCR, it is possible topopulate the fields of the Illinois XDRO registry. When this merge iscompleted it should result in more complete and better quality dataon CRE in Illinois. As intended, the definition of CRE used by theregistry is less inclusive than that used by CSTE. Future work willshow the number of CRE lab results captured by each definition.Table 1: CRE 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

ObjectiveTo extend an open source platform for measuring the qualityof electronic health data by adding functions useful for syndromicsurveillance.IntroductionNearly all of the myriad activities (or use cases) in clinical andpublic health (e.g., patient care, surveillance, community healthassessment, policy) involve generating, collecting, storing, analyzing,or sharing data about individual patients or populations. Effectiveclinical and public health practice in the twenty-first century requiresaccess to data from an increasing array of information systems,including but not limited to electronic health records. However, thequality of data in electronic health record systems can be poor or“unfit for use.” Therefore measuring and monitoring data quality isan essential activity for clinical and public health professionals aswell as researchers.MethodsUsing the Health Data Stewardship Framework1, we will extendAutomated Characterization of Health Information at Large-scaleLongitudinal Evidence Systems (ACHILLES), a software packagepublished open-source by the Observational Health Data Sciencesand Informatics collaborative (OHDSI; www.ohdsi.org) to measurethe quality of data electronically reported from disparate informationsystems. Our extensions will focus on analysis of data reportedelectronically to public health agencies for disease surveillance. Nextwe will apply the ACHILLES extensions to explore the quality ofdata captured from multiple real-world health systems, hospitals,laboratories, and clinics. We will further demonstrate the extendedsoftware to public health professionals, gathering feedback on theability of the methods and software tool to support public healthagencies’ efforts to routinely monitor the quality of data received forsurveillance of disease prevalence and burden.ResultsTo date we have mapped key surveillance data fields into theOHDSI common data model, and we have transformed 111 millionsyndromic surveillance message segments pertaining to 16.4 millionemergency department encounters representing 6 million patientsfor importation into ACHILLES. Using these data, we are exploringthe existing 167 metrics across 16 categories available withinACHILLES, including a person (e.g., number of unique persons);and observation period (e.g., Distribution of age at first observationperiod). Syndromic surveillance (SS), however, is driven largelyby monitoring patient stated chief complaints (non-standard freetext clinical data) in addition to coded diagnoses. Consequently,ACHILLES must be extended to maximally support use in analyzingSS datasets.ConclusionsThis work remains a work-in-progress. Over the coming year, wewill not only explore existing ACHILLES constructs using real-worldpublic health data but also introduce new functionality to explore1) patient demographics; 2) facility and location (e.g., emergencydepartment where care was delivered); and 3) clinical observations(e.g., chief complaint). The design and methods for examining theseaspects of surveillance data will be included on the poster, and theywill be made freely available for distribution with a future instance ofthe ACHILLES software. We ultimately envision these tools beingavailable for use on platforms such as the CDC’s Biosense – open toall local and state health agencies as a one-stop portal for surveillancedata analysis – or research environments where they can be used toexamine and improve the quality of data output from informaticssystems.

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Abstract

ObjectiveThe National Biosurveillance Integration Center (NBIC) andthe Defense Threat Reduction Agency's Chemical and BiologicalTechnologies Department (DTRA J9 CB) have partnered to co-develop the Biosurveillance Ecosystem (BSVE), an emergingcapability that aims to provide a virtual, customizable analystworkbench that integrates health and non-health data. This partnershippromotes engagement between diverse health surveillance entities toincrease awareness and improve decision-making capabilities.IntroductionNBIC collects, analyzes, and shares key biosurveillanceinformation to support the nation's response to biological events ofconcern. Integration of this information enables early warning andshared situational awareness to inform critical decision making, anddirect response and recovery efforts.DTRA J9 CB leads DoD S&T to anticipate, defend, and safeguardagainst chemical and biological threats for the warfighter and thenation.These agencies have partnered to meet the evolving needs of thebiosurveillance community and address gaps in technology and datasharing capabilities. High-profile events such as the 2009 H1N1pandemic, the West African Ebola outbreak, and the recent emergenceof Zika virus disease have underscored the need for integration ofdisparate biosurveillance systems to provide a more functionalinfrastructure. This allows analysts and others in the communityto collect, analyze, and share relevant data across organizationssecurely and efficiently. Leveraging existing biosurveillance effortsprovides the federal public health community, and its partners, witha comprehensive interagency platform that enables engagement anddata sharing.MethodsNBIC and DTRA are leveraging existing biosurveillance projectsto share data feeds, work processes, resources, and lessons learned.A multi-stakeholder Agile process was implemented to representthe interests of NBIC, DTRA, and their respective partners. Systemrequirements generated by both agencies were combined to form asingle backlog of prioritized needs. Functional requirements fromNBIC support the development of the prototype by refining systemcapabilities and providing an operational perspective. DTRA'stechnical expertise and research and development (R&D) portfolioensures robust analytic applications are embedded within a secure,scalable system architecture.Integration of analyst validated data from the NBIC Biofeedssystem serves as a gold-standard to improve analytic developmentin machine learning and natural language processing. Additionally,working groups are formed using NBIC and DTRA extendedpartnerships with academia and private industry to expand R&Dpossibilities. These expansions include leveraging existing ontologyefforts for improved system functionality and integrating social mediaalgorithms for improved topic analysis output.ResultsThe combined efforts of these two agencies to develop theBSVE and improve overall biosurveillance processes across thefederal government has enhanced understanding of the needs ofthe community in a variety of mission spaces. To date, co-creation ofproducts, joint analysis, and sharing of data feeds has become a majorpriority for both partners to advance biosurveillance outcomes. Withinthe larger efforts of system development, possible coordination withother agencies such as the Department of Veterans Affairs (VA) andthe US Geological Survey (USGS) could expand reach of the systemto ensure fulfillment of health surveillance requirements as a whole.ConclusionsThe NBIC and DTRA partnership has demonstrated value inimproving biosurveillance capabilities for each agency and theirpartners. BSVE will provide NBIC analysts with a collaborativetool that can leverage use of applications that visualize near real-time global epidemic and outbreak data from a range of unique andtrusted sources. The continued collaboration means ongoing accessto new data streams and analytic processes for all analysts, as wellas advanced machine learning algorithms that increase capabilitiesfor joint analysis, rapid product creation, and continuous interagencycommunication.

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

Abstract

ObjectiveThe NEDSS Base System (NBS), an integrated disease surveillancesystem, implemented extensible functionality to support electronicdata exchange for multiple use cases and public health workflowmanagement of incoming messages and documents.IntroductionThe NBS is an integrated disease surveillance system deployedin 22 public health jurisdictions to support receipt, investigation,analysis and reporting, and data exchange for state reportableconditions. The NBS is governed by the Centers for Disease Controland Prevention (CDC) and state, local, and territorial users that makeup the NBS Community. In the early 2000's, electronic laboratoryresults reporting (ELR) was implemented in an effort to improvetimeliness and completeness of disease reporting. As standards-basedelectronic health records (EHRs) are adopted and more surveillancedata become available, modern surveillance systems must consumeinformation in an automated way and provide more functionality toautomate key surveillance processes.MethodsMany use cases exist for exchanging data with an integrated publichealth surveillance system. These can include exchange of electroniccase and laboratory reports from healthcare, data sharing betweenpublic health entities, data migration from legacy systems, andongoing exchange with other public health systems (e.g. immunizationregistries). The NBS implemented an interface specification called thePublic Health Document Container (PHDC). PHDC is based on HL7version 3 Clinical Document Architecture (CDA). It allows import ofpatient (cases and contacts), investigation, treatment, interview, andlaboratory information into NBS. CDA was chosen as the buildingblock to facilitate data exchange with the healthcare community.Through use of data integration tools, incoming data can be mappedfrom any format to PHDC and imported into the system. Existingservices, such as patient, provider, and organization deduplicationare applied. To assist with management of incoming electronicdocuments, NBS implemented a functionality called WorkflowDecision Support (WDS). WDS uses configurable algorithms toautomatically process incoming documents (including case reports,laboratory reports, etc.) into the public health workflow. Users canchoose to mark an incoming document as reviewed or automaticallycreate an investigation and case notification message to CDC (fornationally notifiable conditions).ResultsThrough PHDC, NBS is able to receive data from healthcare usingnational standards, such as the HL7 Electronic Initial Case Report(eICR). Three NBS partners are currently collaborating to pilot eICRfunctionality. PHDC was successfully used to migrate large volumesof data from a legacy surveillance system into the NBS. Two NBSstates are using PHDC to implement ongoing data exchange betweenseparate surveillance systems within their jurisdiction. In several NBSjurisdictions, WDS is used to automatically create investigations andcase notifications for high-morbidity conditions such as gonorrheaand chlamydia. In other jurisdictions, WDS is used to assist withmanaging high volumes of Hepatitis B and C reports.ConclusionsCDA-based PHDC does require that public health have knowledgeof standards and data integration resources to transform incomingmessages to the PHDC interface; however, the flexibility providedby this approach ensures the system is able to respond to newand changing standards without system development. Additionalenhancements are needed to support data exchange with immunizationregistries. WDS functionality does reduce burden on public healthstaff, especially when dealing with high-volume diseases. Futurefunctionalities include the ability to define more criteria (such as ageor gender) to drive the actions taken on an incoming lab or case report.

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

Abstract

ObjectiveThe NIST Syndromic Surveillance Test Suite for 2015 EditionONC certification testing was published in February 2016. Keyinformation related to the purpose, development, and use of thisconformance test tool is provided via snapshots on a poster.IntroductionDetails about the ONC 2015 Edition certification criteria forSyndromic Surveillance and the related NIST Test Suite wereexplained previously. We now provide an overview and keyinformation regarding updates to the Test Suite and how it is designedto be used.MethodsSnapshots are provided on a poster and are used by the presenterto explain the steps involved in developing the NIST SyndromicSurveillance Test Suite 2015 Edition, to show key features of andupdates to the Test Suite, and to illustrate the relationship of the TestSuite to various releases of the PHIN Messaging Guide for SyndromicSurveillance.ResultsThe NIST Syndromic Surveillance Test Suite for 2015 EditionONC certification testing was published in February 2016. As thetarget stakeholders began using it and providing feedback, this tooland associated documentation were updated. The Test Suite is beingused by test labs for ONC certification testing of health informationtechnologies, by developers in preparation for certification testing,and ultimately by public health jurisdictions for on-boarding ofprovider organizations that need to submit surveillance data.ConclusionsAutomated conformance test tools enable validation of healthinformation technologies’ ability to support the requirementspublished in the PHIN Messaging Guide for Syndromic Surveillance.Having this standard and the means to validate conformance helpsdrive the industry toward the level of interoperability needed topromote efficient reporting and utilization of syndrome-based publichealth 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

ObjectiveDemonstrate the value of consolidated claims data from communityhealthcare providers in Zika Virus Disease surveillance at local level.IntroductionZika virus disease and Zika virus congenital infection arenationally notifiable conditions that became prominent recently as agrowing number of travel-associated infections have been identifiedin the United States. The Centers for Disease Control and Prevention(CDC) have dedicated significant time and effort on determining andaddressing the risks and impact of Zika on pregnant women and theirbabies who are most vulnerable to the disease. CDC relies on twosources of information, reported voluntarily by healthcare providers,to monitor Zika virus disease: ArboNET and the newly establishedU.S. Zika Pregnancy Registry. A study by IMS Health compared U.S.trends of the Zika virus disease in general and pregnant women withZika virus disease in particular observed in an IMS healthcare claimsdatabase and the CDC ArboNET and the newly established U.S. ZikaPregnancy Registry.MethodsIMS used for this analysis claims for reimbursement from office-based healthcare providers, which are widely accepted standardbusiness practice records throughout the healthcare industry. IMSclaims data is collected daily from office-based providers throughoutthe U.S. and processed, stored and analyzed in a centralized database.The information is available at the patient and visit level, with theability to characterize deidentified patients by age, gender andZIP3 location and to trace a patient’s history of visits, diagnoses,procedures, drugs prescribed and tests performed or ordered.The general IMS study sample captured all patients throughout thecontinental United States covered in claims between October 1, 2016and May 24, 2016 with ICD 10 diagnosis code A92.8, Other SpecifiedMosquito-Borne Viral Fevers. This sample was compared to thesample of laboratory-confirmed Zika virus disease cases reportedto ArboNET by state or territory from the CDC Arboviral DiseaseBranch from January 1, 2015 through May 18, 2016. In addition,IMS compared the subset of patients with both a Zika virus diseasediagnosis and any ICD 10 pregnancy diagnosis to the CDC sampleof patients captured by the U.S. Zika Pregnancy Registry with anylaboratory evidence of possible Zika virus infection in the UnitedStates and territories.ResultsThroughout the continental United States, the IMS claims-basedsample captured 875 patients with a Zika virus disease diagnosiscompared to 548 travel-associated cases reported by CDC. At thestate level, especially in New York, New Jersey, Illinois and Texas,the IMS data captured a much larger number of cases that the CDCreported cases. Most of these possible Zika cases are concentratedin the large metropolitan areas around New York City, Chicagoand Houston. Many of them are diagnosed and treated by the samehealthcare providers.The IMS sample captured 577 pregnant women with a possibleZika virus infection compared to the 168 pregnant women with apossible Zika virus infection reported in the U.S. Zika PregnancyRegistry as of May 24, 2016. Many of the pregnant women in the IMSsample had multiple visits, often in consecutive months, associatedwith the Zika virus disease diagnosis. Pregnant women are morelikely to be tested and diagnosed with a Zika virus infection due tothe risk of fetal malformations from the disease. As many as 250 ofthe 577 pregnant women with a possible Zika virus infection also hada diagnosis of suspected fetal damage due to a viral disease. Of allwomen with a possible Zika virus infection in the IMS sample, 120were in New Jersey, 111 in New York, 93 in Illinois and 74 in Texas,and most were concentrated in the large metropolitan areas aroundNew York City, Chicago and Houston.ConclusionsThese findings suggest that all-payer claims data can be usedsuccesfully to monitor Zika transmission trends at local and statelevel, especially with a focus on pregnant women. Healthcare claimsdata is fast, granular, relevant at local level and can be used tosupplement CDC ArboNET data for local and state level surveillanceand response to the evolving Zika virus infection outbreak. Thisstudy is an example of a novel approach to surveillance for Zika virusdisease and potentially many other infectious diseases.

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

Abstract

ObjectiveThe presentation describes the design and the main functionalitiesof two user-friendly applications developed using R-shiny to supportthe statistical analysis of morbidity and mortality data from the Frenchsyndromic surveillance system SurSaUD.IntroductionThe French syndromic surveillance system SursaUD® has beenset up by Santé publique France, the national public health agency(formerly French institute for public health - InVS) in 2004. In 2016,the system is based on three main data sources: the attendancesin about 650 emergency departments (ED), the consultations to62 emergency general practitioners' (GPs) associations SOSMédecins and the mortality data from 3,000 civil status offices [1].Daily, about 60,000 attendances in ED (88% of the nationalattendances), 8,000 visits in SOS Médecins associations (95% ofthe national visits) and 1,200 deaths (80% of the national mortality)are recorded all over the territory and transmitted to Santé publiqueFrance.About 100 syndromic groupings of interest are constructed fromthe reported diagnostic codes, and monitored daily or weekly, fordifferent age groups and geographical scales, to characterize trends,detect expected or unexpected events (outbreaks) and assess potentialimpact of both environmental and infectious events. All-causesmortality is also monitored in similar objectives.Two user-friendly interactive web applications have beendeveloped using the R shiny package [2] to provide a homogeneousframework for all the epidemiologists involved in the syndromicsurveillance at the national and the regional levels.MethodsThe first application, named MASS-SurSaUD, is dedicated to theanalysis of the two morbidity data sources in Sursaud, along with dataprovided by a network of Sentinel GPs [3]. Based on pre-aggregateddata availaible daily at 10:30 am, R programs create daily, weeklyand monthly time series of the proportion of each syndromic groupingamong all visits/attendances with a valid code at the national andregional levels. Twelve syndromic groupings (mainly infectious andrespiratory groups, like ILI, gastroenteritis, bronchiolitis, pulmonarydiseases) and 13 age groups have been chosen for this application.For ILI, 3 statistical methods (periodic regression, robust periodicregression and Hidden Markov model) have been implementedto identify outbreaks. The results of the 3 methods applied to the3 data sources are combined with a voting algorithm to compilethe influenza alarm level for each region each week: non-epidemic,pre/post epidemic or epidemic.The second application, named MASS-Euromomo, allowsconsulting results provided by the model developed by the Europeanproject EuroMomo for the common analysis of mortality in theEuropean countries (www.euromomo.eu). The Euromomo model,initially developed using Stata software, has been transcripted inR. The model has been adapted to run in France both at a national,regional and other geographical administrative levels, and for 7 agegroups.ResultsThe two applications, accessible on a web-portal, are similarlydesigned, with:- a dropdown menu and radio buttons on the left hand side to selectthe data to display (e.g. filter by data source, age group, geographicallevels, syndromic grouping and/or time period),- several tab panels allowing to consult data and statistical resultsthrough tables, static and dynamic charts, statistical alarm matrix,geographical maps,... (Figure 1),- a "help" tab panel, including documentations and guidelines,links, contact details.The MASS-SurSaUD application has been deployed in December2015 and used during the 2015-2016 influenza season. MASS-Euromomo application has been deployed in July 2016 for the heat-wave surveillance period. Positive feedbacks from several users havebeen reported.ConclusionsBusiness Intelligence tools are generally focused on datavisualisation and are not generally tailored for providing advancedstatistical analysis. Web applications built with the R-shiny packagecombining user-friendly visualisations and advanced statistics can berapidly built to support timely epidemiological analyses and outbreakdetection.Figure 1: screen-shots of a page of the two applications

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

Abstract

ObjectiveTo explore how outpatient and urgent care syndromic surveillancefor influenza-like illness (ILI) compare with emergency departmentsyndromic ILI and other seasonal ILI surveillance indicators.IntroductionThe North Dakota Department of Health (NDDoH) collectsoutpatient ILI data through North Dakota Influenza-like IllnessNetwork (ND ILINet), providing situational awareness regardingthe percent of visits for ILI at sentinel sites across the state. Becauseof increased clinic staff time devoted to electronic health initiativesand an expanding population, we have found sentinel sites have beenharder to maintain in recent years, and the number of participatingsentinel sites has decreased. Outpatient sentinel surveillance forinfluenza is an important component of influenza surveillance becausehospital and death surveillance does not capture the full spectrum ofinfluenza illness.Syndromic surveillance (SyS) is another possible source ofinformation for outpatient ILI that can be used for situationalawareness during the influenza season; one benefit of SyS is that itcan provide more timely information than traditional outpatient ILIsurveillance [1,2]. The NDDoH collects SyS data from hospitals(emergency department and inpatient visits) and outpatient clinics,including urgent and primary care locations. Visits include chiefcomplaint and/or diagnosis code data. This data is sent to theBioSense 2.0 SyS platform. We compared our outpatient SyS ILI withour ND ILINet and reported influenza cases, and included hospitaland combined SyS ILI for comparison.MethodsWeekly rates from ND ILINet, SyS ILI, and counts of reportedcases from the influenza season (annual weeks 40 through 20) forthe 2014-2015 and 2015-2016 seasons were compiled. Syndromiccategories for outpatient, hospital (emergency department andinpatient), and combined hospital and outpatient data were created,and the BioSense 2.0 definition for ILI was used. These includeddata from 127,050 outpatient and 323,318 hospital visits for2014-15, and 124,597 outpatient and 424,097 hospital visits for2015-16. Because influenza is a reportable condition in North Dakota,case data is routinely used to represent the seasonal influenza trend,and is useful when other respiratory viruses are circulating. A PearsonCorrelation Coefficient was calculated on all variables using SAS 9.4.Alpha was set to 0.05. There was no overlap between the outpatientclinics providing syndromic surveillance data and clinics participatingin ND ILINet.ResultsAll outpatient, hospital, and combined outpatient and hospitalILI rates from SyS data were positively and significantly correlatedwith both ND ILINet rates and influenza case counts (Table 1). Thecorrelation between outpatient SyS ILI rates and traditional influenzaindicators was lower than for hospital SyS ILI rates for both years,with correlation coefficients ranging from 0.38-0.48 and 0.56-0.92,respectively. Generally SyS data was more highly correlated withcase counts than ND ILINET rates. For the 2014-15 season, hospitalSyS data was the most strongly correlated with traditional influenzaindicators. For 2015-16, combined SyS data was the most stronglycorrelated. Visual inspection of the chief complaint data for ILI visitsfound a significant number of gastrointestinal visits that included thephrase “flu-like illness” in both outpatient and hospital SyS data.ConclusionsAlthough correlation coefficients were lower for outpatient SySILI rates, they are significant enough to be included in our ongoinginfluenza surveillance. One possible confounding factor for therelationship between ED surveillance and reported cases is that peoplewith more severe illness may be more likely to be tested for influenza,and may be more likely to seek medical attention at a hospital setting.This may explain why hospital SyS data provided the strongestcorrelation during the 2014-15 season, a season with higher rates ofmore severe illness than 2015-16. The combination of outpatient dataand hospital data provided the strongest correlation for the 2015-16influenza season, indicating the addition of outpatient data, which mayincrease representativeness of ILI data, may be beneficial to SyS ILIsurveillance. We used an existing ILI syndrome from the BioSense2.0 tool, and revising this syndrome may improve correlationsbetween SyS ILI and ND ILINet and case count data. Negation termsto remove visits for GI illness incorrectly referred to as “flu-like”would be one useful change. The nature of visits for influenza atoutpatient clinic versus hospitals is different, and it is possible thismay account for the difference in the strength of correlations betweenthe two data sources. Use of a different ILI syndrome definition foroutpatient SyS data should be investigated.Table 1. Pearson correlation coefficient values for influenza-like illness in threesyndromic surveillance categories compared with ND ILINET and influenzacase counts.

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

Abstract

ObjectiveTo explore the interest of Wikipedia as a data source to monitorseasonal diseases trends in metropolitan France.IntroductionToday, Internet, especially Wikipedia, is an important part ofeveryday life. People can notably use this popular free onlineencyclopedia to search health-related information. Recent studiesshowed that Wikipedia data can be used to monitor and to forecastinfluenza-like illnesses in near real time in the United States [1,2].We carried out a study to explore whether French Wikipedia dataallow to monitor the trends of five seasonal diseases in metropolitanFrance: influenza-like illness, gastroenteritis, bronchiolitis,chickenpox and asthma.MethodsTo collect Wikipedia data, we used two free web applications(https://stats.grok.se and https://tools.wmflabs.org/pageviews), whichaggregate daily views for each French entry of the encyclopedia.As some articles have several entries (redirects), we collectedview statistics for all the article entries and added them to make timeseries from January 1st, 2009 to June 30, 2016 (Figure 1). Then, wecompared these data to those of OSCOUR®network, which is a robustnational surveillance system based on the emergency departments.For each disease, we modelized daily variations in Wikipedia viewsaccording to daily visits in ED using Poisson regression modelsallowing for overdispersion. The following adjustment variables wereincluded in the model: long-term trend, seasonality, day of the week.We tested several lags (day-7 to day+7) in order to explore whetherone of the two indicators (Wikipedia view or ED visits) varied earlierthan the other.ResultsThe mean number of daily views was 764 [16-8271] for influenza-like illness, 202 [6-1660] for bronchiolitis, 1228 [59-10030] forgastroenteritis, 475 [21-2729] for asthma and 879 [25-4081] forchickenpox. Times series analyses showed a positive associationbetween page views and ED visits for each seasonal disease (Figure 2).For each increase in 100 Wikipedia views, the number of ED visitsthe same day increased by 2.9% (95% CI=[2.5-3.3]) for influenza,1.8 (95% CI=[1.4-2.2]) for bronchiolitis, 2.4% (95% CI=[2.2-2.7])for gastroenteritis, 1.4% (95% CI=[1.0-1.7]) for asthma and 2.9%(95% CI=[1.7-4.1]) for chickenpox. Globally, the highest relativerisks were observed for lag-1 (day-1) to lag0.ConclusionsThis study allowed to show that French Wikipedia data canbe useful to monitor the trends of seasonal diseases. Indeed, theywere significantly associated with data from a robust surveillancesystem, with a maximum lag of one day. Wikipedia can thereforebe considered as an interesting complementary data source, notablywhen traditional surveillance systems are not available in real time.Further works will be necessary to elaborate forecasting models forthese seasonal diseases.Figure1. Daily number of page views and ED visits for seasonal dieases,January 1st, 2009 to June 30, 2016Figure2. Relative risk between Wikipedia page views and ED visits forseasonal diseases by several lags

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Abstract

ObjectiveWisconsin is leading the way in novel approaches monitoringhealth outcomes for opioid-related adverse events. This panel willshare innovative public health informatics methods that harnessvarious data sources (e.g., Prescription Drug Monitoring Data(PDMP), death, birth and hospitalization data) for population healthsurveillance. Discussion will include topics on detection of drug abuseand diversion, identifying potential neonatal abstinence syndromecases, surveillance of substance-related hospitalizations and overdosedeaths, and modeling opioid-related mortality risk factors.Figure 1. Health Outcomes Opioids Surveillance System DiagramFigure 2. Ratios of MME and Length of Prescription for Select Groups(2013-2015)Map 1. Filled Opioids Over 90MME, Southeast Region Local HeahtDepartments, Wisconsin, 2015.

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Abstract

ObjectiveThe research objective was to develop and validate an automatedsystem to extract and classify patient alcohol use based on unstructured(i.e., free) text in primary care electronic medical records (EMRs).IntroductionEMRs are a potentially valuable source of information about apatient’s history of health risk behaviors, such as excessive alcoholconsumption or smoking. This information is often found in theunstructured (i.e., free) text of physician notes. It may be difficultto classify and analyze health risk behaviors because there are nostandardized formats for this type of information1. As well, thecompleteness of the data may vary across clinics and physicians.The application of automated classification tools for this type ofinformation could be useful for describing patterns within thepopulation and developing disease risk prediction models.Natural Language Processing (NLP) tools are currently used toprocess EMR free text in an automated and systematic way. However,these tools have primarily been applied to classify information aboutthe presence or absence of disease diagnoses2. The application of NLPtools to health risk behaviors, particularly alcohol use informationfrom primary care EMRs, has thus far received limited attention.MethodsStudy data were from the Manitoba regional network of theCanadian Primary Care Sentinel Surveillance Network (CPCSSN)for the period from 1998 to 2016. CPCSSN is a national primary caresurveillance network for chronic diseases comprised of 11 regionalnetworks with publicly funded healthcare systems. Currently, a totalof 53 clinics and more than 260 physicians provide data to CPCSSNin Manitoba. We classified each record based on unstructured textfrom physician notes into the following mutually exclusive categories:current drinker, not a current drinker, and unknown1. A standardizedde-identification process was applied to each record prior to applyingan NLP tool to the data.Text classification used a support vector machine (SVM) appliedto both unigrams (i.e., single words) and mixed grams (i.e., unigrams,and pairs of words known as bigrams) from a bag-of-words model inwhich each record is quantified by the relative frequency of occurrenceof each word in the record3. The training dataset for the SVM wascomprised of 2000 records classified by two primary care physicians.These physicians were initially trained using an independent sampleof 200 EMR text strings containing specific reference to alcohol use.Cohen’s kappa statistic, a chance-adjusted measure, was used toestimate agreement. Internal validation of the SVM was conductedusing 10-fold cross-validation techniques. Model performance wasassessed using recall and precision statistics, as well as the F-measurestatistic, which is a function of their average. All analyses wereconducted using the R open-source software package.ResultsA total of 57,663 unique records were included in the study. Theestimate of the kappa statistic for the physician training phase was0.98, indicating excellent agreement. Subsequent classification of thetraining dataset by the physicians resulted in 1.7% of records assignedas not a current drinker, 16.8% as current drinker, and 81.5% asunknown. Average estimates of recall for the 10 validation folds usingunigrams were 0.62 for not current drinkers, 0.86 for current drinkers,and 0.98 for the unknown category. Average estimates of recall usingmixed grams were 0.48, 0.84, and 0.97, respectively. Estimates ofprecision were higher with mixed grams than unigrams for the notcurrently drinking category, but the opposite was true for the currentdrinker category. There was no difference in precision between thetwo methods for the unknown category. The F-measure statistic washigher for classification of current drinkers using unigrams (0.89)than mixed grams (0.83), although the differences for the unknowncategory were negligible (0.98 versus 0.97). Application of the SVMwith unigrams to the entire dataset resulted in 15.3% of recordsclassified as current drinkers, 2.0% classified as not current drinkers,and 82.7% as unknown.ConclusionsThis study developed an automated system to classify unstructuredtext about alcohol consumption into mutually-exclusive alcohol usecategories. However, we found that only a small percentage of primarycare records contained documentation about alcohol consumption,which limits the utility of the automated tool and the data source fordisease risk prediction or alcohol use prevalence estimation1. Whileour automated approach is useful for processing existing EMR data,systematic documentation of alcohol consumption will benefit fromstandardized entry fields and terms to produce clinically meaningfulinformation that will improve the understanding of health riskbehaviors in primary care populations.

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Abstract

ObjectiveTo describe the effect of symptom negation in emergencydepartment (ED) chief complaint data received by the New York City(NYC) Department of Health and Mental Hygiene (DOHMH), and todevise a solution to avoid syndrome and symptom misclassificationfor commonly used negations using SAS Perl Regular Expression(PRX) functions.IntroductionIn July 2016, 77% of ED data was transmitted daily via HealthLevel 7 (HL7) messages, compared to only 27% in July 2015(Figure). During this same period, chief complaint (CC) word counthas increased from an average of 3.8 words to 6.0 words, with atwenty-fold increase in the appearance of the word “denies” in thechief complaint (Figure). While HL7 messages provide robust chiefcomplaint data, this may also introduce errors that could lead tosymptom and syndrome misclassification.MethodsUsing SAS 9.4 and Tableau 9.3, we examined data submissionsfrom 14 EDs responsible for 97% of the occurrences of the word‘denies’ in chief complaints in July 2016.To account for variation in chief complaint format among hospitals,we developed three PRX patterns to identify entire phrases in thechief complaint data field that began with conjugations of the word“deny” followed by various combinations of words, punctuation,spaces, and/or characters.Pattern 1: ''/DEN(Y|I(ES|ED|NG))(\s|\w|(\/)|(\+)|,|(\\)){1,}((\.)|(\|)|($)|(;)|(\))|(-))/’Pattern 2: "/DEN(Y|I(ES|ED|NG))(\s|\w|(\/)|(\+)|(\\)){1,}((\.)|(\|)|($)|(;)|(\))|(-)|(,))/";Pattern 3: "/DENIES:(|\w|\.|,){1,}/");We separated the ‘denies’ statement from the chief complaint andidentified commonly negated symptoms. We then defined symptomsusing keyword searches of the chief complaint and the ‘denies’statement. We compared symptom classification with and withoutthe consideration of symptom negation.ResultsOf the 14 EDs analyzed, we applied pattern 1 to 8 of the ED’s,pattern 2 to 5 EDs, and patterns 2 and 3 to 1 ED. Approximately98% of denies statements were extracted from chief complaints. Only2% of symptom negation was not captured due to uncommon chiefcomplaint format whose symptom negation didn’t meet one of thepreviously described PRX patterns.The most common words associated with a “denies” statementwere: pain, chest, fever, loc, shortness, breath, vomiting, nausea,travel, headache, recent, trauma, history, abdominal, injury, diarrhea,SOB (shortness of breath), V (vomit), Head, N (nausea), PMH (pastmedical history), suicidal, dizziness, homicidal and D (diarrhea) (seeTable).By not taking negation into consideration in symptom definitions,between 3.5% and 16.5% of symptom visits were misclassified.Symptom misclassification varied greatly by hospital, ranging from0% to 55%.ConclusionsAs hospitals in NYC implement HL7 messaging, symptomnegation is becoming increasingly common in chief complaint data.Current symptom definitions are based on keyword searches that donot take into account symptom negations. This leads to symptommisclassification, and could potentially cause false signals or inflatesyndrome baselines, causing true signals to go undetected. SAS PRXfunctions can be used to flexibly identify symptom negation patternsand exclude them from syndrome definitions. Future studies willquantify the effect symptom negation has had on signal frequency inNYC, and examine symptoms associated with other forms of negationsuch as “Personal Medical History”, “No” and “Negative.”Most Common Symptoms Denied in Emergency Department Chief Complaints

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

Abstract

ObjectiveTo evaluate prediction of laboratory diagnosis of acute respiratoryinfection (ARI) from participatory data using machine learningmodels.IntroductionARIs have epidemic and pandemic potential. Prediction of presenceof ARIs from individual signs and symptoms in existing studieshave been based on clinically-sourced data1. Clinical data generallyrepresents the most severe cases, and those from locations with accessto healthcare institutions. Thus, the viral information that comes fromclinical sampling is insufficient to either capture disease incidence ingeneral populations or its predictability from symptoms. Participatorydata — information that individuals today can produce on their own— enabled by the ubiquity of digital tools, can help fill this gap byproviding self-reported data from the community. Internet-basedparticipatory efforts such as Flu Near You2have augmented existingARI surveillance through early and widespread detection of outbreaksand public health trends.MethodsThe GoViral platform3was established to obtain self-reportedsymptoms and diagnostic specimens from the community (Table 1summarizes participation detail). Participants from states with themost data, MA, NY, CT, NH, and CA were included. Age, gender,zip code, and vaccination status were requested from each participant.Participants submitted saliva and nasal swab specimens and reportedsymptoms from: fever, cough, sore throat, shortness of breath, chills,fatigue, body aches, headache, nausea, and diarrhea. Pathogenswere confirmed via RT-PCR on a GenMark respiratory panel assay(full virus list reported previously3).Observations with missing, invalid or equivocal lab tests wereremoved. Table 2 summarizes the binary features. Age categorieswere:≤20, > 20 and < 40, and≥40 to represent young, middle-aged, and old. Missing age and gender values were imputed based onoverall distributions.Three machine learning algorithms—Support Vector Machines(SVMs)4, Random Forests (RFs)5, and Logistic Regression (LR) wereconsidered. Both individual features and their combinations wereassessed. Outcome was the presence (1) or absence (0) of laboratorydiagnosis of ARI.ResultsTen-fold cross validation was repeated ten times. Evaluationsmetrics used were: positive predictive value (PPV), negativepredictive value (NPV), sensitivity, and specificity6. LR and SVMsyielded the best PPV of 0.64 (standard deviation:±0.08) with coughand fever as predictors. The best sensitivity of 0.59 (±0.14) was fromLR using cough, fever, and sore throat. RFs had the best NPV andspecificity of 0.62 (±0.15) and 0.83 (±0.10) respectively with theCDC ILI symptom profile of fever and (cough or sore throat). Addingdemographics and vaccination status did not improve performanceof the classifiers. Results are consistent with studies using clinically-sourced data: cough and fever together were found to be the bestpredictors of flu-like illness1. Because our data include mildlyinfectious and asymptomatic cases, the classifier sensitivity and PPVare low compared to results from clinical data.ConclusionsEvidence of fever and cough together are good predictors of ARIin the community, but clinical data may overestimate this due tosampling bias. Integration of participatory data can not only improvepopulation health by actively engaging the general public2but alsoimprove the scope of studies solely based on clinically-sourcedsurveillance data.Table 1. Details of included participants.Table 2. Coding of binary features

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

Abstract

ObjectiveThe objective of this analysis is to leverage recent advances innatural language processing (NLP) to develop new methods andsystem capabilities for processing social media (Twitter messages)for situational awareness (SA), syndromic surveillance (SS), andevent-based surveillance (EBS). Specifically, we evaluated the useof human-in-the-loop semantic analysis to assist public health (PH)SA stakeholders in SS and EBS using massive amounts of publiclyavailable social media data.IntroductionSocial media messages are often short, informal, and ungrammatical.They frequently involve text, images, audio, or video, which makesthe identification of useful information difficult. This complexityreduces the efficacy of standard information extraction techniques1.However, recent advances in NLP, especially methods tailoredto social media2, have shown promise in improving real-time PHsurveillance and emergency response3. Surveillance data derived fromsemantic analysis combined with traditional surveillance processeshas potential to improve event detection and characterization. TheCDC Office of Public Health Preparedness and Response (OPHPR),Division of Emergency Operations (DEO) and the Georgia TechResearch Institute have collaborated on the advancement of PH SAthrough development of new approaches in using semantic analysisfor social media.MethodsTo understand how computational methods may benefit SS andEBS, we studied an iterative refinement process, in which the datauser actively cultivated text-based topics ("semantic culling") in asemi-automated SS process. This 'human-in-the-loop' process wascritical for creating accurate and efficient extraction functions in large,dynamic volumes of data. The general process involved identifyinga set of expert-supplied keywords, which were used to collect aninitial set of social media messages. For purposes of this analysisresearchers applied topic modeling to categorize related messages intoclusters. Topic modeling uses statistical techniques to semanticallycluster and automatically determine salient aggregations. A user thensemantically culled messages according to their PH relevance.In June 2016, researchers collected 7,489 worldwide English-language Twitter messages (tweets) and compared three samplingmethods: a baseline random sample (C1, n=2700), a keyword-basedsample (C2, n=2689), and one gathered after semantically cullingC2 topics of irrelevant messages (C3, n=2100). Researchers utilizeda software tool, Luminoso Compass4, to sample and perform topicmodeling using its real-time modeling and Twitter integrationfeatures. For C2 and C3, researchers sampled tweets that theLuminoso service matched to both clinical and layman definitions ofRash, Gastro-Intestinal syndromes5, and Zika-like symptoms. Laymanterms were derived from clinical definitions from plain languagemedical thesauri. ANOVA statistics were calculated using SPSSsoftware, version. Post-hoc pairwise comparisons were completedusing ANOVA Turkey's honest significant difference (HSD) test.ResultsAn ANOVA was conducted, finding the following mean relevancevalues: 3% (+/- 0.01%), 24% (+/- 6.6%) and 27% (+/- 9.4%)respectively for C1, C2, and C3. Post-hoc pairwise comparison testsshowed the percentages of discovered messages related to the eventtweets using C2 and C3 methods were significantly higher than forthe C1 method (random sampling) (p<0.05). This indicates that thehuman-in-the-loop approach provides benefits in filtering socialmedia data for SS and ESB; notably, this increase is on the basis ofa single iteration of semantic culling; subsequent iterations could beexpected to increase the benefits.ConclusionsThis work demonstrates the benefits of incorporating non-traditional data sources into SS and EBS. It was shown that an NLP-based extraction method in combination with human-in-the-loopsemantic analysis may enhance the potential value of social media(Twitter) for SS and EBS. It also supports the claim that advancedanalytical tools for processing non-traditional SA, SS, and EBSsources, including social media, have the potential to enhance diseasedetection, risk assessment, and decision support, by reducing the timeit takes to identify public health events.

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

Abstract

ObjectiveWe aim to develop an automated method to track opium relateddiscussions that are made in the social media platform calledReddit.As a first step towards this goal, we use a keyword-based approach totrack how often Reddit members discuss opium related issues.IntroductionIn recent years, the use of social media has increased at anunprecedented rate. For example, the popular social media platformReddit (http://www.reddit.com) had 83 billion page views from over88,000 active sub-communities (subreddits) in 2015. Members ofReddit made over 73 million individual posts and over 725 millionassociated comments in the same year [1].We use Reddit to track opium related discussions, because Redditallows for throwaway and unidentifiable accounts that are suitable forstigmatized discussions that may not be appropriate for identifiableaccounts. Reddit members exchange conversation via a forum likeplatform, and members who have achieved a certain status withinthe community are able to create new topically focused group calledsubreddits.MethodsFirst, we use a dataset archived by one of Reddit members who usedReddit’s official Application Programming Interface (API) to collectthe data (https://www.reddit.com/r/datasets/comments/3bxlg7/i_have_every_publicly_available_reddit_comment/). The dataset iscomprised of 239,772 (including both active and inactive) subreddits,13,213,173 unique user IDs, 114,320,798 posts, and 1,659,361,605associated comments that are made from Oct of 2007 to May of 2015.Second, we identify 10 terms that are associated with opium. Theterms are ‘opium’, ‘opioid’, ‘morphine’, ‘opiate’,’ hydrocodone’,‘oxycodone’, ‘fentanyl’, ‘oxy’, ‘heroin’, ‘methadone’. Third, wepreprocess the entire dataset, which includes structuring the data intomonthly time frame, converting text to lower cases, and stemmingkeywords and text. Fourth, we employed a dictionary approachto count and extract timestamps, user IDs, posts, and commentscontaining opium related terms. Fifth, we normalized the frequencycount by dividing the frequency count by the overall number of therespective variable for that period.ResultsAccording to our dataset, Reddit members discuss opium relatedtopics in social media. The normalized frequency count of postersshows that less than one percent members, on average, talk aboutopium related topics (Figure 1). Although the community as a wholedoes not frequently talk about opium related issues, this still amountsto more than 10,000 members in 2015 (Figure 2). Moreover, membersof Reddit created a number of subreddits, such as ‘oxycontin’,‘opioid’, ‘heroin’, ‘oxycodon’, that explicitly focus on opioids.ConclusionsWe present preliminary findings on developing an automatedmethod to track opium related discussions in Reddit. Our initialresults suggest that on the basis of our analysis of Reddit, members ofthe Reddit community discuss opium related issues in social media,although the discussions are contributed by a small fraction of themembers.We provide several interesting directions to future work to bettertrack opium related discussions in Reddit. First, the automated methodneeds to be further developed to employ more sophisticated methodslike knowledge-based and corpus-based approaches to better extractopium related discussions. Second, the automated method needs tobe thoroughly evaluated and measure precision, recall, accuracy, andF1-score of the system. Third, given how many members use socialmedia to discuss these issues, it will be helpful to investigate thespecifics of their discussions.Line Graphs of normalized frequency counts for posters, comments, and poststhat contained opium related termsLine Graphs of raw frequency counts for posters, comments, and posts thatcontained opium related terms

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

Abstract

ObjectiveTo examine community engagement as a means to strengthentobacco-related policies and programs use in marginalizedpopulations.IntroductionAlthough significant progress has been made in tobacco control inthe United States (US) over the past 50 years, more than 15% of thepopulation currently use tobacco products.1Tobacco use continuesto be the leading cause of preventable death, contributing to over480,000 deaths and about $300 billion in economic costs each year.To achieve theHealthy People 2020(HP2020) objective of 12%national adult smoking rate by 2020, it is important to focus ourtobacco control efforts on surveillance and addressing disparitiesin tobacco use prevalence and tobacco-induced diseases acrossdifferent subpopulations and geographic areas.2Utah reportedthe lowest prevalence rate (9.7% in 2014), while rates as high as28% were identified in central Appalachia. Modern epidemiologyis limited in its ability to explain patterns of tobacco use andtobacco-related interventions and policies in these highly prevalent,marginalized environments. Therefore, a combination of quantitativeand community-based participatory research (CBPR), as proposedin Public Health 3.0, will expand the scope and reach to addressall factors of tobacco use, including cross-sector collaboration andmulti-level actions.3This study aimed to comprehensively investigatecounties in the Northeast Tennessee region where tobacco useprevalence is disproportionately highest, and to identify regionaland culturally specific evidence-based practices for tobacco control.Additionally, the study examined how these practices can be scaledup to address similar high tobacco use and disadvantaged populationselsewhere in the US and worldwide.MethodsGrounded by the CBPR framework, a mixed-methods approachtriangulated multiple sources of data using a three-prong assemblageofProtection,Prevention, andCessation, to develop tobaccocontrol recommendations and goals as part of a Population HealthImprovement Plan for Tennessee. Information gained from healthcouncil discussions, focus groups, interviews, and stakeholdermeetings were combined with quantitative analyses of secondarydata from Tennessee Department of Health, school-based surveys,and qualitative analyses conducted for descriptive and inferentialstatistics. All discussions and interviews involving 222 individualsfrom 91 organizations were recorded and organized using NVivo10, thematically coded using grounded theory, and analyzed usingdescriptive statistics. The results utilized aggregated themes generatedfrom the data.ResultsTobacco use in the Northeast Tennessee region comprises cigarettesmoking and smokeless tobacco, with increasing uptake of electroniccigarettes across all age groups. Among others, culture of tobaccouse and cultivation was identified as the most salient factor fortobacco use. Reducing tobacco use requires a foundation built oninformatics, community engagement, and a model for sustainablefunding to support infrastructure and program interventions. Whilestate and national policies and programs have received less attentionin this region, several effective community-based policies andprograms to prevent tobacco use were identified, including incentiveprograms such as Baby and Me, voluntary smoke-free campuspolicies by businesses and colleges, 100% screening programs byhospitals, and nicotine-free employee population. Overall, a total of25 recommendations were identified, with 14 aimed at protection,four at prevention, and seven at cessation. These recommendationsculminated into five overarching goals:Protectthe population fromtobacco and secondhand smoke exposure through policy enforcementand implementation and counter-marketing;Preventinitiation oftobacco use with comprehensive youth-focused programs that increaseknowledge and awareness;Expandaccess to cessation resources andtreatment, especially in high risk populations;Fostercollaborationand partnership; andMonitordata for evaluation and validity.ConclusionsThis is one of the few comprehensive attempts to address the socialdynamics of tobacco use and identify population and geographicpolicies and programs in highly prevalent communities. Amongthe myriad issues identified, the expansion of surveillance data toinform tobacco policy and culturally-tailored tobacco policies andprograms are essential to reduce tobacco use in population subgroups.Combining CBPR with actionable data can spur innovations inlocal efforts, highlight social determinants of health, and contributeto evidence-based policy. While the results of this study primarilyprovide in-depth descriptions of central Appalachia's tobacco-relatedrisks and their perceptions of and reactions to tobacco preventionintervention, the policies and programs identified through the processmay be more readily adopted and scaled-up to address the disparitiesin tobacco use and tobacco-induced diseases, particularly pertainingto low-income, disadvantaged, and hard-to-reach populations.

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

Abstract

ObjectiveTo develop a spatially accurate biosurveillance synthetic datagenerator for the testing, evaluation, and comparison of new outbreakdetection techniques.IntroductionDevelopment of new methods for the rapid detection of emergingdisease outbreaks is a research priority in the field of biosurveillance.Because real-world data are often proprietary in nature, scientists mustutilize synthetic data generation methods to evaluate new detectionmethodologies. Colizza et. al. have shown that epidemic spread isdependent on the airline transportation network [1], yet current datagenerators do not operate over network structures.Here we present a new spatial data generator that models thespread of contagion across a network of cities connected by airlineroutes. The generator is developed in the R programming languageand produces data compatible with the popular `surveillance' softwarepackage.MethodsColizza et. al. demonstrate the power-law relationships betweencity population, air traffic, and degree distribution [1]. We generate atransportation network as a Chung-Lu random graph [2] that preservesthese scale-free relationships (Figure 1).First, given a power-law exponent and a desired number of cities,a probability mass function (PMF) is generated that mirrors theexpected degree distribution for the given power-law relationship.Values are then sampled from this PMF to generate an expecteddegree (number of connected cities) for each city in the network.Edges (airline connections) are added to the network probabilisticallyas described in [2]. Unconnected graph components are each joinedto the largest component using linear preferential attachment. Finally,city sizes are calculated based on an observed three-quarter power-law scaling relationship with the sampled degree distribution.Each city is represented as a customizable stochastic compartmentalSIR model. Transportation between cities is modeled similar to [2].An infection is initialized in a single random city and infection countsare recorded in each city for a fixed period of time. A consistentfraction of the modeled infection cases are recorded as daily clinicvisits. These counts are then added onto statically generated baselinedata for each city to produce a full synthetic data set. Alternatively,data sets can be generated using real-world networks, such as the onemaintained by the International Air Transport Association.ResultsDynamics such as the number of cities, degree distribution power-law exponent, traffic flow, and disease kinetics can be customized.In the presented example (Figure 2) the outbreak spreads over a 20city transportation network. Infection spreads rapidly once the morepopulated hub cities are infected. Cities that are multiple flights awayfrom the initially infected city are infected late in the process. Thegenerator is capable of creating data sets of arbitrary size, length, andconnectivity to better mirror a diverse set of observed network types.ConclusionsNew computational methods for outbreak detection andsurveillance must be compared to established approaches. Outbreakmitigation strategies require a realistic model of human transportationbehavior to best evaluate impact. These actions require test data thataccurately reflect the complexity of the real-world data they wouldbe applied to. The outbreak data generated here represents thecomplexity of modern transportation networks and are made to beeasily integrated with established software packages to allow for rapidtesting and deployment.Randomly generated scale-free transportation network with a power-lawdegree exponent ofλ=1.8. City and link sizes are scaled to reflect their weight.An example of observed daily outbreak-related clinic visits across a randomlygenerated network of 20 cities. Each city is colored by the number of flightsrequired to reach the city from the initial infection location. These generatedcounts are then added onto baseline data to create a synthetic data set forexperimentation.KeywordsSimulation; Network; Spatial; Synthetic; Data

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

Abstract

IntroductionMitigating the spread of infectious disease is of great importancefor policy makers. Taking the recent outbreak of Ebola as an example,it was difficult for policy makers to identify the best course of actionbased on the cost-effectiveness of what was available.In effort to address the needs of policy makers to mitigate the spreadof infectious disease before an outbreak becomes uncontrollable, wehave devised a cost-benefit disease control model to simulate theeffect of various control methods on disease incidence and the costassociated with each of the scenarios. Here, we present a case studyof Ebola used to quantify the cost effectiveness of vaccination andisolation methods to minimize the spread of the disease. We evaluatethe impact of changing strategy levels on the incidence of the diseaseand address the benefits of choosing one strategy over the other withregards to cost of vaccine and isolation.MethodsDisease.We use a general SEIRJ model for disease transmission.Here, S-Susceptible, E- Exposed (latent), IA– Infected (asymptomatic),IM– Infected (mild symptoms), IS– Infected (severe symptoms),JM– Isolated (mild symptoms at home), JS– Isolated (severesymptoms in hospital), and R- Recovered individuals. In this model,we consider the dynamics of the system and the effect of the relativetransmissibility of isolated individuals (L) compared to other infectedindividuals1.Cost.Ebola vaccination and treatment are very expensive andnot widely available. Some preliminary data shows that it will take$73 million (M) to produce 27 M vaccines2plus the cost for vaccinedelivery and health care professionals (not included here). On theother hand, the treatment for Ebola in the U.S. would cost $25,000dollars a day per person3to ensure proper isolation and adequate care(treatment, health care professionals, facilities and special equipment).Although not included in this research, the proper isolation of Ebolapatients would also lead to a loss in hospital revenue of $148,000per day due to reduced patient capacity3. Here, we use $27,000 perindividual hospitalized per day and $2.70 per person vaccinated.Model.To evaluate the cost-effectiveness of control methods ondisease transmission, we assessed the affect of different levels ofvaccination coverage on the resulting number of infected individuals.Then, we calculated the overall estimated cost of vaccination andresulting hospitalization for each scenario to identify the lowest cost-benefit ratio.ResultsUsing a base population of 10 M individuals, we ran scenarios fordifferent levels of vaccination (μ= 0.01, 0.05, 0.1) while varying therelative transmissibility of isolated individuals (L = 0.5, 0.6, 0.65).For each combination, we calculated the incidence, vaccination andhospitalization cost per individual per day (Fig 1). We note that anincrease in the relative transmissibility of isolated individuals leads toa higher number of infected people and, therefore, a reduced numberof candidates for vaccination and an overall increase in cost. Since thecost of vaccination is 1 ten-thousandth of the cost of hospitalization,our results clearly show the cost-benefit of vaccinating over hospitaltreatment. In every scenario studied, we observed a measurablereduction in disease incidence when vaccinating a higher fraction ofthe population compared to isolating individuals post infection.ConclusionsGiven these preliminary results, we plan to extend the frameworkof our model to a dynamic control system where we consider the costof vaccination and isolation embedded in the system of differentialequations. This approach will allow us see the best availablecontrol implementation while minimizing the cost of treatment andvaccination.KeywordsControl; Epidemiological Modeling; Transmission Dynamics; Cost;EBOLAReferences1. Chowell D, Castillo-Chavez C, Krishna S, Qiu X, Anderson KS. 2015.Modeling the effect of early detection of Ebola.The Lancet InfectiousDiseases, 15(2), 148-149.2. http://www.forbes.com/sites/danmunro/2014/10/23/head-of-gsk-ebola-vaccine-research-can-we-even-consider-doing-a-trial/#3cbd929665db3. http://www.usatoday.com/story/news/nation/2014/11/25/ebola-costs-add-up/19346913/

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Abstract

ObjectiveThe purpose of this project is to demonstrate progress in developinga scientific and practical approach for public health (PH) emergencypreparedness and response informatics (EPRI) that supports theNational Health Security Strategy and Global Health SecurityAgenda (GHSA) objectives. PH emergency operations centers (EOC)contribute to health security objectives because they operationalizeresponse, recovery and mitigation activities during national andinternational PH events. The primary focus of this presentation is todescribe the results of an analysis of CDC's EOC, and other EOCs, inbuilding their EPRI capabilities.IntroductionGlobal travel and human migration patterns facilitate the spreadof diseases such as influenza A/H1N1, Ebola, and Zika, increasingpressure to PH systems to protect their constituents against globalhealth threats. Effective prevention, detection, and rapid response tothreats rely heavily on adequate information sharing. This requireseffective information management through PH EPRI applicationssuch as information systems and tools, knowledge management,and a continuous cycle improvement to maintain system quality.Enhancement of PH EPRI capabilities contributes to improveddecision making during emergencies1. It transforms public healthpractice and improves health outcomes through better surveillance,epidemiology, integrated delivery of services, and other emergencypreparedness and response activities.EPRI activities depend on both technical systems and the peoplewho use them. Without adequate training, these systems cannot beeffective. CDC's PH EOC information processes and data flows area notable use case, utilized by hundreds of emergency respondersduring large-scale PH events. By analyzing this use case, CDC'sinformaticians have identified multiple opportunities for advancingPH EPRI and advance the objectives of the GHSA.MethodsPH EPRI is an interdisciplinary science, incorporating knowledgeand techniques from a multiple fields of research and practice. Theseinclude epidemiology and surveillance, gathering and distributinginformation for situational awareness (SA), technology infrastructuredevelopment, incident management, and several other disciplines.CDC's Situational Awareness Branch used three sources for thisanalysis: direct analysis of CDC's EOC information systems andSA activities; WHO'sFramework for a Public Health EmergencyOperations Centre2, and HHS'Public Health and Medical SituationalAwareness Strategy3. This assessment also included a comparisonof the objectives of PH EPRI to the objectives of other emergingdisciplines, such as PH informatics and emergency preparednessinformatics. This helped in avoiding overlap with other disciplinesand fixing gaps within PH EPRI.ResultsThe following information flows were identified as part of theCDC's EOC operations: Managing and Commanding, Operations,Planning and Intelligence, Logistics, and Finance/Administration.These information flows are standard for PH EPRIs. Each informationflow is supported by an information structure that consists ofhierarchical categories. For example, the Operations information flowincludes Task Tracking, Event Investigation, and Controlling. As ofAugust, 2016, CDC's EOC defined 41 hierarchical categories for PHEPRI data flows.CDC's EOC harmonized different information flows by using aconsistent vocabulary to describe the hierarchical components ofeach information flow. Two hundred thirty six data elements of thisvocabulary were harmonized as of August 2016 to standardize itsEPRI systems. The hierarchy of PH EOC data flows and harmonizeddata elements were published in the CDC Vocabulary and AccessDistribution System, VADS4.Some information flows were unique to PH EPRI, and were notcovered by other emerging disciplines. Examples of these uniqueinformation flows include some incident management data, logisticsfor deployment of PH personnel and resources, and some eventmitigation data.ConclusionsCDC's EOC has several harmonized information flows that benefitusers and CDC emergency activations. Understanding these uniquePH EPRI data flows helps improve preparedness of staff for workingwith information flows during emergency activations. Advancesin harmonization and standardization helped improve PH EPRI,optimize staff training.

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

Abstract

ObjectiveTo develop agent-based model of sexually transmitted infectionsspreading by example of Syphilis and its analysis.IntroductionEvery year nearly 12 million new cases of syphilis in the world areregistered. Currently, in many countries of the world the stabilizationor even reduction of the incidence of syphilis is marked, but this doesnot apply to Ukraine. The current stage of development of the syphilisproblem in Ukraine is characterized by not only high morbidity, butalso the fact that in the overwhelming number of cases, we are talkingabout the latent forms and atypical manifestations of the disease andresistance to therapy [1].Preventive and prophylactic measures are important in maintainingthe public health. Predicting the dynamics of disease spreading allowsdeveloping appropriate countermeasures and ensuring rational useof human and material resources. Qualitative forecast of syphilisspreading is possible to implement by means of mathematicalmodeling.MethodsDeterministic analytical models that are most common inepidemiological studies do not take into account the dynamic andstochastic nature of epidemics. Agent-based simulation approachto modeling allows fixing these shortcomings. It allows conveyingthe social structure of simulated system by the most natural and easyway. Each agent has individual state variables and rules of behaviorthat allows detailing the model very deeply. Therefore there is noneed to describe the complex system of mathematical formulasand probability of the dynamics of the epidemic process is definedparametrically. The NetLogo software has been used for the programrealization of the developed model.ResultsThe model of morbidity by syphilis spreading has been developedby the tradition SIR model expansion. Thus, agents can be in followingstates: S (Susceptible) for health people, IP(Infected Primary) forinfected people who stay in primary stage and can transmit theinfection by direct sexual contact with susceptible person, IS(InfectedSecondary) for infected people who stay in secondary stage and havealso infectious skin lesions, IL(Infected Latent) for infected peoplewho stay in latent stage and change its contagious rate from earlylatent syphilis to late latent syphilis, IT(Infected Tertiary) for infectedpeople who stay in tertiary stage and transmit the infection partially,and R (Recovered) for people who are recovered from the infection.Infecting of agents in the model depends on the number and stateof agents and the stage of infected agent’s disease. Also, in orderto correctly determine the intensity of contacts with other agentsdifferent age groups of agents have been highlighted in the model.Screen form of developed agent-based model of syphilis spreadingis shown in Figure.The transmission between agent’s states are defined by probabilisticway and depends on features of particular states as well as differentfactors, such as coupling tendency, condom use, commitment, testfrequency etc.The analysis of experiments under developed model has shownthat the most influencing factor in the reduction in the percentage ofpatients is frequency of checks on the disease and isolation of patients,the second most important factor is constancy of sexual partners, thethird is the use of condoms, and finally, the fourth is the number ofexchangeable partners.ConclusionsThe agent-based model of syphilis spreading has been developed.The model allows forecasting the morbidity by infection andanalyzing the disease by changing the initial data. All data has beenchecked by the factual statistics on the syphilis incidence in Kharkivregion (Ukraine) from 1975 to 2015 years. The simulation resultsallow us determining the direction of prevention of syphilis treatmentand the main factors in reducing morbidity. As is evident from thesimulation results, social factors take precedence over the healthcare that gives grounds for advocacy in health policy among thepopulation, especially the youth. Developed model can be configuredfor other sexually transmitted infections by changing the diseasetransition rules.Figure. The main panel of simulation management and graphic visualization.

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Abstract

ObjectiveImplement a mobile technology platform to capture and transmitsyndromic cattle data collected at Texas market sales.IntroductionAn active syndromic surveillance system was designed to collectcattle health information from a sample of Texas cattle market sales.Texas Animal Health Commission livestock inspectors record the totalnumber of animals observed along with the total number displayingclinical signs of interest grouped into body system categories(e.g. respiratory, neurologic, etc.). Inspection reports are submitted tothe United States Department of Agriculture Veterinary Services (VS)Risk Identification Team for monitoring.MethodsThe pilot project started in 2012 with paper-based data collectionforms to both 1) gain trust from the inspector supervisors and 2)evaluate the value of the system with minimal early investment.The data collected at each sale on paper-based forms were later enteredinto spreadsheets at the office. These sale inspection reports were thensubmitted to the inspector's supervisor for review prior to forwardingby email to VS. VS staff aggregated data from each spreadsheet in toa centralized database and conducted weekly monitoring.Recently, a new reporting system was developed at VS to enablecollection and transmission of the data on mobile devices runningan Android operating system capable of transmitting data to VS viaa Wi-Fi connection. The new system was deployed March 2016following in-person training, release of a user guide document, and amonth of user testing.ResultsBetween March 2014 and June 2016 a total of 1,330 sale inspectionreports from 16 markets were submitted by spreadsheet an average11 days following the sale (range: 1 day through 141 days followingthe sale). These reports were tracked for data quality issues thatrequired manual intervention. It was discovered that 64 (4.8%) ofthe reports required correction. The most common types of dataquality issues were market sale date not provided, market alias ID notprovided, report submitted more than once, and report not submittedas an Excel file but as an image, such as a pdf file.Between March and June 2016 a total of 160 sale inspection reportsfrom 16 markets were submitted using mobile devices an average7 days following the sale (range: same day through 47 days followingthe sale). All data submitted could be directly imported into thecentralized database and processed as needed for monitoring withoutany data correction required.Some challenges encountered with deploying the mobile technologysystem included addressing the VS Information Technology securityrequirements for establishing user accounts and implementing directdata upload into VS systems. Additionally, Wi-Fi connectivity can bedifficult in some remote areas.Some advantages to using the mobile technology included havingthe option to download and run the application on most mobile devicesrunning the Android operating system. There was an improvementin data reporting timeliness of 4 days on average, and the rangesubstantially narrowed. There was also time savings for inspectorswho no longer needed to transfer hard copy data to a spreadsheet,and for VS personnel who no longer needed to aggregate data fromindividual spreadsheets. Improvements in data quality included theability to directly report that sales were canceled or not attended;the ability to provide comments at various levels of detail related to thesale, the pen of animals observed, or specific signs observed; and therequirement to supply essential data elements such as sale dateandmarket ID.ConclusionsThe conversion from a paper and spreadsheet-based sale inspectionreport to a mobile technology platform resulted in significant timesavings and data quality improvements that appeared to justify thesystem development and deployment costs and challenges. Thesebenefits support potential expansion of the system.

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

Abstract

ObjectiveTo build an open source spatiotemporal system that integratesanalysis and visualization for disease surveillanceIntroductionMost surveillance methods in the literature focus on temporalaberration detections with data aggregated to certain geographicalboundaries. SaTScan has been widely used for spatiotemporalaberration detection due to its user friendly software interface.However, the software is limited to spatial scan statistics and suffersfrom location imprecision and heterogeneity of population. RSurveillance has a collection of spatiotemporal methods that focusmore on research instead of surveillanceMethodsBased in Ontario, Canada, we used postal codes for determiningthe location of cases of reportable infectious diseases. The variationin geographic sizes and shapes of the case and census geographiescreated challenges for developing a uniform temporal spatialsurveillance system, including:Linking case and population data due to misclassification errors,Distance based correlations due to irregularly shaped areas(e.g. FSA’s), andVisualization bias due to variation in population density, e.g. largearea with little population.To overcome these challenges, we developed the Ontario HybridInformation Map (OHIM) boundary, which is a combination ofPublic Health Unit boundaries (rural areas), census subdivisions(rural urban mixed) and regular grid cells (urban). The goal is tocapture population details in urban areas without losing informationin rural areas. OHIM has around 4600 geographies with more thanhalf located in urban centers. Population distribution by gender andage group was calculated for each OHIM geography. A lookup filewas also created to link all Ontario postal codes to OHIM geography.To create baselines, historical data for influenza A were used tomodel the seasonality and calculate expected case count for eachOHIM geography for each week. Standardized incident ratios (SIR)were calculated as exploratory statistics, and a spatiotemporal Besag-York-Mollie (BYM) model was used to calculate the probability thatthe risk is higher than a pre-specified threshold. Integrated NestedLaplace Approximation (R-INLA) was used in R to explore differenttypes of spatiotemporal interactions and for fast Bayesian inference.The ability to apply the models was verified by examining previousoutbreaks and seeking the opinion of staff that routinely performsurveillance on influenza.To ensure the visualization integrates with the analysis, R packageShiny was used to build an interactive spatiotemporal visualizationon OHIM boundary utilizing Open Street Map and html5. Theapplication not only allows users to pan and zoom in space and timeto explore the results and locate high risk areas, it also gives users theflexibility to change algorithm parameters for instant feedback. Figure1 demonstrates a zoomed-in OHIM boundary with pointers signalfor “high risk” area at user specified statistics exceeds a threshold(e.g., SIR > 2). Using the algorithms and visualization tools,surveillance experts pick the optimal time and place to be notifiedbased on historical data and therefore the optimal threshold, whichwill be verified by prospectively running the algorithms.ResultsThe OHIM boundaries build the foundation for efficient spatialmodelling and visualization for public health surveillance in Ontario.Together with the integrated modelling and visualization system,staff are able to interactively optimize the aberration thresholds andidentify potential outbreaks in real time. Staff reported preference ofSIR due to its faster computations and easier interpretation.One major challenge was scalability: the ability to handle highresolutions of spatiotemporal data. When the system was applied on4600 polygons by 200 weeks, significant delays were encountered inboth analysis and visualization. Difficulties in computational time,memory requirement and visualization interactivity created delaysand freezing, thereby limited user experience. This problem waspartially addressed by optimizing parameters for fast computationsConclusionsThis work shows the “proof of concept” for an open source,customizable spatiotemporal surveillance system that overcomesexisting data challenges in Ontario. However, more work is requiredto make this fully operational and efficient in production.

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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 National Biosurveillance Integration Center (NBIC) is developing a scalable, flexible open source data collection, analysis, and dissemination tool to support biosurveillance operations by the U.S. Department of Homeland Security (DHS) and its federal interagency partners. Introduction The NBIC integrates, analyzes, and distributes key information about health and disease events to help ensure the nation's responses are well-informed, save lives, and minimize economic impact. NBIC serves as a bridge between Federal, State, Local, Territorial, and Tribal entities to conduct biosurveillance across human, animal, plant, and environmental domains. The integration of information enables early warning and shared situational awareness of biological events to inform critical decisions directing response and recovery efforts. To meet its mission objectives, NBIC utilizes a variety of data sets, including open source information, to provide comprehensive coverage of biological events occurring across the globe. NBIC Biofeeds is a digital tool designed to improve the efficiency of reviewing and analyzing large volumes of open source reporting by biosurveillance analysts on a daily basis; moreover, the system provides a mechanism to disseminate tailored feeds allowing NBIC to better meet the specific information needs of individual, interagency partners. The tool is currently under development by the Department of Energy (DOE), Pacific Northwest National Laboratory (PNNL) and it is in a testing and evaluation phase supported by NBIC biosurveillance subject matter experts. Integration with the Defense Threat Reduction Agency (DTRA), Biosurveillance Ecosystem (BSVE) is also underway. NBIC Biofeeds Version 1 is expected to be fully operational in Fiscal Year 2017. Methods The PNNL is applying agile methodology to streamline the build of NBIC Biofeeds to specifications required for operational use by NBIC and its federal interagency partners. Biosurveillance, analytics, and system engineering subject matter experts provide guidance on the implementation of features in the tool to ensure functionality aligns with operational workflows and production support. PNNL is leveraging software from a previous government effort to repurpose the technology to meet NBIC needs. NBIC Biofeeds incorporates the open source, document-orientated MongoDB database to capture user- and system-generated metadata on hundreds of thousands of records, in part, to establish baselines to aid prospective and retrospective analysis on emerging biological events. NBIC Biofeeds integrates a biosurveillance taxonomy (uniquely developed by NBIC), which includes input from interagency partners to recognize critical characteristics of a biological event. In NBIC Biofeeds Version 1, metadata capture of reported events is done manually by NBIC analysts; however, moving forward in Version 2, the tool will be further automated to flag significant reporting on biological events with a human remaining in the loop to confirm the validity of the system-generated tags. Results To serve as a one-stop tool for open source biosurveillance, NBIC Biofeeds automatically harvests information from thousands of websites, utilizing third party aggregators, paid subscriptions to data feeds, and scraping of high priority sources. Users can develop desired queries for automatic updating, leverage a unique review and curation mechanism, and further analyze data from topical, geographic, and temporal visualization features in the tool. To meet NBIC's information sharing needs, the tool allows for design of tailored RSS feeds and electronic message-based delivery of analysis on biological events, intended for recipients in the government with unique missions around human, animal, plant, and environmental health. Conclusions Through current testing and evaluation – underway by biosurveillance subject matter experts – NBIC Biofeeds is demonstrating value in supporting open source biosurveillance by the Center for more rapid recognition and sharing of key event characteristics. Centralizing access and analysis of this dataset into a single system is increasing the efficiency of daily, global biosurveillance, while enhancing the value of information identified through use of the querying, curation, and production support features in the tool.

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

Abstract

ObjectiveThe NEDSS Base System (NBS) is designed and developed usinginput from CDC programs, public health standards organizations,as well as its expansive user community. This community-basedapproach to development of an integrated surveillance system isdescribed.IntroductionThe NEDSS Base System (NBS) is a web-based, standards-driven, integrated disease surveillance system launched in 2001 andis currently in use in twenty-two public health jurisdictions. Over thepast fifteen years, the NBS has grown into a highly functional, modernapplication that supports: case management, electronic data exchange,metadata-driven data collection, workflow decision support, and ahost of other functionalities, all of which are defined and designedthrough a community-based approach.MethodsIn order to encourage open communication and collaborationacross and among the community, there is a well-publicized, long-standing communication plan in place. Further, tools such as an onlinecollaboration and support forum, NBSCentral, are made availableto any person who requests access. Also, the NBS source code isprovided in an open source package to anyone interested, alongwith each release, and a demonstration version of the applicationcan be accessed online by anyone to review the latest release of theapplication. All of these channels are in place to ensure there are waysfor all who have in interest in collaborating to easily participate.The NBS community regularly meets to provide input into furtherdevelopment of the system, as well as discuss topics affecting publichealth. As a community, members:■ Share best practices, tools, and lessons learned across jurisdictions■ Share innovative local approaches to disease surveillance andreporting■ Access NBSCentral for support and collaboration■ Participate in the change control and planning process for eachNBS release■ Work collaboratively with CDC to define high-level vision andpriorities■ Provide input to create community-defined requirements forsystem development■ Participate in weekly subject matter expert (SME) calls to discussdevelopment and best practices■ Have the opportunity to participate in beta testing for releases■ Attend a bi-weekly NBS User Group (NUG) call to discussthe system as well as reach out to colleagues to brainstorm creativesolutions to common problems in public health surveillanceAll meetings with stakeholders are recorded and shared withthe larger community to ensure full transparency and for historicalreference.ResultsThrough this inclusive development approach, the NBS hasevolved into a highly extensible, configurable system that can meetthat needs of twenty-two very different public health jurisdictions; thesystem can be implemented without the need for custom developmentin a relatively short timeframe due to the fact that it was designed tomeet the needs of many. Further, it has encouraged interoperabilityprojects, such as: piloting electronic case reporting use cases betweenNBS implementation sites and building and sharing electronic caseinvestigation forms for data collection using the NBS Page Buildermodule. All NBS sites use the same translation routes for electroniclab report, case report, and Nationally Notifiable Disease messageprocessing – embracing the build once, use many concept. Mostrecently, having this collaboration network in place made it very easyfor the NBS community to quickly adapt to the changing needs ofZika virus surveillance.ConclusionsIt does require clear definition of processes and communicationchannels, as well as regular update and transparency into the processfor community-based development to work. However, when theproper tools and processes are in place, the benefits of collaborationwith all key stakeholders are exponential when realized. Developingan application in this way has provided NBS users not only with amuch better, integrated surveillance system, but also a forum forunderstanding how other jurisdictions have solved similar issues; itprovides a springboard for sharing and building upon novel ideas andnew approaches in public health 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

ObjectivePacific Northwest National Laboratory hosted an intern-basedweb application development contest in the summer of 2016 centeredaround developing novel chemical surveillance applications to aid inhealth situational awareness. Making up the three teams were threegraduate students (n=9) from various US schools majoring in non-public health domains, such as computer sicence and user design. Theinterns suc- cessfully developed three applications that demonstrateda value-add to chemical surveillance—ChemAnalyzer (textanalytics), RetroSpect (retrospective analysis of chemical events),and ToxicBusters (geo-based trend analytics). These applicationswill be the basis for the first chemical surveillance application to beincorporated into the DTRA Biosurveillance Ecosystem (BSVE).IntroductionPacific Northwest National Laboratory (PNNL), on behalf theDefense Threat Reduction Agency (DTRA; project number CB10190),hosts an annual intern- based web app development contest. Previouscompetitions have focused on mobile biosurveillance applications.The 2016 competition pivoted away from biosurveillance to focus onaddressing challenges within the field of chemical surveillance andincreasing public health chemical situational awareness. The result ofthe app will be integrated within the DTRA BSVE.MethodsPNNL hosted nine graduate interns for a 10-week period inthe summer of 2016 as participants in a summer web applicationdevelopment contest. Students were drawn from such fields assoftware engineering and user experience and design and placedinto three teams of three students. The challenge presented to theinterns was to design and develop a fully-functional web applicationthat would address a critical need within the chemical surveillancecommunity. The interns developed their own ideas (vetted by PNNLand DTRA), discovered and inte- grated their own data sources,and produced their own visualizations and an- alytics, independentof any assistence outside of that provided in an advisory capacity.The competition end with a judging event with a panel of subjectmatter experts and cash awards were distributed to the teams.ResultsEach team produced a unique application. Although there wasmild overlap between some of the ideas, the applications weredeveloped independently and each reflected the unique contributionsof the teams. ChemAnalyzer is a text-analytics platform designedto facilitate more data- driven decision, given a corpus of text dataabout a chemical event. Their plat- form provided the ability toautomatically identify and highlight key words in documents relatedto chemical events. The keywords are drawn from an on- tologyinstalled with the system, as well as any user-identified keywords.The ChemAnalyzer team finished in third place. The RetroSpect teamdeveloped a visual analytic tool for performing retrospec- tive analysisand monitoring of chemical events. Their app provided the ability tosearch and analyze past events, as well as visualization of state andcounty information for the recorded chemical events. The RetroSpectteam finished in second place. The Toxicbusters team—the winnersof the competition—created a geo-based situational awareness toolfor tracking chemical events. Their app featured an updateable mapoverlay, search functionality for finding specific or related events,incident and city/state/national-level statistics and trends, as wellas news and social media integration based on keywords related tochemical surveillance.ConclusionsEach of the apps developed by the teams provides value to ananalyst tasked with monitoring chemical events. The apps integratedunique data sources to provides a full picture of a chemical event, andits effects upon the surrounding population. This integrated analyticsprovides a valuable benefit over existing workflows, where analystsmust monitor news, social, and other information sources manuallyfor real-time information. The apps developed by these interns aredesigned to enable identification and analysis of the incident asquickly as possible, allowing for more timely assessments of theincident and its impacts. The web app development contest provideda unique opportunity for students to learn about the emergingneeds in chemical surveillance as it relates to health sit- uationalawareness. Students were drawn from a variety of fields and weretasked with developing novel web apps addressing some of the mostpressing challenges in the field of chemical surveillance. The ideasgenerated by the students will help form the basis for future chemicalsurveillance application development to be integrated with the DTRABSVE.

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

Abstract

ObjectiveTo assess the feasibility of tracking the prevalence of chronicconditions at the state and community level over time using MDPHnet,a distributed network for querying electronic health record systemsIntroductionPublic health agencies and researchers have traditionally reliedon the Behavioral Risk Factor Surveillance System (BRFSS) andsimilar tools for surveillance of non-reportable conditions. Thesetools are valuable but the data are delayed by more than a year,limited in scope, and based only on participant self-report. Thesecharacteristics limit the utility of traditional surveillance systems forprogram monitoring and impact assessments. Automated surveillanceusing electronic health record (EHR) data has the potential to increasethe efficiency, breadth, accuracy, and timeliness of surveillance. Wesought to assess the feasibility and utility of public health surveillancefor chronic diseases using EHR data using MDPHnet. MDPHnet isa distributed data network that allows the Massachusetts Departmentof Public Health to query participating practices' EHR data for thepurposes of public health surveillance (www.esphealth.org). Practicesretain the ability to approve queries on a case-by-case basis and thenetwork is updated daily.MethodsWe queried the quarterly prevalence of pediatric asthma, smoking,type 2 diabetes, obesity, overweight, and hypertension statewideand in 9 Massachusetts communities between January 1, 2012 andJuly 1, 2016. We selected these 9 communities because they wereparticipating in a state-funded initiative to decrease the prevalenceof one or more of these conditions. Conditions were defined usingalgorithms based upon vital signs, diagnosis codes, laboratorymeasures, prescriptions, and self-reported smoking status. Eligiblepatients were those with at least 1 encounter of any kind within the2 years preceding the start of each quarter. Results were adjusted forage, sex, and race / ethnicity using the 2010 Massachusetts censusdata.ResultsSurveillance data were available for 1.2 million people overall,approximately 20% of the state population. Coverage varied bycommunity with >28% coverage for 7 of the communities and11% coverage in the eighth. The ninth community had only 2%coverage and was dropped from further analyses. The race / ethnicitydistribution in MDPHnet data was comparable to census datastatewide and in most communities. Queries for all six conditionssuccessfully executed across the network for all time periods ofinterest. The prevalence of asthma among children under 10 yrs rosefrom 12% in January 2012 to 13% in July 2016. Current smoking inadults age≥20 rose from 14% in 2013 to 16% in 2016 (we excludedresults from 2012 due to changes in documentation propelled by theintroduction of meaningful use criteria). This is comparable to the15% rate of smoking per BRFSS in 20141. Obesity among adultsincreased slightly from 22% to 24% during the study period, resultsnearly identical to the most recent BRFSS results for Massachusetts(23% in 2014 and 24% in 2015)2. The prevalence of each conditionvaried widely across the communities under study. For example, forthe third quarter of 2016, the prevalence of asthma among childrenunder 10 ranged from 5% to 23% depending on the community,the prevalence of smoking among adults ranged from 11% to 35%,and the prevalence of type 2 diabetes among adults ranged from7% to 14%. We also examined differences in disease estimates byrace / ethnicity. Substantial racial / ethnic differences were evidentfor type 2 diabetes among adults, with whites having the lowestprevalence at 7% and blacks having the highest at 12% in the thirdquarter of 2016; this trend was consistent over the study period.ConclusionsOur study demonstrates that MDPHnet can provide theMassachusetts Department of Public Health with timely population-level estimates of chronic diseases for numerous conditions at boththe state and community level. MDPHnet surveillance providesprevalence estimates that align well with BRFSS and other traditionalsurveillance sources but is able to make surveillance more timelyand more efficient with more geographical specificity compared totraditional surveillance systems. Our ability to generate real-timetime-series data supports the use of MDPHnet as a source for project/program evaluation.

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Abstract

ObjectiveTo design a low budget process to enroll, track and approvesyndromic submitters for ongoing submission of data to the OregonPublic Health DivisionIntroductionIn 2012, the Oregon Public Health Division (OPHD) tookadvantage of the opportunity created by Meaningful Use, a Centersfor Medicare & Medicaid Services (CMS) Incentive Program, toimplement statewide syndromic surveillance. The Oregon syndromicsurveillance project, or Oregon ESSENCE, began accepting MU-compliant HL7 2.5.1 data in late 2013. Early onboarding effortswere labor-intensive and led to the creation of a testing queue. Asinterest in submitting syndromic data increased, Oregon ESSENCEstreamlined the onboarding process by creating guidance for HL7message construction, message testing and submitter business processdetails (collectively referred to as “onboarding documents”). OregonESSENCE also built a project management database to track MUtesting statuses and data quality variations. With this system, OregonESSENCE collected, tested and approved all 32 eligible healthsystems (56 hospitals) for production-level submission by mid-2015.One health system (with four hospitals) continued to send non-MUcompliant syndromic data for the duration of the project period.MethodsInitially, Oregon ESSENCE began onboarding syndromicsubmitters on a first-come-first-served basis. The lack of a clearprocess for onboarding, a single FTE devoted the endeavor andsubstantial interest in submitting, led to a testing queue. To streamlinethe onboarding process and accommodate the testing timelines of allsubmitters, Oregon ESSENCE created tools to allow for self-pacedtesting followed by short duration, intensive testing with the project.Oregon ESSENCE-branded onboarding documents incorporatedavailable resources such as the CDC’s Public Health InformationNetwork Messaging Guide for Syndromic Surveillance: EmergencyDepartment and Urgent Care Data, Release 1.1 (August 2012) and theNIST 2014 Edition ONC Health IT Certification HL7v2 SyndromicSurveillance Reporting Validation Tool. Submitters began self-pacedtesting by testing their own messages using the NIST tool and sendingsuccessful reports back to Oregon ESSENCE. They then filled outan Oregon ESSENCE Business Process Survey which asked formeta-data and project contact information. Oregon ESSENCE built aproject managment database in FileMaker v14 (FileMaker Inc., SantaClara, CA USA), used to support the statewide communicable diseasedatabase, to store information from the Business Process Survey.After completing self-paced testing, submitters selected a singleweek for intensive testing with Oregon ESSENCE. Each healthsystem’s project staff (registration staff, technical project lead, HL7translator and data exchange lead) met daily with Oregon ESSENCEto test messages. Oregon ESSENCE used Rhapsody IntegrationEngine v6.2.1 (Orion Health, Auckland, NZ), already in use at OPHDfor electronic lab reporting, to parse test data into a test database andthen generated a report for each testing session using SAS v9.4 (SASInstitute Inc., Cary, NC, USA). The report indicated whether or notthe submitter had achieved production-level syndromic messaging bythe end of this week of intensive testing. The project managementdatabase stored notes from each testing session along with MU testingdates.ResultsOregon ESSENCE developed their onboarding documentsbetween November, 2012 and March, 2013 and achieved 100%syndromic submission from eligible health systems in June, 2015.The average duration of onboarding (from initiation of the testingprocess to achieving production submission) of a single healthsystem decreased from 23 months in 2012 to 4 months in 2014 (seeDuration of Onboarding Syndromic Submitters: Oregon 2012-2015).As interest in the project grew (number of submitters contactingOPHD), the amount of time spent onboarding decreased.Oregon ESSENCE uses their project management database forongoing syndromic data quality improvement and to communicateMU dates to submitters (by generating health system-specific emailsdirectly from the database). FileMaker, Rhapsody and SAS are allcurrently used by OPHD and did not require any additional expensefor their use in this testing process. Oregon ESSENCE plans to usethis onboarding process to collect urgent care data for Stage 3 MU.ConclusionsThe onboarding process created by Oregon ESSENCE streamlinedsyndromic data submission without the purchase of additionalprograms or the hiring of additional project staff. Submitting facilitiesbenefited from this process by testing syndromic messages withoutwaiting in a testing queue. The project management database createdfor the testing process will continue to benefit submitters by storingMU testing dates and information for ongoing quality assuranceevaluations. The success of this project took advantage of existinginformatics capabilities at OPHD and speaks to the importance ofthose skills in public health practice. Oregon ESSENCE will usethese methods again in 2017 to collect urgent care data for syndromicsurveillance.Duration of Onboarding Syndromic Submitters: Oregon 2012-2015

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Abstract

ObjectiveThis presentation will share findings from more than three years ofusing mobile technology for reactive case detection (RACD) to helpeliminate malaria in a well-defined geographic area. It will reviewthe concepts of RACD, the application of mobile technology, lessonslearned from more than three years of application, and considerationsin applying this technology in other malaria elimination contexts.IntroductionZanzibar is comprised primarily of two large islands with apopulation of 1.3 million. Indoor Residual Spraying (IRS) campaigns,distribution of long-lasting insecticide treated bed nets (LLINs),and use of Rapid Diagnostic Tests (RDTs) have reduced Malariaprevalence from 39% in 2005 to less than 1% in 2011-2012. Asmalaria burden decreases, there is an increasing need to track andfollow up individual cases to contain transmission that could lead toresurgence. One method being used to achieve these aims is reactivecase detection (RACD).RACD is generally understood to be triggered whenever a case isidentified by passive case detection. The response involves visiting thehousehold of the newly reported case and screening family members.Depending on program protocol, it may also involve screeningneighbors within a defined radius. RACD has been used or testedin Cambodia, China, India, Peru, Senegal, Swaziland, Tanzania,and Zambia. RACD can be resource intensive. Several studies raisequestions concerning whether and how RACD can be prioritized andtargeted effectively as case numbers continue to decline.MethodsSince September 2012 Zanzibar Malaria Elimination Programme(ZAMEP) has used RACD to limit onward transmission, reduce thelocal parasite reservoir, and gather data needed improve programeffectiveness. Zanzibar is one of very few malaria eliminationcontexts using a mobile technology system to support RACD.1Thissystem, called the Malaria Case Notification system (MCN) usesmobile software called Coconut Surveillance.Coconut Surveillance is free and open source software designed formalaria elimination. It includes an interactive SMS system for casenotification, a mobile software application designed to guide mobilecase workers through RACD, and an analytics software applicationdesigned for surveillance and response program managers.Data were collected in the Coconut Surveillance database formore than three years, beginning in September 2012. Reports weremonitored in real time and periodically to assess RACD responsetimes against protocol targets, case trends, case locations, and otherdata. Geographical Information System (GIS) software was usedto produce detailed maps of case households. Three independentassessments were conducted of various aspects of the malariasurveillance system.ResultsFrom September 2012 to December 2015, Coconut Surveillancehas helped malaria surveillance officers in Zanzibar respond tomore than 8,617 (84%) reported cases of malaria, complete nearly10,245 household visits, test more than 36,185 household members,and identify and treat 2,032 previously unknown cases. The averagenumber of RACD activities occurring within 48 hours increased from72% in 2013 to 89% in 2015. The number of household membersscreened during RACD also increased from 7,589 in 2013 to 14,987in 2015. Challenges included incomplete registers at health carefacilities, lack of transport, inadequate training for clinicians andsurveillance officers, and insufficient communication to the affectedcommunities.ConclusionsIn Zanzibar twenty malaria surveillance officers equipped withinexpensive Android tablets and motorbikes are keeping malariaprevalence at less than 1%. The effectiveness of the system mightbe enhanced by improving training for clinicians and surveillanceofficers, ensuring the availability of transportation for surveillanceofficers, and improving communications to the affected communities.These results suggest key considerations for applying this and similarsystems in other malaria elimination contexts.

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Abstract

ObjectiveTo describe the development of an evaluation framework thatallows quantification of surveillance functions and subsequentaggregation towards an overall score for biosurveillance systemperformance.IntroductionEvaluation and strengthening of biosurveillance systems is acomplex process that involves sequential decision steps, numerousstakeholders, and requires accommodating multiple and conflictingobjectives. Biosurveillance evaluation, the initiating step towardsbiosurveillance strengthening, is a multi-dimensional decisionproblem that can be properly addressed via multi-criteria-decisionmodels.Existing evaluation frameworks tend to focus on “hard” technicalattributes (e.g. sensitivity) while ignoring other “soft” criteria(e.g. transparency) of difficult measurement and aggregation. Asa result, biosurveillance value, a multi-dimensional entity, is notproperly defined or assessed. Not addressing the entire range of criterialeads to partial evaluations that may fail to convene sufficient supportacross the stakeholders’ base for biosurveillance improvements.We seek to develop a generic and flexible evaluation frameworkcapable of integrating the multiple and conflicting criteria and valuesof different stakeholders, and which is sufficiently tractable to allowquantification of the value of specific biosurveillance projects towardsthe overall performance of biosurveillance systems.MethodsWe chose a Multi Attribute Value Theory model (MAVT) tosupport the development of the evaluation framework. Developmentof the model was done through online decision conferencing sessionswith expert judgement, an indispensable part of MAVT modelling,provided by surveillance experts recruited from the member pool ofthe International Society for Disease Surveillance.The surveillance functions or quality criteria that were consideredfor the framework were initially gathered from a review of theliterature with specific attention to a subset of public health qualitycriteria (1). Group discussions with the experts led to a final list offunctions, finally reviewed to comply with the properties for goodcriteria in decision models. The eleven functions were: sensitivity;timeliness; positive predictive value (PPV); transparency; versatility;multiple utility; representativeness; sustainability; advancing thefield and innovation; risk reduction; and actionable information.In addition, 24 different scenarios were developed for sensitivity,PPV, and timeliness since their values may differ with the level ofinfectiousness of the condition/event of interest, its severity andthe availability of treatment and/or prevention measures. Four orfive levels of performance were also developed for each criterion.Macbeth (Measuring Attractiveness by a Category-Based EvaluationTechnique) tables were used to elicit values of different levels ofperformance from the experts using qualitative pairwise comparisonsand then convert them into numerical values.ResultsTo date, two criteria, sensitivity and transparency, have beenassessed by more than one expert working on the same scenario.Value functions were generated for each criterion and scenario bycalculating the median of the different values produced by the experts.For both sensitivity and transparency, value functions were mostlylinear, indicating similar preferences between levels of performance.However, for some scenarios, experts allocated greater value toincreases at the higher end of the performance level distribution.ConclusionsAt the time of writing new elicitation sessions are planned toconclude the model. Next, we will apply swing weights to supportthe trade-offs between the different criteria. We will present thebaseline model elicitated from the experts and demonstrate howto apply portfolio decision analysis to assess overall performanceof biosurveillance systems according to the specific needs ofstakeholders and in conjunction with macro-epidemiological 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

ObjectiveFacing challenges to establish a new national syndromicsurveillance system in the Netherlands for infectious diseases amongasylum seekers.IntroductionMost European countries are facing a continuous increased influxof asylum seekers [1]. Poor living conditions in crowded shelters andrefugee camps increase the risk for - outbreaks of - infectious diseasesin this vulnerable population. In line with ECDC recommendations[2], we aim to improve information on infectious diseases amongasylum seekers by establishing a new syndromic surveillance systemin the Netherlands. This system will complement the notifiabledisease system for infectious diseases.The aim of the syndromic surveillance system is to improve thedetecting of outbreaks of infectious diseases in asylum seekers'centres in an early stage of development to be able to take adequateand timely measures to prevent further spread, and to collectinformation on the burden of infection within this population.MethodsPrimary health care for asylum seekers in the Netherlands isorganized nationally by the Asylum Seekers Health Centre, withgeneral practitioners providing care in each reception centre. Generalpractitioners (GPs) act as gatekeepers for specialized, secondaryhealth care and the GP is the first professional to consult for healthproblems. Therefore, electronic health records (EHR) kept by GPsprovide a complete picture of this population. These EHRs containdata on diagnoses/symptoms and treatment of asylum seekers, usingthe International Classification of Primary Care (ICPC). This data isrecorded routinely, as part of the health care process. During summer2016, about 30,000 asylum seekers were housed in about 60 receptioncentres across the Netherlands.ResultsThe governance structure was layed down in a collaborationagreement between the Asylum Seekers Health Centre, the nationalinstitute of public health RIVM and NIVEL. To ensure privacy ofthe asylum seekers, a privacy protocol has been drawn, taking intoaccount strict privacy regulations in the Netherlands. The informationsystem provider of the health care centre developed an extraction toolthat automatically generates weekly data extracts from the electronichealth records system to a Trusted Third Party (TTP). Beforetransferring the data to NIVEL, the TTP removes directly identifyingpatient information, indirectly identifying information like date ofbirth is replaced by quarter and year, and the personal identificationnumber is replaced by a pseudonym. At NIVEL, all data is storedin a relational database, from which weekly research extracts aregenerated for infectious disease surveillance at RIVM after applyinga second pseudonymisation step (two-way pseudonimisation) [3].First data extracts are being expected mid-October 2016, after whichdata quality will be evaluated. Weekly, or daily, consultations rateswill be calculated based on the number of cases meeting predefineddefinitions, stratified by immigration centre, age group, sex andnationality. Numerators will be based on the number of populationhoused in the immigration centres.ConclusionsWith the cooperation of a national health care centre, providingprimary care to asylum seekers housed at several locations, and theinformation system provider of the health care centre, EHRs can beused for syndromic surveillance, taking into account strict privacyregulations. The new surveillance system will be evaluated after oneyear, focusing on data quality, usefulness, and the added value aboveto the notification of diseases.

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

Abstract

ObjectiveA mixed methods study is being conducted on the statewide EarlyNotification of Community Based Epidemics (ESSENCE) systemin Missouri to identify factors that can improve the timeliness andidentification of outbreaks. This research will provide stakeholderswith guidance on how best to implement and improve ESSENCEusage statewide, and by sharing this research input can be solicitedon the utility of the applied framework as well as future implicationsfrom this body of work.IntroductionIn spite of the noted benefits of syndromic surveillance, andmore than a decade after it started gaining support, the primary usefor syndromic surveillance appears to be largely for seasonal andjurisdictional disease monitoring, event response and situationalawareness as opposed to its intended purpose of early event detection.(1-4) Research assessing the user characteristics and standards appliedat local public health agencies (LPHA's) for syndromic surveillanceare scarce, and in national surveys epidemiologists frequently tendto utilize their own syndromic surveillance systems as opposed toa national system such as Biosense. While the National SyndromicSurveillance Program (NSSP) has addressed many operationalconcerns from stakeholders, and is in the process of providing accessto the cloud based Biosense platform-along with ESSENCE as a keytool, there is still a paucity of research that exists as to what can bedone to improve the utilization of syndromic surveillance systems forits primary purpose of early event detection.MethodsThis research proposes to evaluate the use of ESSENCE withinMissouri and the surrounding areas, to comprehensively identifyits strengths and limitations, through an assessment of the userexperience. This research will evaluate three key areas: 1) thequality of the data received by the syndromic surveillance system,2) the characteristics of the individuals and organizations utilizingthe system (end-users), 3) the influence and extent of syndromicsurveillance data on public health actions. ESSENCE data will beevaluated directly with special attention to the top three data qualityattributes across the literature, completeness, accuracy and timeliness.(5) A survey will also be administered to ESSENCE system users andpublic health leadership at LPHA's, to gain insight into perspectives,perceptions and general practices, as well as how they interact withdata from ESSENCE.ResultsThe data for this research is primarily being collected throughoutthe fall of 2016, so the hope is to bring preliminary data to thisconference as a means to validate some of the findings, solicit inputon the proposed framework and share this research in a timely mannerfor the NSSP roll out of Biosense and ESSENCE.ConclusionsThrough a thorough evaluation, the application and utility ofESSENCE for early event detection will be better understood, alongwith the identification of factors that can be targeted in the future(and across syndromic surveillance platforms) for improvement in thetimely identification of outbreaks.

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

Abstract

ObjectiveTo use syndromic surveillance data to assess whether there hasbeen an increase in GP fever consultations since the inclusion of themeningococcal B (MenB) vaccine in the UK vaccination schedule.IntroductionFrom 1 September 2015, babies in the United Kingdom (UK)born on/after 1 July 2015 became eligible to receive the MenBvaccine, given at 2 and 4 months of age, with a booster at 12 months.1Early trials found a high prevalence of fever (over 38°C) in babiesgiven the vaccine with other routine vaccines at 2 and 4 months.We used syndromic surveillance2data to assess whether there hadbeen increased family doctor (general practitioner (GP)) consultationsfor fever in young infants following the introduction of the vaccine.MethodsGP consultations for fever in infants aged under 1 year wereextracted from The Phoenix Partnership (TPP) ResearchOne database(400 GP surgeries in England).3Data were stratified by week ofage over the period 1 September 2015 to 30 November 2015 and1 December 2015 to 29 February 2016. Fever consultation rates(per 100,000 registered practice population in the database) werecompared to the same 3 month periods of the previous 5 years(2010-14) using incident rate ratios (IRR). Pre- and post-vaccinationconsultation rates were applied to the England 0-26 week populationto estimate excess fever consultations.ResultsBetween 1 September and 30 November 2015 the average dailyfever consultation rate for infants aged 0-26 weeks was 4.72/100,000;the incident rate ratio was 1.46 (95% CI, 1.09-1.92). In the 7-10 weekage group the average daily fever consultation rate was 7.79/100,000.The incidence rate was 2.68 times higher than in previous years(95% CI, 1.42-4.94).Between 1 December 2015 and 29 February 2016 the averagedaily consultation rate for infants aged 0-26 weeks was 6.19/100,000.The incidence rate was 1.49 times higher than in the same 3 monthperiod of previous years (95% CI, 1.16-1.90). In infants aged7-10 weeks the average daily consultation rate was 8.44/100,000and the incidence rate was 1.83 times higher than previous years(95% CI 1.03-3.16).Between 1 September 2015 and 29 February 2016 there werean estimated additional 959 fever consultations for infants aged0-26 weeks to English family doctors.ConclusionsWe have demonstrated an innovative use of syndromic surveillanceto quickly and easily assess the impact on healthcare seekingbehaviour for infants with fever following the introduction of a newvaccination into the routine vaccination programme in England. Ourstudy provides reassurance that in infants aged 0-26 weeks therewas no marked increase in consultations following the introductionof the new MenB vaccination. However, in some age groups below0-26 weeks there was an increase in healthcare seeking behaviour forfever, in particular, the 7-10 week age group which includes infantsaged 8 weeks receiving their first vaccination. Other age groups alsodemonstrated increased fever consultations during these two periods,albeit at less significant levels. We will analyse data for the full yearfrom 1 September 2015 to further explore these findings, investigatepotential confounders and assess trends since vaccine introduction.

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

Abstract

ObjectiveTo provide surveillance tools to support policymakers andpractitioners to identify epidemiological situations and inform theprogressive implementation of rabies elimination programmes.IntroductionGlobal targets for elimination of human rabies mediated by dogshave been set for 2030. In the Americas countries are progressingtowards interruption of transmission and declaration of rabiesfreedom1. Guidance for managing elimination programmes toensure continued progress during the endgame is critical, yet oftenlimited and lacking in specific recommendations. Characteristicspatiotemporal incidence patterns are indicative of progress, andthrough their identification, tailored guidance can be provided.MethodsUsing SIRVERA, a surveillance database for rabies in theAmericas2, we developed a classification framework for identificationof epidemiological situations at subnational level. Each situationexhibits a characteristic pattern identified via a set of objective criteriaincluding trends in case detection, assessment of virus variants, caselocations and measures of incursion risk.We refined our framework through application to Mexico inconsultation with stakeholders. To understand factors predictingincursions we analysed state-level data on vaccination campaigns,populations and socioeconomic indicators employing multivariateregression models.ResultsWe were able to classify all states in Mexico and providecorrespondingly tailored guidance. Control efforts have resultedin progress towards elimination; however rabies still circulatesendemically in one state Chiapas, putting its neighbours at risk ofre-emergence.Epidemiological and socioeconomic factors associated withincursions were primarily geographic proximity to endemic and high-prevalence states, and inconsistent vaccination campaigns associatedwith a low human development index.ConclusionsOur management tool can support rabies programme managersat subnational levels to identify their epidemiological situation,develop tailored plans to meet targets, and sustainably maintainrabies freedom, as demonstrated for Mexico. Effective surveillanceis critical for disease elimination. Control options differ dependingon whether disease circulates intermittently through reintroductionsor persists focally, but with poor detection these situations mightbe indistinguishable. Our analysis enables identification of at-riskareas and methods to reduce risk. Investment in remaining endemicareas, through improved implementation and monitoring of mass dogvaccinations, is expected to provide the most cost-effective approachto elimination whilst preventing re-emergence elsewhere.Decision-tree framework.Rabies incursions in Mexico, 2005-2015. Blue circles indicate incursionlocations, and resulting outbreak sizes, with darker shading for more recentincursions. Red shading indicates the duration of endemic circulation over theten-year 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

ObjectiveTo describe the Caribbean Public Health Agency’s (CARPHA)Tourism and Health Information System (THiS), a web-basedsyndromic surveillance system to increase the capacity of Caribbeancountries to monitor the health of visitors and staff in hotels, anddetect potential infectious disease outbreaks for early and coordinatedpublic health response.IntroductionThe tourism industry is highly vulnerable to Health, Safety, andEnvironmental Sanitation (HSE) threats. The Caribbean is the mosttourism dependent region in the world, with over 54.2 million stay-over and cruise ship arrivals in 2015, generating revenues of $US29.6billion and contributing to 15% of the Gross Domestic Product (GDP)and 2,255,000 jobs [1]. Tourists and staff are at an increased risk ofacquiring infectious diseases, given the mass-gathering of individualswith varying levels of susceptibility and often times in close quartersin hotels and cruise ships. To prevent the spread of infectious diseasesin these settings, early warning and response to potential publichealth threats is essential. To increase the capacity of countries in theCaribbean monitor and protect the health of tourists and staff in theirhotel establishments, THiS was designed as an early warning systemfor infectious disease outbreaks.MethodsCARPHA launched the Regional Tourism Health Information,Monitoring and Response System in 2016 with donor fundingreceived from the Inter-American Development Bank (IDB). Theoverall objective of THMRS project from 2016-2018 is to improveparticipating country’s capacity to provide cost-effective and qualityhealth, food safety and environmental solutions to HSE threats.As part of the THMRS project, the development of a hotel-basedsyndromic surveillance system for early warning and response toinfectious diseases was developed.THiS was developed in collaboration with six participating IDBcountries: Barbados, Bahamas, Belize, Guyana, Jamaica, Trinidadand Tobago. The implementation plan (2016-2018) with each countryinvolved three stages:1) Project Operations, Coordination, Management (includingAdvocacy, and Endorsement)2) Development of the project outputs: gap analysis and bestpractices; development of surveillance guidelines and trainingmodules, HSE Standards3) Implementation in participating countries (i.e. technical visits,ongoing technical coordination): Preparation, Buy-in, Training andLaunchThe web-based design of THiS enables the collection of real-time data which will inform health service delivery decisions/policies, strengthen national and regional health monitoring efforts,and trigger a rapid coordinated response to outbreaks, and preventescalation of tourism HSE incidents. The system involves a web-based questionnaire with a series of 11 short questions that ask theuser for basic non-identifiable demographic information as well assymptoms. The reported symptoms are used by the system to generatesix syndromes: Gastroenteritis, Undifferentiated Fever, HemorrhagicFever, Fever with Neurologic symptoms. Fever with Respiratorysymptoms, Fever with Rash.Data entry persons include hotel staff, physicians, and the case.Access to anlaytic dashboards of the aggregated data is limited toregistered hotel staff (i.e. Managers), the Ministry of Health of thecountry where the hotel reporting is located, and CARPHA.The limited level of baseline data for syndromes in the Caribbeanregion means that statistical aberration detection mechanisms formost syndromes will not be available until THiS collects at least oneyear’s worth of data. However, for acute gastroenteritis, until a moreaccurate threshold can be generated, a cut-off of 3% ill (staff andguests) will be used for alerting potential outbreaks. This is scheduledto be live and functional beginning in hotel facilities in Trinidad andTobago at the beginning of October 2016.By the end of 2016, THiS will be operating in facilities in all sixparticipating countries, allowing for the collection of baseline data forsyndromes occurring among tourists and staff in hotel-settings, andproviding a mechanism to detect and response to emerging publichealth threats early and efficiently.ConclusionsEstablishing this system is critical to improving countries’capacities to support the overall health surveillance system of thetourism-dependent Caribbean economies, enabling countries tocollect real-time data which will inform health service deliverydecisions/policies, strengthen national and regional health monitoringefforts to trigger a rapid coordinated response to outbreaks and othercrises and thus prevent tourism HSE incidents.

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

Abstract

ObjectiveTo describe the results of the new organization of influenzasurveillance in France, based on a regional approach.IntroductionIn France, until winter 2014-2015, management and preventiveactions for the control of the flu epidemic were implemented whenthe national incidence of influenza-like illness (ILI) consultationsin general practice was over an epidemic threshold. The 2014-2015influenza epidemic had a major public health impact, particularly inthe elderly, and caused a severe overloading of the health care system,in particular emergency departments (ED) [1]. The epidemic alertemitted by the French National Public Health Agency at the nationallevel was too late for the hospitals to prepare themselves in manyregions.After a national feedback organized in April 2015 with allpartners involved in influenza surveillance and management, it wasrecommended to improve influenza surveillance in France following3 axes: 1) regionalize surveillance so that healthcare structures canadapt to the particular situation of their region; 2) use a pre-epidemicalert level for better anticipating the outbreak; 3) use multiple datasources and multiple outbreak detection methods to strengthen thedetermination of influenza alert level.MethodsA user-friendly web application was developed to provide commondata visualizations and statistical results of outbreak detectionmethods to all the epidemiologists involved in influenza surveillanceat the national level or in the 15 regional units of our agency [2].It relies on 3 data sources, aggregated on a weekly time step: 1) theproportion of ILI among all coded attendances in the ED participatingto the OSCOUR Network [3] ; 2) the proportion of ILI among allcoded visits made by emergency general practitioners (GPs) workingin the SOS Médecins associations [3]; 3) the incidence rate of ILIestimated from a sample of sentinel GPs [4].For each region each week, 3 statistical outbreak detection methodswere applied to the 3 data sources, generating 9 results that werecombined to obtain a weekly regional influenza alarm level. Basedon this alarm level and on other information (e.g.virological data),the epidemiologists then determined the epidemiological status ofeach region as either 1) epidemic-free, 2) in pre/post epidemic or 3)epidemic.The R software was used for programming algorithms and buildingthe web interface (package shiny).ResultsThe epidemiological status of influenza at the regional level wascommunicated through maps published in the weekly influenzareports of the Agency throughout the surveillance season [5].In week 2016-W03, Brittany was the first French region to declarethe influenza epidemic, with nine other regions in pre-epidemic alert.The epidemic then spread over the whole mainland territory. The peakof the epidemic was declared in week 11, the end in week 16.ConclusionsThis regional multi-source approach has been made possible bythe sharing of data visualizations and statistical results through a webapplication. This application helped detecting early the epidemicstart and allowed a reactive communication with the regionalhealth authorities in charge of the organization of health care, themanagement and the setting up of the appropriate preventivemeasures.

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Abstract

ObjectiveTo develop and validate a Zika virus disease syndrome definitionwithin the GUARDIAN (Geographic Utilization of ArtificialIntelligence in Real-Time for Disease Identification and AlertNotification) surveillance system.IntroductionIn 2016, the World Health Organization declared Zika virus aglobal public health emergency. Zika infection during pregnancycan cause microcephaly and other fetal brain defects. To facilitateclinicians' ability to detect Zika, various syndrome definitions havebeen developed.MethodsTo create and validate a detailed syndrome definition for Zika,we utilized the literature based methodology developed anddocumented by GUARDIAN researchers.1,2The syndrome definitionutilized clinical signs and symptoms that were documented inhistorical Zika cases.A testing sample of 1000 randomly selected emergency departmentcases (i.e., true negative cases) and 200 synthetically generated cases(i.e., true positive cases) was created. These 1,200 sample cases wereevaluated by the GUARDIAN surveillance system to determine theprobability of matching the Zika syndrome definition. A probabilityof≥90% was utilized to designate positive Zika cases.We identified the main signs and symptoms contributing to theidentification of Zika cases and conducted statistical performancemetrics. Clinical review of the false positive and false negative casesalong with a sample of true positive and true negative cases wasconducted by a board certified emergency physician.ResultsThe Zika syndrome definition was developed with eleven articles(six used for developing the syndrome definition, and five used fortesting the definition). The sample size for these articles was between1 and 72 positive Zika cases, with a total of 139 cases across the11 articles. The article with the most number of Zika cases wasbased on pregnant women with rash. The publication timeframefor the articles was from 1962 to 2016. Some of the main signsand symptoms from the historical cases that contribute to the Zikasyndrome definition are presented in Table 1. The initial results forthe sample testing data showed accuracy, sensitivity, and specificitywere 94.7%, 93%, and 95% respectively. There were a total of14 false negative and 50 false positive cases.ConclusionsThe initial Zika syndrome definition utilized by the GUARDIANsurveillance system contains similar signs and symptoms to thecurrent CDC case definition, but also includes additional signs andsymptoms such as pruritus/itching, malaise/fatigue/generalizedweakness, headache, retro-orbital pain, myalgia/muscle pain, andlymphadenopathy In addition, the GUARDIAN system provides therelative importance of identified signs and symptoms and allows forproactive surveillance of emergency department patients in real-time.Though we did not include epidemiologic risk factors, such as travel toan infected region or contact with an infected person in the syndromedefinition, GUARDIAN has above 90% sensitivity and specificity.Thus, inclusion of epidemiologic risk factors would further enhancethe early detection of Zika, when used with the appropriate high riskpopulation.Table 1. Main signs and symptoms of Zika syndrome definition*Signs and symptoms included in the Centers for Disease Control andPrevention (CDC)'s Zika clinical case 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

ObjectiveStady the activity of natural foci of tularemia and identify the maintypes of reservoirs and vectors ofFrancisella tularensis.IntroductionAnnually sporadic cases of tularemia in humans are registered inUkraine and new enzootic areas are found. Monitoring of tularemianatural foci is important given the potential significant financiallosses in case of tularemia outbreaks and taken into account that thispathogen can be used as a bioterrorist agent.Methods1. Light microscopy of smears of organs and tissues of animals,bacterial suspension (Gram staining) - the study of morphological andtinctorial properties of the pathogen.2. Immunofluorescence method for detection of antibody (IFA)- detection of tularemia bacterial cells using specific fluorescentimmunoglobulin.3. Biological method - subcutaneous infection of laboratoryanimals (white mice) with material from environmental samples andbacterial suspension (for accumulation of tularemia agent in organsand tissues of laboratory animals).4. Bacteriological method - inoculation of samples of wildand laboratory animals in differential diagnostic nutrient media(for isolation of a pure culture of tularemia agent).5. Serological method:- Indirect reaction of agglutination - detection of antibodies totularemia agent in blood of humans, wild rodents (liquid tularemiaantigen erythrocyte diagnostic agent).- Indirect reaction of agglutination - detection of tularemia agentand its antigen in suspensions of organs, swabs of substrate fromnests of rodents, pellets of birds (liquid tularemia immunoglobulinerythrocyte diagnostic agent).- Reaction of agglutination - detection of tularemia agent and itsantigen (dry tularemia diagnostic serum).ResultsTularemia in Lviv oblast has been studied for more than40 years, 69 enzootic localities in 14 administrative districts have beenregistered. More than 200 cultures ofFrancisella tularensishave beenisolated, mostly from ticks (58.3%) and Myomorphic rodents (24.5%),the rest from water, straw, other rodents, and patients. In 2012-2015,210 suspected patients were studied for tularemia, negative resultswere obtained. 22,320 ticks, 1,810 Myomorphic rodents, 282 watersamples, 15 straw samples, and 3 bird nests were tested for tularemia.Tularemia cultures have not been isolated bacteriologically over thelast few years. Pathogen circulation in natural foci was confirmedby immuno-serological studies of field material. Antibodies to thepathogen were detected in 6.5% out of 630 samples from Myomorphicrodents of seven species studied by Indirect Hemagglutination test.Most of the positive results were obtained from the samples of stripedfield mouse (46.3%), red-backed vole (17.0%), and common vole(14.6%).Francisella tularensisantigen was detected in 32 samplesout of 14,600 ticksD. reticulatuscollected in natural biotopes and in8.9% out of 289 samples of pellet.ConclusionsNo incidence registered in Lviv oblast and difficulty of isolationof Francisella tularensis cultures over the last years in other oblasts(the last one happened in 2006) may indicate the decrease of fociactivity under the influence of anthropogenic and environmentalfactors or changes in parasitic systems. But there are some evidenceof agent circulation in the oblast, so some precautions should betaken, especially considering the fact that there have been no specificpreventive measures taken over the last years.

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Abstract

ObjectiveWe evaluated the AFP surveillance system in Oyo State to assessits attributes and determine if it was meeting its set objectives.IntroductionIn September, 2015, Nigeria was delisted from the list of polioendemic countries globally. To be certified polio free, the countrymust attain and maintain certification standard Acute Flaccid Paralysis(AFP) surveillance for additional two-years. In Oyo State, no case ofWild Polio Virus (WPV) has been reported since February, 2009.MethodsWe used the Centre for Disease Control and Prevention updatedguidelines for evaluating public health surveillance system.We conducted a retrospective review of AFP surveillance databetween 1stJanuary, 2008 and 31stDecember, 2014. We conductedin-depth interviews with identified stakeholders. Semi-structuredquestionnaires were administered to Disease Surveillance andNotification Officers (DSNOs) and AFP focal persons. Univariateanalysis was performed by calculating frequencies, means andproportions using Microsoft Excel 2010.ResultsThe case definition of AFP and the tools for reporting are simple.Of the 897 AFP cases detected during the period under review(2008-2014), 20 (2.2%) were laboratory confirmed WPV. Thesensitivity of the system between 2008 and 2014 measured by theAnnualized Non-Polio AFP (NPAFP) rate was consistently abovethe target. of≥2/100,000 population(Mean=3.96, Standard deviation(SD): 0.48). The mean NPAFP rate for underperforming LGAs duringthe review period was 1.6, SD: 0.31. The mean Stool adequacy andTimeliness were 91.43% (SD: 18.3) and 91.3% (SD: 20.3) abovethe target of≥80% respectively. The mean Data quality was 90%(target is≥90; SD: 3.8). Positive Predictive Value (PVP) was 2%(2008 -2009), and 0% in 2010-2014.ConclusionsThe Oyo State AFP surveillance system is simple, flexible,sensitive and meeting its set objectives. However, PVP was low andthe system’s operating conditions are not stable. All the LGAs, at onepoint during the period under review did not meet the NPAFP andNPENT rates. We recommended that more logistic support shouldbe provided for non-performing LGAs to improve case reporting,investigation, and response. DSNOs should be re -sensitized onreverse cold chain, so as to improve the NPENT rate

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Abstract

ObjectiveEnhanced daily surveillance is used to identify reportablediseases, outbreaks, and clusters and provides situational awareness.This project examines how health care visits requiring additionalinformation are detected using enhanced syndromic surveillance andthe resources required from detection through completion.IntroductionThe Florida Department of Health in Hillsborough County (FDOH-Hillsborough) conducts enhanced syndromic surveillance on a dailybasis. The Electronic Surveillance System for the Early Notificationof Community-based Epidemics in Florida (ESSENCE-FL) is thesyndromic surveillance system used by epidemiologists within theFlorida Department of Health (FDOH). During the time of this study,ESSENCE-FL receives data from 210 of emergency departments(ED) and 33 urgent care centers (UCC) throughout the state of Florida,including 12 EDs and 3 UCCs in Hillsborough County. In 2014, theESSENCE-FL system added a feature that delivers an automaticdaily email to designated primary ESSENCE-FL users in each countycontaining all visits which have been detected by the state's visits ofinterest (VOI) query. The email contains all visits which have beendetected by the visits of interest (VOI) query for each ESSENCE-FLusers designated county. The VOI query utilizes the combinedchief complaint and discharge diagnosis (CCDD) field of a visit forkeywords related to reportable diseases and exposures of public healthinterest. In addition to this VOI email, Hillsborough County analyzestime of arrival alerts, specialized emerging infectious disease queries,poison information center data, and volume levels of syndromes andsubsyndromes predetermined by ESSENCE-FL. A daily summaryreport of the enhanced daily surveillance analysis is then providedto area public health officials within FDOH-Hillsborough and thesurrounding counties. This study examines how visits requiringadditional investigation are detected and the resources required tocomplete the investigation.MethodsDuring the study period from July 23 through September 30, 2015,visits identified were recorded along with the time and method ofdetection. Each day this surveillance began with the review of thevisits of interest email, facility and syndrome volumes, the VOIquery, emerging infectious disease queries (MERS-CoV, Ebola virusdisease, chikungunya, etc.), time of arrival alerts, and the review ofFlorida Poison Information Center data. A daily summary report ofthe enhanced surveillance was manually created and provided byemail to public health officials. After completion of the daily analysis,facilities were contacted about any visits identified as requiringadditional investigation, such as a reportable disease or cluster ofpublic health concern. The time of the information request, receiptof the requested information, and completion of the investigation wasrecorded.ResultsAn average of 1740 visits were made each day in HillsboroughCounty in the month prior to the start of this project. During thissame time period the daily VOI email identified an average of 5.5visits per day. During the study period, an average of 7.8 visitswere detected each day during the enhanced syndromic surveillanceprotocol. The VOI email detected 6 visits per day. Overall 558 totalvisits were detected from the enhanced daily surveillance and82 percent of these visits were found in the system generated VOIemail. Of the visits identified 149 required additional investigationand 15 were determined to be associated with a reportable disease,most commonly carbon monoxide poisoning and varicella. Anaverage of 1.3 days elapsed from the time a visit occurred to the timeit was detected through surveillance. Follow-up was started within1 day of detection and completed in an average of 1.1 days. Overallthe daily enhanced syndromic surveillance data analysis required anaverage of 60 minutes of work time daily with a range of 18-144minutes.ConclusionsDuring the study period, 15 visits were found to be cases ofreportable diseases, primarily carbon monoxide poisoning andvaricella, which would have otherwise gone unreported to FDOH-Hillsborough. The enhanced surveillance process also allows for thequick detection and evaluation of diseases or conditions requiringimmediate action that may not always be reported immediately suchas meningitis or an emerging infectious disease. The enhanced dailysyndromic surveillance in Hillsborough County has been useful indetecting reportable diseases, clusters, and providing situationalawareness in a timely manner without an overwhelming burden onstaff and resources.

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

Abstract

ObjectiveTo describe the recent trends in the burden of disease and mortalityassociated with vaccine preventable diseases (VPDs).IntroductionVaccination is one of the most successful public healthinterventions. Despite this, there are a variety of reasons that VPDscontinue to be seen in developed countries such as Canada. Thisanalysis describes the recent trends in the burden of disease andmortality associated with VPDs for which publicly funded vaccinationprograms for infants or children are implemented across the countryand for which national surveillance data are available.MethodsSurveillance data on VPDs were obtained from the CanadianNotifiable Disease Surveillance System. Population and death datawere obtained from Statistics Canada. Death data were only availableto 2012. In total, 11 VPDs have been included in the analysesnamely tetanus, diphtheria, pertussis, polio, haemophilus influenza(Hi), measles, mumps, rubella, congenital rubella syndrome (CRS),invasive meningococcal disease (IMD), invasive pneumococcaldisease (IPD). Exclusion of non-vaccine preventable serotypes fromeither data source was not possible. Analyses included incidence rate,proportion, mortality rate and risk ratio.ResultsSurveillance data indicate that from 2010 to 2014, an average of6,020 cases of VPDs were reported annually, representing an averageannual crude incidence rate of 17.3 cases per 100,000 population.VPDs accounting for the largest proportion of reported cases includeIPD (54.4%) and pertussis (29.6%). Age groups most affected includechildren less than 1 year of age (92.6 cases per 100,000) and childrenbetween 1 and 4 years of age (36.0 cases per 100,000). Age groupsleast affected include adults between 20 and 24 years old (6.9 casesper 100,000 population) and between 25 and 29 years old (7.3 casesper 100,000 population). Age groups affected differed by VPD.Death data indicate that from 2010 to 2012, VPDs accountingfor the largest proportion of deaths across all ages include IPD(58.2%), Hi (16.3%) and IMD (15.3%). Youth aged 19 years andunder accounted for 26.1% of VPDs deaths (mortality rate of 0.17 per100,000 population). Children less than one year old have the highestmortality rate due to VPDs (2.0 per 100,000 population) and were26.9 times more likely to die from VPDs compared to children between1 and 19 years of age. Adults aged 20 years and older accounted for73.9% of VPD deaths (mortality rate of 0.14 per 100,000 population).A high mortality rate was also seen in adults 60 year old and over(0.3 per 100,000 population); adults 60 years old and over were more2.6 times more likely to die from VPDs compared to adults between20 and 59 years old.ConclusionsThe results of routine Canadian surveillance data suggest thatdespite high vaccine coverage rates generally seen in developedcountries such as Canada, a possible preventable burden of illnessdue to VPDs still occurs across all age groups. Consideration ofVPDs as a whole allows a real appreciation of the burden and deathsassociated with VPDs in general. The analysis has shown that whilethe incidence rates are highest among children 4 years old andyounger, mortality due to VPDs continues to occur and primarilyaffects infants and elderly. Due to the asymptomatic nature of someVPDs and data limitations, reported cases are likely underestimatesof the true burden.

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

Abstract

ObjectiveTo examine demographic as well as clinical characteristics of theCarbapenam Resistant Enteriobacteriacae (CRE) Organisms cases inHouston, Texas, 2015-2016IntroductionAccording to CDC, CRE is used to describe bacteria that are non-susceptible to one or more carbapenems; doripenem, meropenemor imipenem and resistant to third generation cephalosporins likeceftriaxone, cefotaxime and ceftazidime. These organisms causeinfections that are associated with high mortality rates and they havethe potential to spread widely. Antibiotic resistant bacteria causemore than 2 million illnesses and at least 23,000 deaths each year inUnited States. CREs are found in many health care settings like acutecare hospitals, long term care facilities, nursing homes, rehabilitationfacilities and other health care settings. Although CREs includes anumber of species, reporting in State of Texas is limited to CRE-Klebsiellaspecies and CRE-E.coli.MethodsPopulation-based surveillance data was generated from Houston'selectronic disease surveillance system reported to Houston HealthDepartment (HHD) from October 2015 to July 2016. Descriptiveanalysis was performed to examine demographic and clinicalcharacteristics across different age groups, gender and race/ethnicity.HHD has received a total of 463 CRE cases during the time period,out of which 72 were non-reportable and did not meet the casecriteria, 187 were out of jurisdiction. The remaining 204 cases wereincluded in this study.ResultsOut of a total of 204 cases, males and females were representedequally (50% each). The mean age of the cases was 67 years(age ranges from 22-98). Majority of the cases were in the older agegroup, 70 years and above 53 (26%), followed by 48 (24%) in agegroup 80 and above years. Among the different race/ethnic groups,African-Americans comprised of 82 (40%), followed by Whites67 (33%) and Hispanics 33 (16%). Out of 204 cases, 156 (76%)were hospitalized, which included acute care hospital, long-termacute care or nursing home. Out of 156 hospitalized cases, 71 (34%)were in Intensive Care Unit (ICU) and 136 (67%) had an invasiveor indwelling device. Of all the cases, 80% had CREKlebsiellapneumoniae, followed by 11% who had CRE- E coli. The cases weredistributed evenly across the city when plotted on ArcGIS with theirresidential addresses.ConclusionsCRE cases are found to be more common among older age groups,African American population and in hospitalized patients. CRE canbe a ground for increasing infectious diseases in the community andone of the reason may be unnecessary use of antimicrobial agents.This study provides a glimpse into the number of CRE cases reportedin Houston since CREs are classified a separate disease in Texas.Further studies are needed to explore the occurrence of anti-microbialdrug resistance among the specific population groups and how thecase investigation efforts can be targeted to enhance prevention.

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

Abstract

ObjectiveTo describe the planning strategies and lessons learned by theVirginia Department of Health (VDH) when conducting enhancedsurveillance during mass gathering events and coordinating withhealthcare entities to distinguish event-related emergency department(ED) visits from community-related ED visits.IntroductionMass gatherings can result in morbidity and mortality fromcommunicable and non-communicable diseases, injury, andbioterrorism. Therefore, it is important to identify event-related visitsas opposed to community-related visits when conducting publichealth surveillance1. Previous mass gatherings in Virginia havedemonstrated the importance of implementing enhanced surveillanceto facilitate early detection of public health issues to allow for timelyresponse2.MethodsBetween June 2015 and September 2015, VDH coordinatedwith two healthcare entities representing six acute care hospitalsto conduct enhanced surveillance for the 2015 World Police andFire Games and 2015 Union Cycliste Internationale (UCI) RoadWorld Championships. VDH established initial communicationwith each healthcare entity between 1 week to 2 months before theevent start date to discuss functional requirements with technical,informatics, and clinical staff. Requirements included: 1) health careentity identifying gathering attendees during the ED registration, 2)capturing a standardized mass gathering indicator within the patient'selectronic health record (EHR), and 3) transmitting the gatheringindicator to VDH through existing electronic syndromic surveillancereporting processes. ED visit records with the gathering indicator wereanalyzed by VDH using the Virginia Electronic Surveillance Systemfor the Notification Community-based Epidemics (ESSENCE) andfindings were incorporated in daily VDH situational reports. Thissame methodology will be applied for the upcoming U.S. VicePresidential Debate in October 2016.ResultsThe duration of the two gatherings in 2015 ranged from 9 to 10 daysand the locations were categorized as urban. The population densityof the gathering location ranged from 1,950 to 2,889 populationper square mile. The estimated number of attendees ranged from45,000 to 400,000. Attendees were defined as having attended at leastone day of the mass gathering event. The mass gathering indicatorcaptured during the ED registration included the gathering acronymor a gathering specific field with a drop down menu containingtrue/false options. VDH utilized ESSENCE to identify 42 ED visits(0.5%) with the gathering acronym out of 8,768 total ED visits duringthe 2015 World Police and Fire Games and 60 ED visits (2.6%)with the gathering specific field out of 2,296 total visits during the2015 UCI Road World Championships. The results of the U.S. VicePresidential Debate in October 2016 are pending.ConclusionsIn 2015, VDH partnered with two healthcare entities to conductenhanced surveillance during two mass gatherings. Although VDHroutinely uses syndromic surveillance data to identify issues of publichealth concern, it has previously lacked the ability to identify EDvisits specific to mass gatherings. Prior to collaboration with VDH,the healthcare entities did not capture gathering-specific ED visitsusing their EHR systems. The two healthcare entities successfullymodified their business procedures and EHR system to capture andtransmit a gathering indicator for ED visits despite some challenges.These challenges include constraints with customization of theEHR and syndromic surveillance systems, lack of standardizedtraining among ED registration staff for interpreting and applyingthe gathering indicator, and limited functionality testing prior tothe event. Lessons learned from this coordinated effort are to: 1)initiate the planning phase and identification of requirements as earlyas possible to ensure they are well defined and understandable, 2)implement frequent communications with the healthcare entity,and 3) customize requirements for the specific gathering as muchas possible while balancing the burden and benefit to public healthand the healthcare entity. The coordinated enhanced surveillanceefforts provided both VDH and the healthcare entities with improvedsituational awareness and capacity building during mass gatheringevents. The strategies and lessons learned from these two events willbe applied to improve enhanced surveillance of public health issuesduring future mass gatherings, including the U.S. Vice PresidentialDebate in October 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

ObjectiveTo assess the correlations between weekly rates of elementaryschool absenteeism due to illness (SAi) and percent positivity forinfluenza A from laboratory testing (PPFluA) when conducted at acity level from September to December over multiple years.IntroductionRates of student absenteeism in schools have been mainly used todetect outbreaks in schools and prompt public health action to stoplocal transmission1,2. A report by Mogto et al.3stated that aggregatedcounts of school absenteeism (SAi) were correlated with PPFluA, butthe sample may have been biased. The purpose of this study was toassess the correlation between aggregated rates of SAi and PPFluAfor two cities, Calgary and Edmonton, in Alberta. In such situations,SAi could potentially be used as a proxy for PPFluA when there arenot enough samples for stable laboratory estimates.MethodsThe Alberta Real-Time Syndromic Surveillance Net (ARTSSN)4collects elementary SA data from the two major school boards intwo cities in Alberta with populations >800,000. Since reasons forSA are stated, rates of SAi can be calculated. Data were obtained forthree years, 2012 to 2014, for each city. Laboratory data on tests ofrespiratory agents using a standardized protocol were obtained fromAlberta's Provincial Laboratory for Public Health for the same timeperiod and locations. The dates of the specimens being received bythe laboratory were used in this analysis. For each data source, therelative proportions (SAi and PPFluA) were calculated. Data forthe first week of school in September and for the last two weeks ofDecember were removed for each year due to the SAi rates beingunstable. Linear regression models were constructed, with rates ofSAi predicted by PPFluA. Separate models were run for each cityand for each year, resulting in a total of 6 models. Percent positivityfor entero-rhinoviruses (PPERV) was added to see if it improved themodel. The regression models were created using Excel and checkedin the statistical programs, SAS and R. An analysis to assess theinfluence of a lag period was assessed using R.ResultsFor each city, the provincial lab tested between 4,000 and 6,000specimens each fall and SAi rates were based on denominators ofbetween 20,000 and 36,000 children. The R2, betas, and p-valuesfor all 6 regression models are shown in Table 1. The minimumcorrelation value was 0.693 and the maximum was 0.935. Dueto the strong negative correlations between PPERV and PPFluA,PPERV was not retained in the models. Looking at the lag periods,the maximum correlations occurred at a zero week lag in two years(2012 and 2014) and at a -1 week lag in 2013. The two years with azero lag were both dominated by a H3N2 strain while the year withmainly a H1N1 strain showed a lag of -1. Only one year of H1N1 datawas available for analysis.ConclusionsWe observed strong correlations between the weekly rates ofelementary SAi and PPFluA at the city level over three years, fromSeptember to December. The reasons for the difference in lag timesbetween the H1N1 and H3N2 seasons are being investigated.

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

Abstract

ObjectiveWe describe surveillance for Dengue virus (DENV), Chikungunyavirus (CHIKV) and Zika virus (ZIKV) in VA Caribbean HealthcareSystem (VACHS) from the start of ZIKV transmission in Puerto Rico.IntroductionDENV, CHIKV and ZIKV are all transmitted by mosquitoes andhave occurred in outbreaks in the Caribbean. Common symptoms(which can be severe and disabling) are similar among the 3 virusesand include fever, joint pain/swelling, headache, muscle pain andrash. In December 2015, the first endemic case of ZIKV infection wasreported by VACHS. Since that time, an increasing number of ZIKVinfections have been reported in Puerto Rico. Due to the growingZIKV outbreak, we performed ongoing testing and surveillance.MethodsDENV, CHIKV and ZIKV infection surveillance from November2015 - August 2016 at VACHS was performed from 2 primary datasources: (1) VA PraedicoTMPublic Health Surveillance System forlaboratory results documented within the electronic medical record(EMR) and (2) communications with facility clinicians for laboratoryresults not entered into the EMR. Laboratory tests were consideredunique tests if they were performed >30 days apart. A positive testwas defined as a positive IgM or RT-PCR test result. Serial infectionwas defined as infection with CHIKV and ZIKV or CHIKV andDENV. Potential cross-reaction of assays was defined as positiveDENV and ZIKV IgM results within 30 days. Demographic andclinical data was obtained on all positive ZIKV cases including caseswith serial infection.ResultsFor the time period evaluated, 2,218 unique tests were performedfor DENV (744), CHIKV (741), and ZIKV (744). Five hundred thirtythree positive tests were identified for: DENV (34), CHIKV (55) andZIKV (444) (Figure 1). Demographic and virus breakdown of testingis shown in Table 1. Percent positive range for DENV testing was0-23%, for CHIKV was 0-14%, and for ZIKV 0-73%. Temporaltiming of positive tests for each virus by percent positive is depictedin Figure 2. Serial infections were identified in 39 patients (1 CHIKVIgM/ZIKV IgM/PCR+, 7 CHIKV IgM/ZIKV IgM+, 26 CHIKV IgM/ZIKV PCR+, 2 CHIKV IgM/ZIKV PCR/DENV IgM+, 2 DENV IgM/CHIKV IgM+, 1 DENV IgM/CHIKV IgM/ZIKV IgM+). The averageage of patients with serial infection was 63.5 years (range 33-85) andoccurred in 4 females and 35 males. 21 patients were identified withpositive DENV and ZIKV IgM tests, which could represent cross-reactivity between the assays or co-infection. Confirmatory testing ofthese specimens is pending.ConclusionsLaboratory surveillance demonstrated co-circulation of all 3viruses, although ZIKV was the dominant infection identifiedduring this time period. In addition, laboratory data suggests serialinfection with CHIKV and ZIKV while also identifying patients withprobable cross-reaction between DENV and ZIKV tests. Additionalinvestigation is needed to determine whether patients with serialinfection have increased severity of symptoms or different clinicaloutcomes. Since number of ZIKV infections continues to increase andall 3 viruses continue to circulate, continued public health messagingremains important.Figure 1Table 1:VA Caribbean Healthcare System Dengue Virus (DENV),Chikungunya Virus (CHIKV) and Zika Virus (ZIKV) Demographics andTesting, Nov. 2015-Aug. 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

ObjectiveA test kit for the detection of antibodies to Newcastle disease virus(NDV) based on haemagglutination inhibition (HI) assay has beendeveloped and introduced into practice for the first time in Ukraine.IntroductionNewcastle disease (ND) is the most important infectious viraldisease of poultry. The world-wide economic loss from it is 2-3billion USD per year. ND is reportable to the World Organizationfor Animal Health (OIE). ND is caused by virulent strains of avianParamyxoviruses belonging to type 1. Industrial poultry farmingis rapidly developing in Ukraine. Ornithological fauna of Ukraineincludes about four hundred species of birds, 207 of which nestwithin its borders. The territory of Ukraine transits 3 out of 14transcontinental global migration flows. The wild birds are themain natural reservoir of ND agents. It is necessary to control theintensity of post-vaccination immunity in poultry and the timing ofrevaccinations. OIE recommends enzyme linked immunosorbentassays (ELISA) and HI test for these purposes [1]. However, it shouldbe noted that HI test, possessing high specificity and sensitivity, ismuch cheaper. Therefore, it is the excellent means for ND timelysurveillance.MethodsDuring the development of a new diagnostic kit, we used thereference strain “La-Sota”, which was obtained from the NationalCenter of Microorganism Strains of Ukraine. We have producedhaemagglutinating antigen using embryonated SPF fowl eggs and10-11 day incubation. A dilution of the virus was inoculated in0.1 ml volumes into the allantoic cavity and incubated at 35-37° Cfor 80-96 hours. For the purpose of NDV inactivation, we usedaminoethyleneimine at the final concentration of 0.1%. Positive serumwas prepared by immunizing 60-day-old chickens with live virus onceand by inactivated virus twice with an interval of 2 weeks. Negativeserum was obtained from healthy birds that did not contain antibodiesto NDV. The investigated blood sera were inactivated by heating(56 C/30 minutes). Samples of 1% suspension of chicken erythrocytesin phosphate buffered saline (pH 7.0-7.1) were used in HI tests.ResultsThe specific haemagglutination activity of the obtained antigenamounted to 10-11 log2.The test was performed using the 4HA unitsof the antigen. Positive control serum activity was in the range of 7-9log2. Negative control serum did not give results of more than 2 log2.The estimation of the quality indexes of the components of thediagnostic test-kit was performed using harmonized methods. In orderto examine sensitivity and specificity of HI test kits, antigens and serafrom commercial diagnostic kits were used. Also, certified negativecontrol serum and samples of International Standard sera were used,which were obtained from reference laboratories, namely againstthe following pathogens: Avian Influenza A (H5), Avian InfluenzaA (H7), Egg Drop Syndrome"76 Virus, Paramyxoviruses of 2 and3 serotypes, Reovirus, Avian Infectious Laryngotracheitis, AvianInfectious Bronchitis Virus, Mycoplasma gallisepticum, and NDV.In order to ensure a high degree of specificity for the antigen,special attention was given to the selection of a stabilizer for freeze-drying (the subject of a patent).Comparison between the national diagnostic test kit for HI andcommercial ELISA kit (IDEXX) in the evaluation of humoralimmune response to ND in vaccinated chickens was investigatedby examining of serum samples (n=152). Statistical analysis of datashowed that the correlation coefficient for the results of both tests was0.92. The relative sensitivity of HI test kit was 93.5% and the relativespecificity - 91.5%.The developed test kit was successfully used for the examinationof field samples. We developed regulatory documents, completed theprocedure of validation and registration in Ukraine of the commercialHI test kit for the detection of antibodies to NDV.ConclusionsThe use of the national standardized diagnostic test kit based onHI for detection of antibodies to NDV allows assessing the post-vaccination antibodies level that helps to maintain the disease-freestatus of the Ukrainian poultry industry with regard to ND.

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

Abstract

ObjectiveThis surveillance project aims to increase and broaden coverage ofAedesspp. ovitrap locations in Arizona's U.S.-Mexico border regionthrough interagency collaboration.IntroductionAs part of a statewide effort to enhance surveillance forAedesspp.mosquitoes (1,2) the Office of Border Health (OBH) took the lead inproviding technical assistance on surveillance in counties borderingMexico. In 2016, OBH sought ways to enhance surveillance in a widergeographic area. Trap locations closer to the border were establishedas a priority, given high amount of traffic across the internationalline, high borderAedesmosquito activity, and native cases of denguereported at the border in Mexico.MethodsThe Arizona Office of Border Health partnered with U.S. Customsand Border Protection to select possible locations for ovitrappingnear the border. Border Patrol Health and Safety Tucson coordinationaccompanied OBH and preparedness staff on three occasions to scoutareas around pre-selected border patrol facilities. County, and borderpatrol staff contributed to trap maintenance. BIDS provided technicalassistance to identify positive traps, collected data for reporting tothe state, and collaborated with experts at the University of Arizonaentomology department to verify results and identifyAedesspp.ResultsOut of 15 border patrol stations within border lands in SantaCruz County, and Cochise County, OBH epidemiologist considered10 viable trapping sites. Two facilities were eventually eliminatedbecause of logistical challenges. OBH visited eight facilities andselected five locations within five miles of the U.S. –Mexicoborder and two located less than 30 miles from the border. OBHepidemiologists inspected sites for potential mosquito habitat and setovitraps low to the ground in areas protected from rain. Some facilitieshad areas of standing water discovered in unused tires, truck-washingstations, heavy-lifting equipment, and natural washes. Border Patrolstaff complained of mosquito activity around some of the stations.After inspection OBH set an average of three traps at each site. Onesite had evidence of mosquito larvae activity.ConclusionsBorder patrol facilities offer ideal trap locations given theirproximity to the international line. Secure facilities offer extraprotection for traps against tampering. The partnership across local,state, tribal, and federal lines allowed Arizona Office of Border Healthto expand surveillance locations, allowing two jurisdictions to set thefirst Aedes-specific traps since Arizona began the 2016 campaign,"Fight the Bite."

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

Abstract

ObjectiveTo determine avian influenza A(H5N6) virus infection in humanand environment using extensive surveillances. To evaluate theprevalence of H5N6 infection among high risk population.IntroductionSince the emergence of avian influenza A(H7N9) virus in 2013,extensive surveillances have been established to monitor the humaninfection and environmental contamination with avian influenza virusin southern China. At the end of 2015, human infection with influenzaA(H5N6) virus was identified in Shenzhen for the first time throughthese surveillances. These surveillances include severe pneumoniascreening, influenza like illness (ILI) surveillance, follow-up onclose contact of the confirmed case, serological survey among poultryworkers, environment surveillance in poultry market.MethodsSevere pneumonia screening was carried out in all hospitals ofShenzhen. When a patient with severe pneumonia is suspected forinfection with avian influenza virus, after consultation with at leasttwo senior respiratory physicians from the designated expert paneland gaining their approval, the patient will be reported to local CDC,nasal and pharyngeal swabs will be collected and sent for detectionof H5N6 virus by RT-PCR.ILI surveillance was conducted in 11 sentinel hospitals, 5-20 ILIcases were sampled for detection of seasonal influenza virus by RT-PCR test every week for one sentinel. If swab sample is tested positivefor influenza type A and negative for subtypes of seasonal A(H3N2)and A(H1N1), it will be detected further for influenza A(H5N6) virus.Follow-up on close contacts was immediately carried out whenhuman case of infection with H5N6 was identified. All of closecontacts were requested to report any signs and symptoms of acuterespiratory illness for 10 days, nasal and pharyngeal swabs werecollected and tested for influenza A(H5N6) virus by RT-PCR test.In the meantime, environmental samples were collected in the marketwhich was epidemiologically associated with patient and tested forH5N6 virus by RT-PCR test.Serological survey among poultry workers was conducted in tendistricts of Shenzhen. Poultry workers were recruited in poultrymarkets and screened for any signs and symptoms of acute respiratoryillness, blood samples were collected to detect haemagglutination-inhibition (HI) antibody for influenza A(H5N6) virus.Environment surveillance was conducted twice a month in tendistricts of Shenzhen. For each district, 10 swab samples werecollected at a time. All environmental samples were tested forinfluenza A(H5N6) virus by RT-PCR test.ResultsFrom Nov 1, 2015 to May 31, 2016, 50 patients with severepneumonia were reported and detected for H5N6 virus, three patientswere confirmed to be infected with H5N6 virus. Case 1 was a 26 yearsold woman and identified on Dec 29, 2015. She purchased a duck ata live poultry stall of nearby market, cooked and ate the duck 4 daysbefore symptom onset. After admission to hospital on Dec 27, hercondition deteriorated rapidly, on Dec 30 she died. The case 2 was a25 years old man and confirmed on Jan 7, 2016. He visited a marketeveryday and had no close contact with poultry, except for passingby live poultry stalls. He recovered and was discharged from hospitalon Jan 22. The case 3 was is a 31 years old woman and reported onJan 16, 2016, she had no contact with live poultry and died on Feb 8.For 60 close contacts of three cases, none of them reported signsor symptoms of acute respiratory illness, all of nasal and pharyngealswabs were tested negative for influenza A(H5N6) virus by RT-PCRtest. Of 146 environmental swabs collected in the case's living placesand relevant poultry markets, 38 were tested positive for influenzaA(H5N6) virus by RT-PCR test.From Nov 1, 2015 to May 31, 2016, 2812 ILI cases were sampledand tested for influenza type A and subtypes of seasonal influenza.Those samples tested positive for influenza type A could be furthersubtyped to seasonal A(H3N2) or A(H1N1), therefore no sample fromILI case was tested for influenza A(H5N6) virus.Serological surveys among poultry workers were conductedtwice, for the first survey 186 poultry workers were recruited in Oct2015, for the second survey 195 poultry workers were recruited inJan 2016. Blood sample were collected and tested for HI antibodyof influenza A(H5N6) virus. 2 individuals had H5N6 HI antibodytiter of 1:40, 5 individuals had H5N6 HI antibody titer of 1:20, rest ofthem had H5N6 HI antibody titer of <1:20. According to the WHOguideline, HI antibody titer of≥1:160 against avian influenza viruswere considered positive.From Nov 1, 2015 to May 31, 2016, of 1234 environmental swabscollected in poultry markets, 339 (27.5%)were tested positive forinfluenza A(H5N6) virus by RT-PCR test. Each of the ten districtshad poultry markets which was contaminated by influenza A(H5N6)virus.ConclusionsIn 2015-2016 winter, three cases of infection with influenzaA(H5N6) virus were identified in Shenzhen, all of them were youngindividuals with average age of 27.3 years and developed severepneumonia soon after illness onset, two cases died. For acute andsevere disease, early detection and treatment is the key measure forpatient's prognosis.H5N6 virus was identified in poultry market and other placeswhere patient appeared, implying poultry market probably was thesource of infection. Despite the high contamination rate of H5N6virus in poultry market, we found that the infection with H5N6 virusamong poultry workers was not prevalent, with infection rate being0/381. Human infection with H5N6 virus seemed to be a sporadicoccurrence, poultry-human transmission of H5N6 virus might not bevery effective.

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

Abstract

ObjectiveTo address the limitations of traditional static surveillancereporting by developing in-house infrastructure to create and maintaininteractive surveillance dashboards.IntroductionTraditionally, public health surveillance departments collect,analyze, interpret, and package information into static surveillancereports for distribution to stakeholders. This resource-intensiveproduction and dissemination process has major shortcomings thatimpede end users from optimally utilizing this information for publichealth action. Often, by the time traditional reports are ready fordissemination they are outdated. Information can be difficult to findin long static reports and there is no capability to interact with thedata by users. Instead, ad hoc data requests are made, resulting ininefficiencies and delays.Use of electronic dashboards for surveillance reporting is notnew. Many public health departments have worked with informationtechnology (IT) contractors to develop such technically sophisticatedproducts requiring IT expertise. The technology and tools now existto equip the public health workforce to develop in-house surveillancedashboards, which allow for unprecedented speed, flexibility, andcost savings while meeting the needs of stakeholders. At AlbertaHealth Services (AHS), in-house, end-to-end dashboard developmentinfrastructure has been established that provides epidemiologists anddata analysts full capabilities for effective and timely reporting ofsurveillance information.MethodsAn internal assessment of the available resources and infrastructurewithin AHS was conducted to iteratively develop a new analyticsmodel that provides a foundation for in-house dashboard developmentcapacity. We acquired SAS® and Tableau® software and conductedinternal training for skills development and to transition staff to thenew model. This model is highlighted below using our respiratoryvirus surveillance (RVS) dashboard as an example.For the RVS dashboard, stakeholder engagements wereconducted to understand the end users' needs. Next, data access wasimproved, where possible, by securing direct access to source data(e.g. emergency department visits for influenza like illness (ILI),Health Link calls, hospital admissions, etc.) on existing databaseservers. SAS® code was written for routinely connecting withmultiple data sources, data management and analysis, data qualityassurance, and posting summary data on a secure Oracle® server.The Tableau® dashboard development application was then usedto connect to the summary data on the Oracle® server, create theinteractive dashboards and publish the final products to the AHSTableau server environment. Key users were consulted in the iterativedevelopment of the interface to optimize usability and relevantcontent.Finally, the product was promoted to stakeholders with acommitment to use their feedback to drive continuous improvement.ResultsIn-house generated surveillance dashboards provide more timelyaccess to comprehensive surveillance information for a broadaudience of over 108,000 AHS employees; within as little as 3 hoursof all data being available. They facilitate user-directed deep divesinto the data to understand a more complete surveillance picture aswell as stimulating hypothesis generation. Additionally they enhanceproductivity of personnel, by significantly reducing response timesfor ad hoc request and to generate reports, freeing up more time torespond to other emerging public health issues.Looking specifically at the RVS dashboard, its ability to bring allrelevant surveillance information to one place facilitates valuablediscussions during status update meetings throughout the influenzaseason. Among other things it has allowed Medical Officers ofHealth, emergency department staff, epidemiologists and others tomake informed decisions pertaining to public messaging, the needfor reallocating resources, such as staffing and handling the burden ofILI patients, as well as determining the necessity of opening influenzaassessment centers.ConclusionsSurveillance dashboards can facilitate public health action byassembling comprehensive information in one place in a timelymanner so that informed decisions can be made in emerging situations.

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

Abstract

ObjectiveTo describe the Georgia Department of Public Health's (DPH)mosquito surveillance capacity before and after Zika virus wasdeclared a public health emergency, review and compare mosquitosurveillance results from 2015 to 2016, and evaluate the risk ofautochthonous vector transmission of Zika virus based on 2016surveillance data ofAedes aegyptiandAedes albopictusmosquitoes.IntroductionZika virus was declared an international public health emergencyby the World Health Organization on February 1, 2016. WithGeorgia hosting the world's busiest international airport and a sub-tropical climate that can support the primary Zika virus vector,Aedesaegypti,and secondary vector, Aedes albopictus,the CDC designatedGeorgia as a high risk state for vector transmission. Faced with alack of mosquito surveillance data to evaluate risk of autochthonoustransmission and a few counties statewide that provide comprehensivemosquito control, the DPH rapidly scaled up a response. DPH updatedexisting mosquito surveillance and response plans targeted for WestNile Virus (WNV) and expanded capacity to areas that lackedprevious surveillance targeting the Zika virus vector.MethodsMosquito surveillance data provided by DPH was analyzedfor years 2015 and 2016 to date. The geographical distribution ofcounties conducting surveillance, total number and percentage bymosquito species collected in 2015 were compared to 2016 data.The distribution of counties conducting surveillance was mappedusing ArcMap 10.4.1 for pre and post Zika response. Autochthonousvector transmission risk was evaluated based on the overall numbersand percentages ofAedes aegyptiandAedes albopictusmosquitoescollected for 2016.ResultsIn 2015, Georgia had 14 counties conducting mosquitosurveillance, with a DPH entomologist providing direct surveillancein 4 of these counties. In 2016, DPH expanded surveillance capacity to34 counties, a 142% increase, geographically dispersed across theState in urban and rural areas. A total of 76,052 mosquitoes weretrapped and identified in 2015 compared to 91,261 mosquitoes trappedto date in 2016, representing a 20% increase. A total of 37 mosquitospecies were identified in both years withCulex quinquefasciatus,Georgia's primary WNV vector, representing the highest percentage(2015-79.45% and 2016-70.41%) of mosquitoes trapped overall.In addition,Aedes aegyptirepresented only 0.108% and 0.007% ofthe total mosquitoes trapped respectively each year and was found inone county.Aedes albopictusrepresented only 1.50% and 1.82% ofthe total mosquitoes trapped respectively each year and was found ina majority of the counties conducting surveillance.ConclusionsDPH was able to rapidly expand its surveillance capacity statewideby maximizing existing grant funds to hire new surveillance staffwhile also collaborating with academic institutions, military bases,Georgia Mosquito Control Association, and local health departmentsto provide training and funding for surveillance and data sharing. Thisexpanded surveillance network provided a clearer picture of the typesof mosquitoes potentially exposing the public to mosquito-bornedisease risks.Historical data for the primary vector of Zika virus,Aedesaegyptihas been isolated to just two counties in Georgia. Expandedsurveillance in 2016 confirmed a low abundance ofAedes aegypti,suggesting the primary vector for Zika has been displaced byAedesalbopictus. This may suggest a reduced risk of autochthonoustransmission of Zika virus in Georgia due toAedes albopictus'affinity for feeding on both humans and animals. This should beinterpreted with caution due to limitations in the data related tounstandardized reporting techniques for each county. DPH is workingwith all counties to improve the quality of data collected and reportedand continues to educate the public on ways they can reduce theirindividual risk of mosquito bites, which in turn reduces the risk ofother mosquito-borne diseases such as WNV.In conclusion, DPH's response to Zika virus allowed it to rapidlyincrease its surveillance footprint and with new data, make soundpublic health decisions regarding mosquito-borne disease risks.

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

Abstract

ObjectiveThis session will explore the role of the Houston Health Department(HHD) in the City of Houston's response to the threat of Zika. Thepanelists will provide perspective from the roles of Bureau Chief,informatician, and epidemiologist and provide insight into lessonslearned and strategic successes.IntroductionZika virus spread quickly through South and Central America in2015. The City of Houston saw its first travel-related Zika cases inDecember of 2015. On January 29th, the City held the first planningmeeting with regional partners from healthcare, blood banks,petrochemical companies, mosquito control, and others. Additionallythe City activated Incident Command Structure (ICS) and designatedthe Public Health Authority as the Incident Commander.Initial steps taken by HHD included expanding the capabilityand capacity of the public health laboratory to test for Zika virus;expand surveillance efforts; created an educational campaign aroundthe "3Ds" of Zika defense (Drain, Dress, DEET) which were thendisseminated through several means, including a mass mailing withwater bills; and provided DEET to mothers through the WIC program.The Houston Health Department took the lead in authoringthe City's Zika Action Plan. In this 3 goals and 6 strategies wereidentified. Goals included 1) Keep Houstonians and visitors aware ofthe threat of Zika; 2) minimize the spread of the virus; and 3) protectpregnant women from the virus. The 6 strategies employed were toA) develop preparedness plans; B) implement ICS within the City;C) ensure situational awareness through surveillance; D) Increasecommunity awareness; E) reduce opportunities for Zika mosquitobreeding grounds; and F) provide direct intervention to reduce thethreat of Zika.HHD was responsible for many of the action items within theplan. We conducted several community outreach events, where wedisseminated educational materials, t-shirts, DEET, and other give-aways. These events allowed frequent engagement with the public forbidrectional communication on how to approach the threat.

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

Abstract

IntroductionThe ICD-9 codes for acute respiratory illness (ARI) andpneumonia/influenza (P&I) are commonly used in ARI surveillance;however, few studies evaluate the accuracy of these codes or theimportance of ICD-9 position. We reviewed ICD-9 codes reportedamong patients identified through severe acute respiratory infection(SARI) surveillance to compare medical record documentation withmedical coding and evaluated ICD-9 codes assigned to patients withinfluenza detections.MethodsThe Minnesota Department of Health (MDH) conducted SARIsurveillance at three hospitals. All hospitalized patients withsubmission of a physician-ordered upper respiratory specimens(e.g., sputum, throat or nasopharyngeal swabs) were enrolled.A medical chart review was conducted to identify those meetingSARI criteria, defined as patients admitted to an inpatient ward withnew onset of respiratory symptoms or acute exacerbation of chronicrespiratory conditions. Enrolled patients who did not meet the SARIcriteria were categorized as non-SARI. Residual material from theupper respiratory specimens were submitted to MDH for influenzatesting by RT-PCR. Demographic and clinical data, including upto eight ICD-9 codes, were collected through the medical recordreview. Patients with an ICD-9 code indicating ARI (460 to 466)or P&I (480 to 488) were defined as having an ARI/P&I code. Wecompared the frequency of ARI/P&I codes by SARI clinical criteriaand influenza detection and evaluated the position of the reportedARI/P&I code.ResultsFrom May 2013 through August 2015, we enrolled 5,950patients, of which 4,449 (75%) met SARI criteria and 1501 did not(non-SARI). An ARI/P&I code in any position was found in 61%(2705) of SARI vs. 16% (241) of non-SARI patients (odds ratio [OR]8.1, 95% confidence interval [CI] 7.0-9.4); an ARI/P&I code in thefirst position was found in 40% of SARI vs 7% of non-SARI patients(OR=8.6, 95% CI 7.0-10.5). Among SARI patients with at least oneARI/P&I code, 66% had their first or only ARI/P&I code in the 1stposition, 25% in the 2ndposition, and 6% in the 3rdposition. Foridentification of SARI, sensitivity/specificity was 61%/84% for ARI/P&I codes in any position and 40%/93% for ARI/P&I codes in the 1stposition. Among SARI patients, codes for pneumonia (486) and acutebronchiolitis (466.11, 466.19) were commonly reported. The mostfrequent codes among SARI patients without an ARI/P&I code werefever (780.6), acute respiratory failure (518.81), and asthma (493.92)(Table). Influenza was detected among 8% (351) of SARI patients.An ARI/P&I code in any position was more common in influenza-positive vs. influenza-negative SARI patients (77% vs 59%, OR 2.4,95% CI 1.8-3.1). An ARI/P&I code in the 1stposition was slightlymore common in influenza-positive vs -negative patients though notsignificant (44% vs 40%).ConclusionsAmong patients from whom a respiratory specimen was collected,administrative data identified those meeting SARI with moderatesensitivity and high specificity, and with lower sensitivity but greaterspecificity when limited to the 1stICD-9 position. Pneumonia andacute bronchiolitis ICD-9 codes were frequent ARI/P&I codes amongSARI patients. Further investigation is needed to determine the valueof including additional ICD-9 codes, such as respiratory distress andacute asthma exacerbation, in identifying SARI.

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

Abstract

ObjectiveThis study assessed the transmission of low pathogenic avianinfluenza in live poultry market setting, using paired fecal anddrinking water samples from a longitudinal surveillance program.The relative contribution of transmission via direct fecal-oral routeversus drinking water will be determined.IntroductionLive poultry markets (LPMs) continue to operate in many Asiancountries. Low pathogenic avian influenza (LPAI) viruses areoften endemic in the poultry, and LPM presents the opportunity forhuman-poultry interactions and potential human infections with avianinfluenza viruses.As a series of interventions to control avian influenza transmissionin Hong Kong LPMs, local health authority implemented marketrest days once every month since mid-2001, and an additional restday every month since 2003, during which all unsold poultry wereslaughtered and the stalls cleaned and disinfected. Rest days werefound to effectively reduce avian influenza A(H9N2) isolation rateto baseline level for a few days following the rest days. However,H9N2 isolation rate was still observed to be increasing between therest days, indicating the existence of efficient transmission in spite ofrapid turnover of poultry.In LPMs, poultry are usually stored in cages where drinkingwater is shared among poultry. This is analogous to environmentalcontamination in the wild, but transmissibility may even be higherdue to the dense environment. The use of drinking water for avianinfluenza surveillance in LPM setting was suggested to be moresensitive than fecal samples (1). However, the relative contributionof direct fecal-oral versus water transmission routes in the LPMsetting was not yet understood. This study aimed to determine theirrole, which will have implications in the control of avian influenzatransmission.MethodsWe analyzed 7,321 paired fecal and drinking water samplesfrom a longitudinal surveillance programme during the period with2 monthly rest days in the LPMs. Samples were collected fromchicken cages and subsequently cultured. Positive isolates weresubtyped by hemagglutination-inhibition tests and neuraminidaseinhibition test. Data were aggregated by sampling occasion and daysafter the rest days.A compartmental transmission model which incorporated turnoverand overnight stay of poultry, virus contamination and decay indrinking water was fitted to the data (Figure 1). A 12-hour tradingday was assumed. Based on the parameterized model, we simulatedthe scenario that water transmission was prohibited to assess the roleof transmission via drinking water.ResultsH9N2 isolation rates ranged from 0-25% for fecal samples and0-56% for drinking water samples. A clear increasing trend can beseen over days after the rest days (Figure 2). The estimated parameterfor water transmission is higher than the parameter for direct fecal-oraltransmission. Simulation results show that transmission via drinkingwater plays a major role in the amplification of LPAI in the LPMsetting (Figure 2).ConclusionsOur study showed that drinking water has a major role in thetransmission and amplification of LPAI H9N2 in LPMs, comparingto direct fecal-oral transmission route. Given the relatively lowprevalence of H9N2 in chicken, direct transmission is governed bychance events, while chickens are consistently exposed to viruses indrinking water if contaminated. Drinking water could be targeted forintervention to control LPAI transmission in LPM. The use of drinkingfountain or frequent disinfection of drinking water may be considered.Avian influenza viruses (e.g. H5N1) may differ in their pattern ofvirus shedding via oral versus fecal routes and thus extrapolation ofthese results to other viruses needs to be done with caution. However,H7N9 viruses are similar to H9N2 viruses by being shed primarilyvia the respiratory / oral route (2) and it is reasonable to assume thatthese conclusions would apply to H7N9 virus which is of major publichealth concern. However, our model could not differentiate the effectof indirect fecal-oral transmission through contamination of drinkingwater by droppings versus contamination through drinking.

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

Abstract

ObjectiveTo study the immune response in chicken on the administration ofLPAIV isolated from the natural reservoir.IntroductionInfluenza is a serious problem for the health of people, animals andbirds. Therefore, comprehensive study of influenza virus, its naturalreservoir, pathogenesis and immune response will provide furtheropportunity to ensure protection for animals, birds and people fromthis infection.MethodsFour-week-old commercial chickens were intranasally inoculatedwith a H4N6 LPAIV A/Garganey/Chervonooskilske/4-11/2009(H4N6), isolated from the cloacal swab of clinically healthy garganeyin 2009 in Ukraine. Cecum, spleen, lung, and trachea samples werecollected from infected chickens on 1 - 14 dpi and examined byimmunohistochemical and virology techniques. On these days,we collected blood samples for serological analysis. Detection ofantibodies to avian influenza virus subtype H4 was performed withchicken serum samples by HI test and ELISA. The studies were doneaccording to IACUC.ResultsUpon intravenous and intranasal infection with this virus(A/Garganey/Chervonooskilske/4-11/2009), no clinical signs wereobserved in chickens and no pathological changes were found atnecropsy. Infection of poultry with this virus provoked an antibodyresponse at 10 days after intranasal inoculation which ranged from1:8 to 1:32 serum antibody titers. Only 2 of 5 chickens were positiveby the HI test and 3 of 5 were positive by ELISA at intranasalinoculation. All 10 chickens were positive both by HI test and byELISA after intravenous inoculation. Specific antibodies (HI test) toinfluenza virus H4 were detected in titer ranges of 1:128 to 1:1024.In immunohistological studies, the respiratory tract organs (lungsand trachea) showed higher level of humoral immunity (IgM, IgG,IgA-expressing cells) in the lung compared to the trachea. Also,indicators of cell mediated immunity as measured by the CD4 andmacrophage markers were higher in LPAIV-infected chickens inthe lungs at 14 days post infection compared to uninfected chickens.Lymphocytes expressing CD8 were increased starting 7dpi.The chickens in the infected group showed 2 times higher levels ofCD8 cells compared to the control chickens. IFN-γtranscripts wereobserved in the AI-infected chickens starting at 7dpi that coincideswith the increasing level ofCD4 cells. The number of lymphocytes which secrete IL-2 andIL-15 in AI-infected chickens were in general 1.5 to 2 times highercompared to the uninfected chickens. In AIV-infected chickens, thelevel of cells expressing IFN-γ, IL-2, and IL-15 increased at 7-daysafter infection. The peak time coincided with a period of increasingCD8 cells. However, there was no significant difference in thesecytokine levels between the AIV-infected and uninfected groups.In the cecum, lower levels of CD4 cells were seen on 5 dpi butlevels slowly increased from 7 dpi to 14 dpi following AIV infection.In the ceca, a significant increase in the number of cells expressingIgM and IgG was found.LPAIV infection induced an increase in macrophages andlymphocytes expressing CD4 and CD8 in the spleen throughout theperiod examined in this study indicating their role in host responseto viral infection. The levels of macrophages in chickens of AIV-infected group were 2 times higher than the control after 1 dpi.ConclusionsAlthough infection with a LPAIV did not cause obvious clinicaldisease, viral replication was detected in the trachea and spleen andboth local and systemic cellular and humoral immune responses wereelicited in these LPAIV-infected chickens. Our results indicate thepotential possibility for infection of poultry with viruses isolated fromwild birds. But currently it is not completely known why some virusesfrom wild birds can cause infection in poultry, while others can not.Further study of the immune response will enable us to determine thefeatures of the pathogenesis of low pathogenic avian influenza.

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

Abstract

ObjectiveImprove disease reporting and outbreak mangement.IntroductionSpecific communicable diseases have to be reported by law withina specific time period. In Ohio, prior to 2001, most of these diseasereports were on paper reports that were reported from providers tolocal health departments. In turn the Communicable Disease Nursemailed the hardcopies to the Ohio Department of Health (ODH).In 2001 the Ohio Disease Reporting System (ODRS) was rolled out toall local public health agencies in Ohio.1ODRS is Ohio's portion ofthe National Electronic Disease Surveillance System. ODRS shouldnot be confused with syndromic surveillance systems that are fordetecting a disease outbreak before the disease itself is detected.2Chronic disease surveillance system data has been evaluated forlong term trends and potential enhancements.3However, the use ofcommunicable disease reports vary greatly.4 However, the exportdata has not routinely been used for quality improvement purposesof the disease reporting process itself. In December 2014, GreeneCounty Public Health (GCPH) begain a project to improve reportingof communicable diseases and the response to disease outbreaks.MethodsInitial efforts were to understand the current disease reportingprocess: Quantitative management techniques including creating alogic model and process map of the existing process, brainstormingand ranking of issues. The diseases selected to study included:Campylobacteriosis, Cryptosporidiosis, E. coli O157:H7 &shiga toxin-producing E. coli, Giardiasis, Influenza-associatedhospitalization, Legionnaires' disease, Pertussis, Salmonellosis,and Shigellosis. The next steps included creating a data collectionand analysis plan. An updated process map was created and thepre- and post-process maps were compared to identify areas toimprove. The median number of days were compared before andafter improvements were implemented. Modeling of the impact ofthe process improvements on the median number of days reportedwas conducted. Estimation of the impact in healthy number of daysderived from the reduction in days to report (if any) were calculated.ResultsProcess improvements identified: Ensure all disease reportersuse digital reporting methods preferably starting with electroniclaboratory reporting directly to the online disease reporting system,with other methods such as direct web data entry into system, faxinglab reports, orsecure emailing reports, with no or little hard copy mailing;Centralize incoming email and fax reports (eliminating process steps);Standardize backup staffing procedures for disease reporting staff;Formalize incident command procedures under the authorized personin charge for every incident rather than distribute command betweenenvironmental and clinical services; and place communicable diseasereporting under that single authority rather than clinical services. Thedays to report diseases were reduced from a median of 2 to .5 days(p<.001). All the diseases were improved except for crytosporodiumdue to an outlier report two months late. The estimated societalhealthy days saved were valued at $52,779 in the first eight monthsafter implementation of the improvements.ConclusionsImprovements in disease reporting decreased the reporting timefrom over 2 days to less than 1 day on average. Estimated societalhealthy days saved by this project during the first 9 months was$52,779. Management of early command and control for outbreakresponse was improved.

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Abstract

ObjectiveWe seek to integrate multiple streams of geo-coded information withthe aim to improve public health surveillance accuracy and efficiency.Specifically for vector-borne diseases, knowledge of spatial andtemporal patterns of vector distribution can help early prediction ofhuman incidence. To this end, we develop joint modeling approachesto evaluate the contribution of vector or reservoir information on earlyprediction of human cases. A case study of spatiotemporal modelingof tularemia human incidence and rodent population data from Finnishhealth care districts during the period 1995-2013 is provided. Resultssuggest that spatial and temporal information of rodent abundance isuseful in predicting human cases.IntroductionAn increasing number of geo-coded information streams areavailable with possible use in disease surveillance applications.In this setting, multivariate modeling of health and non-health dataallows assessment of concurrent patterns among data streams andconditioning on one another. Therefore it is appropriate to considerthe analysis of their spatial distributions together. Specifically forvector-borne diseases, knowledge of spatial and temporal patternsof vector distribution could inform incidence in humans. Tularemiais an infectious disease endemic in North America and parts ofEurope. In Finland tularemia is typically mosquito-transmitted withrodents serving as a host; however a country-wide understanding ofthe relationship between rodents and the disease in humans is stilllacking. We propose a methodology to help understand the associationbetween human tularemia incidence and rodent population levels.MethodsData on rodent population levels are collected around the countryby the Finnish Natural Resources Institute. Human Tularaemia casesare recorded as laboratory-confirmed and reported to the NationalInfectious Disease Register (NIDR). Human cases and rodent datawere aggregated to match the 20 Finnish health districts over the period1995-2013 [1]. We develop our methodology in a Bayesian setting.The counts of human cases for each health district in a given yearare assumed to follow a Poisson distribution and the rodent data areassumed to have a categorical likelihood. The linear predictors linkedto the human and rodent likelihood functions are then decomposedadditively into spatial, temporal, and space-time interaction randomeffects. We then link the two likelihoods via the interaction term byassuming that the human spatiotemporal variation is dependent on therodent activity with one-year lag. In the case of the rodent data, wealso included two additional spatial and non-spatial contextual termsto better model ecological effects associated with rodent populationlevels as described before [2]. We then finally develop indicators, onthe scale 0 to 1, to quantify the association between human incidenceand a rodent vector.ResultsResults suggest that spatial and temporal information of rodentabundance is useful in predicting human cases.ConclusionsFuture modeling directions are recommended to includeenvironmental and epidemiological factors. To the best of ourknowledge, this is the first time that rodent data, captured for non-health related purposes, is used to better inform the human risk oftularemia in Finland.

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Abstract

IntroductionSyndromic surveillance is an alternative type of public healthsurveillance which utilises pre-diagnostic data sources to detectoutbreaks earlier than conventional (laboratory) surveillance andmonitor the progression of illnesses in populations. These systems areoften noted for their ability to detect a wider range of cases in under-reported illnesses, utilise existing data sources, and alert public healthauthorities of emerging crises. In addition, they are highly versatileand can be applied to a wide range of illnesses (communicable andnon-communicable) and environmental conditions. As a result, theirimplementation in public health practice is expanding rapidly. Thisscoping review aimed to identify all existing literature detailing thenecessary components in the defining, creating, implementing, andevaluating stages of human infectious disease syndromic surveillancesystems.MethodsA full scoping review protocol was developeda priori. Theresearch question posed for the review was “What are the essentialelements of a fully functional syndromic surveillance system forhuman infectious disease?” Five bibliographic databases (Pubmed,Scopus, CINAHL, Web of Science, ProQuest) and eleven websites(Google, Public Health Ontario, Public Health England, Public HealthAgency of Canada, Centers for Disease Control and Prevention,European Centre for Disease Prevention and Control, InternationalSociety for Disease Surveillance, Syndromic Surveillance Systems inEurope, Eurosurveillance, Kingston Frontenac, Lennox & AddingtonPublic Health (x2)) were searched for peer-reviewed, government,academic, conference, and book literature. A total of 1237 uniquecitations were identified from this search and uploaded into thescoping review softwareCovidence. The titles and abstracts werescreened for relevance to the subject material, resulting in 142documents for full-text screening. Following this step, 55 documentsremained for data extraction and inclusion in the scoping review. Twoindependent reviewers conducted each step.ResultsThe scoping review identified many essential elements in thedefining, creating, implementing, and evaluating of syndromicsurveillance systems. These included the defining of “syndromicsurveillance”, classification of syndromes, data quality andcompleteness, statistical methods, privacy and confidentialityissues, costs, operational challenges, management composition,collaboration with other public health agencies, and evaluationcriteria. Several benefits and limitations of the systems were alsoidentified, when comparing them to other public health surveillancemethods. Benefits included the timeliness of analyses and reporting,potential cost savings, complementing traditional surveillancemethods, high sensitivity, versatility, ability to perform short- andlong-term surveillance, non-specificity of the systems, ability to fillin gaps of under-reported illnesses, and the collaborations whichare fostered through its platform; limitations included the potentialresources and costs required, inability to replace traditional healthcareand surveillance methods, the false alerts which may occur, non-specificity of the systems, poor data quality and completeness, timelags in analyses, limited effectiveness at detecting smaller-scaleoutbreaks, and privacy issues with accessing data.ConclusionsOver the past decade, syndromic surveillance systems have becomean integral part of public health practice internationally. Their abilityto monitor a wide variety of illnesses and conditions, detect illnessesearlier than traditional surveillance methods, and be created usingexisting data sources make them a valuable public health tool.The results from this scoping review demonstrate the benefits andlimitations and overall role of the systems in public health practice.In addition, this study also shows that a complete set of key elementsare required in order to properly define, create, implement, andevaluate these systems to ensure their effectiveness and performance.

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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) Early detection ofAedes-borne arboviral disease; (2) improveddata onAe. aegyptiandAe. albopictusdistribution in the UnitedStates (U.S.); and (3) education of clinicians and the public.IntroductionZika, chikungunya, and dengue have surged in the Americas overthe past several years and pose serious health threats in regions of theU.S. whereAe. aegyptiandAe. albopictusmosquito vectors occur.Ae. aegyptihave been detected up to 6 months of the year or longer inparts of Arizona, Florida, and Texas where mosquito surveillance isregularly conducted. However, many areas in the U.S. lack basic dataon vector presence or absence. The Zika, dengue, and chikungunyaviruses range in pathogenicity, but all include asymptomatic or mildpresentations for which individuals may not seek care. Traditionalpassive surveillance systems rely on confirmatory laboratory testingand may not detect emergent disease until there is high morbidity in acommunity or severe disease presentation. Participatory surveillanceis an approach to disease detection that allows the public to directlyreport symptoms electronically and provides rapid visualization ofaggregated data to the user and public health agencies. Several suchsystems have been shown to be sensitive, accurate, and timelierthan traditional surveillance. We developed Kidenga, a mobilephone app and participatory surveillance system, to address someof the challenges in early detection of day-biting mosquitoes andAedes-borne arboviruses and to enhance dissemination of informationto at-risk communities.MethodsKidenga sends a weekly push notification prompting users toreport symptoms, travel history, and day-biting mosquito activity.If an individual reports through Kidenga that they or a family memberhave had symptoms consistent with Zika, dengue, or chikungunya,they receive an email with educational information about the diseases,prevention strategies, and treatment/testing information for clinicians.Upon registration, users can opt in to have additional follow-up viaemail. At any time, users may also view maps of aggregated userreports, confirmed case counts by county from public health partners(in pilot areas),Aedesdistribution maps, information about preventionand control strategies, and news on the diseases and vectors from acurated newsfeed. Users in select pilot areas may also receive pressreleases issued by their state or local public health department relatedto the diseases and their vectors. University of Arizona owns andmaintains the app and its data. Local and state health departmentsthat want more detailed information on user symptoms and mosquitoactivity may request and monitor the data at no cost. A marketingcampaign to recruit a broad user base is being implemented inArizona, Texas, and Florida.ResultsKidenga was developed with significant input from public healthstakeholders and launched in September 2016,accompanied byEnglish and Spanish radio public service announcements in selectArizona markets, press releases, and a social marketing campaign.A Spanish version of the app is under development. We willdescribe the results of user registration and survey submissions,challenges identified during development and deployment of thisnovel surveillance system, plans for data use and evaluation, andcollaborations with public health partners.ConclusionsThe utility of Kidenga as a surveillance system will depend onbroad and consistent participation among diverse user populations,particularly in low-risk areas; strategies to integrate health reports forhigh-risk populations who may not have smartphones; validation ofdata and development of sensitive and specific algorithms for takingpublic health action, and buy-in from public health departments touse the data and advocate for this novel surveillance tool. Kidenga’ssecondary function as an education tool onAedes-borne viruses is lessdependent upon a large user base and can be evaluated separately.Participatory surveillance systems that specifically monitorAedes-borne pathogens are relatively new, and the challenges associatedwith their early detection may differ from those of other diseases.

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Abstract

IntroductionThere is no safe level of lead in the body, and elevated lead inchildren can lead to decreased Intelligence Quotients (IQ) andbehavioral problems. The American Academy of Pediatricsrecommends lead testing of children with a positive risk assessment.Children who live in low socioeconomic areas may be at higher riskfor lead exposure. As recent events have shown, having an elevatedlead poisoning surveillance system can be critical to ensure that thereis not a community-wide lead exposure. To reach the children thatmay not have been screened by a primary care physician, on March1, 2016 the Sedgwick County Health Department Women, Infants,and Children (WIC) program began offering lead screenings to allchildren in the WIC program and their mothers. Per Centers forDisease Control and Prevention (CDC) guidelines, the SedgwickCounty Health Department Epidemiology program (Epi) investigatesanyone who has an elevated blood lead test (5µg/dL or greater).There are two types of lead tests – screening (capillary finger stick)and confirmatory (venous blood draw).MethodsSedgwick County WIC clients are offered screening lead testingat their WIC appointments. Education to reduce lead exposure isprovided at the time the test is performed. The filter papers used in thistesting are sent to the Kansas Health and Environmental Laboratories(KHEL) for analysis, and the results are reported to Epi. Epi reportsthe lead testing results to WIC, who track the results in their patientcharts. Epi receives KHEL results of <5µg/dL via fax and resultsof >= 5µg/dL via electronic laboratory reporting in the EpiTraxdisease investigation software maintained by the Kansas Departmentof Health and Environment. Epi notifies any WIC clients with results>= 5µg/dL, while WIC staff notify all other clients about their results.Education is provided to the client a second time by Epi staff and/ora WIC nurse or dietician. For clients with elevated blood lead tests,Epi interviews the case or guardian using an enhanced blood leadexposure questionnaire which asks about potential lead exposures,both in the home and at other locations (work, hobbies, etc.). If only ascreening test was performed, Epi recommends confirmatory testing.WIC lead testing program measures, including types of exposuresidentified, are monitored over time using data obtained from EpiTrax.ResultsBetween March 1 and July 21, of the 2,150 WIC clients offeredlead testing, 89% self-reported never having received a lead testpreviously. Of the 1,427 clients with WIC lead screening results,seven cases of elevated blood lead were identified. Of the seven, fivedid not have a previous elevated lead test in EpiTrax. The averagescreening test result was 8.6µg/dL (range 6.8 to 13.4). The averageage of the cases was 2 years (range 1-4). Of the seven cases, two(29%) were confirmed as 10.0 and 11.0µg/dL through venous testingat their primary care provider’s office. The remaining five cases havenot received confirmatory testing. One of the three cases interviewedreported that their babysitter lived in an old home, which could bethe source of lead exposure. While interviewing a child’s guardianabout an elevated 2016 test (7.9µg/dL), Epi discussed a previous2015 elevated lead test (6.0µg/dL) of which the client’s guardianwas unaware.ConclusionsThe ease of access to lead testing in the Sedgwick County WICprogram and the joint effort between WIC and Epi to implement anenhanced lead poisoning surveillance system identified six childrenwith elevated lead levels whose guardians did not know they hadelevated lead levels. This new surveillance program educates WICparents about lead, determines the lead levels in children for guardianknowledge (low level) and further follow-up (elevated level), andidentifies lead exposures of WIC children with elevated lead tests.

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Abstract

ObjectiveTo retrospectively identify initial emergency department (ED)and urgent care center (UCC) visits for Florida’s Middle Eastrespiratory syndrome coronavirus disease (MERS-CoV) patientsunder investigation (PUIs) in the Florida Department of Health’s(DOH) syndromic surveillance system, the Electronic SurveillanceSystem for the Early Notification of Community-based Epidemics(ESSENCE-FL), using information gathered from PUI case reportforms and corresponding medical records for the purpose ofimproving syndromic surveillance for MERS-CoV. The results ofthis study may be further utilized in an effort to evaluate the currentMERS-CoV surveillance query.IntroductionHuman MERS-CoV was first reported in September 2012. Globally,all reported cases have been linked through travel to or residence inthe Arabian Peninsula with the exception of cases associated with anoutbreak involving multiple health care facilities in the Republic ofKorea ending in July 2015. While the majority of MERS-CoV caseshave been reported in the Arabian Peninsula, several cases have beenreported outside of the region. Most cases are believed to have beenacquired in the Middle East and then exported elsewhere, with no orrare instances of secondary transmission. Two cases of MERS-CoVwere exported to the United States and identified in May 2014. Oneof these cases traveled from Saudi Arabia to Florida.DOH conducts regular surveillance for MERS-CoV through theinvestigation of persons with known risk factors. PUIs have mostoften been identified by physicians reporting directly to local healthdepartments and by DOH staff regularly querying ED and UCC chiefcomplaint data in ESSENCE-FL. ESSENCE-FL currently capturesdata from 265 EDs and UCCs statewide and has been useful inidentifying cases associated with reportable disease and emergingpathogens.MethodsFrom 2013-2015 DOH identified and investigated 62 suspectedcases of MERS-CoV, including one confirmed case in May 2014.Specimens were collected from all 62 patients under investigation(PUIs) and 61 were ruled out. Of the 61 PUIs who were ruled out,ten were part of the contact investigation initiated following theidentification of MERS-CoV in May 2014 and were not included inthis analysis. DOH utilizes a MERS-CoV PUI case report form tocollect data regarding demographics, clinical presentation, and riskfactors. Retrospectively, additional documents including medicalrecords and discharge summaries were gathered and utilized toevaluate PUIs identified in ESSENCE-FL.Name of the facility where PUIs presented, date and time of visit,age at event, and sex were identified using PUI case report forms andcorresponding medical records and discharge summaries. Visit detailsfor each of the identified facilities were queried in ESSENCE-FLand pulled for all visits with corresponding age at event and sex forthe patient’s visit date. Additional PUI information including chiefcomplaint, discharge diagnosis, ZIP code, race, and ethnicity weregathered for the purpose of matching corresponding ESSENCE-FLdata fields. ESSENCE-FL visit details were narrowed by ZIP code (orlack of ZIP code for residents of other countries) and match detailswere recorded and evaluated. The fields examined were not alwayscomplete in ESSENCE-FL. Visits were considered matches when allavailable data in the fields examined were consistent with informationobtained in the PUI case report form and available medical recordsand discharge summaries.ResultsOf the 52 PUIs included in this analysis, 39 sought treatmentat facilities participating in ESSENCE-FL at their time of visit.Comparing information obtained from PUI documents with dataprovided in ESSENCE-FL, 30 ED visits were successfully matchedto PUIs, including an initial ED visit for the patient with a confirmedcase of MERS-CoV.ConclusionsFollowing preliminary identification, all matches are to beconfirmed with the appropriate hospitals. Future work to examine thechief complaints associated with patients’ initial ED visits identifiedin ESSENCE-FL will serve as a way to validate and improve uponthe query currently being used as a surveillance tool for MERS-CoV.Detailing these methods also has value in the replication of thisstudy for other diseases and in the development and validation ofother disease-specific queries. Summarizing the reasons why PUIswere unable to be matched to ESSENCE-FL visits is also useful inimproving system robustness.

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Abstract

ObjectiveThe purpose of this article was to quantitative analyses the spatialvariability and temporal variability of influenza like illness (ILI) bya three-level Poisson model, which means to explain the spatial andtemporal level effects by introducing the random effects.IntroductionThe early detection of outbreaks of diseases is one of the mostchallenging objectives of epidemiological surveillance systems. Inorder to achieve this goal, the primary foundation is using those bigsurveillance data for understanding and controlling the spatiotemporalvariability of disease through populations. Typically, publichealth’s surveillance system would generate data with the big datacharacteristics of high volume, velocity, and variety. One commonquestion of big data analysis is most of the data have the multilevel orhierarchy structure, in other word the big data are non-independent.Traditional multilevel or hierarchical model can only deal with 2 or3 hierarchical data structure, which bound health big data furtherresearch for modeling, forecast and early-warning in the public healthsurveillance, in particular involving complex spatial and temporalvariability of Infectious Diseases in the reality.MethodsAll the data based the ISSC project from April 1 2012 throughMarch 31 2014 in the China. We adopted Markov Chain MonteCarlo algorithm (MCMC) in Bayesian hierarchical (multilevel)model, which means to explain the spatial and temporal leveleffects by introducing the random effects. In order to calculate thegeographical variations and temporal variation of ILI cases duringtwo years surveillance, we constructed spatial and temporal modelof three levels, which was day-in-months → months-in-two-year→Monitoring Units (Fig-1). Level one was repeated measures withinevery month, which was referred as day-in-months and the maximumvalue was 31 days. Level two was the variation tendency of monthswhich was 24 months. Level three was the effect of spatial distributionof monitoring units, which took the spatial heterogeneity into accountrather than dependence. This model was then adopted to evaluate andimprove the early warning capacity of syndromic surveillance.ResultsWe adopted multilevel spatio-temporal model (day-in-months →months-in-two-year →Monitoring Units) to analyze the points datacollected from 2 counties in China, including two hospitals at countylevel, 15 central hospital at township level and 152 health care unitsin the villages. The analysis of totally 108163 pieces of point data onILI case indicated there are significant spatial and temporal variationamong these cases. Among two thirds of the variation attributes to thedifference of geographical locations of these monitoring sites. Theremaining one third of the variation attributes to the time dimensions,such as seasonal effect.ConclusionsThe variation of monitoring data collected from health careunits mainly attributes to the difference of geographic locations formonitoring sites, yet only one third of the change attribute to the timechange, such as seasons, holidays and festivals. Therefore, it is criticalto select the location of monitoring site, which is more rational toselect the hotspots with representative characters rather than try tocover the whole monitoring area.

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

Abstract

ObjectiveCase and cluster identification of emergency department visitsrelated to local transmission of Zika virus.IntroductionThe first travel-associated cases of Zika virus infection in NewYork City (NYC) were identified in January 2016. Local transmissionof Zika virus from imported cases is possible due to presence ofAedes albopictus mosquitos. Timely detection of local Zika virustransmission could inform public health interventions and mitigateadditional spread of illness. Daily emergency department (ED) visitsurveillance to detect individual cases and spatio-temporal clusters oflocally-acquired Zika virus disease was initiated in June 2016.MethodsED visits were classified into two Zika syndromes based onchief complaint text and the International Classification of Diseasesversion 9 and 10 diagnosis codes for patients≥6 years old: 1) feverand 2) Zika-like illness. Zika-like illness was defined as visits withmention of Zika; symptoms of rash, fever, and either joint pain orconjunctivitis; diagnosis of Guillain-Barré syndrome; or diagnosis ofrare and non-endemic arboviral infection.We applied the prospective space-time permutation scan statistic1in SaTScan daily since June 2016 to the fever syndrome, selectedas a single representative symptom, to detect clusters by hospital orzip code of patient residence. The maximum spatial cluster size is20% of observed visits, and the maximum temporal cluster size is 14days – reflecting the incubation period.2The study period is 90 days.Statistical significance is determined using Monte Carlo simulations(N=999). Any cluster with a recurrence interval≥365 days issummarized in a map and line-list of contributing visits. The mapdepicts the zip codes of the cluster with an overlay of census tracts athighest risk for human importation of Zika virus, as estimated by azero-inflated Poisson regression model developed at NYC DOHMHthat is updated regularly to reflect the most recent available data onconfirmed cases.Zika-like illness syndrome visits are output in a daily line-list.DOHMH staff contact the EDs that patients visited to determinetravel to Zika-affected country, clinical suspicion of Zika infection,and laboratory testing.ResultsDuring June 1–August 16, 2016, we observed a mean of 253(range: 202-299) ED visits for the fever syndrome per day. Sixteenspatio-temporal fever syndrome clusters have been detected. Of these,2 clusters were during testing and optimization of scan parameters,13 were due to data quality issues, and 1 was dismissed due to thelarge geographic range of the cluster, spanning 3 boroughs.During June 1–August 16, 2016, we observed a mean of 2.7(range: 0-7) ED visits for the Zika-like illness syndrome. Daily countsranged from 0-3 visits from June 1-June 16 and 1-7 visits since June16. Nineteen visits that occurred from July 31-August 4 were furtherinvestigated to establish a protocol for follow-up. Of those, elevenpatients reported recent travel to countries with local transmission,one had travel over 3 months ago and an alternate diagnosis, six hadunknown travel history due to incomplete follow-up, and one reportedno travel. The one without travel had a diagnosis inconsistent withZika virus disease. Subsequently, analysts contacted EDs only for thesubset of Zika-like illness syndrome visits with no indication of travelor without an alternate discharge diagnosis. Findings from this effortwill be presented.ConclusionsThe fever syndrome provides a means to monitor for clusters usingED data. Prospective cluster detection signal volume was manageableand has not identified clusters requiring additional investigation.The Zika-like illness syndrome can be used for case finding.Contacting EDs helps to supplement information missing in thesyndromic system, such as travel history as well as Zika testing anddiagnosis. As Zika-like illness syndrome counts are low and diseaseis emergent, contacting EDs is feasible and helpful in ruling out localZika virus transmission. No visits or clusters to-date have indicatedlocal transmission.

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Abstract

ObjectiveWeekly numbers of deaths are monitored to increase the capacityto deal with both expected and unusual (disease) events such aspandemic influenza, other infections and non-infectious incidents.The monitoring information can potentially be used to detect, trackand estimate the impact of an outbreak or incident on all-causemortality.IntroductionThe mortality monitoring system (initiated in 2009 during theinfluenza A(H1N1) pandemic) is a collaboration between the Centrefor Infectious Disease Control (CIb) and Statistics Netherlands.The system monitors nation-wide reported number of deaths(population size 2014: 16.8 million) from all causes, as cause ofdeath information is not available real-time. Data is received fromStatistics Netherlands by weekly emails.MethodsOnce a week the number of reported deaths is checked for excessabove expected levels at 2 different time-lags: within 1 and 2 weeksafter date of death (covering a median 43% and 96% of all deathsrespectively). A weekly email bulletin reporting the findings is sentto the Infectious Disease Early Warning Unit (at CIb) and a summaryof results is posted on the RIVM website (National Institute for PublicHealth and the Environment). Any known concurrent and possiblyrelated events are also reported. When excess deaths coincide withhot temperatures, the bulletin is sent to the Heat Plan Team (also atRIVM). Data are also sent to EuroMOMO which monitors excessmortality at a European level. For the Dutch system baselines andprediction limits are calculated using a 5 year historical period(updated each July). A serfling-like algorithm based on regressionanalysis is used to produce baselines which includes cyclical seasonaltrends (models based on historical data in which weeks with extremeunderreporting have been removed. Also periods with high excessmortality in winter and summer were removed so as not to influencethe baseline with previous outbreaks).ResultsIncreased mortality occurred during the entire influenza epidemicand up to three weeks thereafter (weeks 1-14 of 2016), except for adrop in week 7 (figure1). Excess mortality was primarily observedin persons 75 or older. Additionally, in several weeks mortality wasincreased in 65-74 year olds, (weeknr 4-6; peaking in week 4 with564 deaths, when 468 baseline deaths were predicted). Also, inweek 4, mortality in the 25-34 year-old age group was significantlyincreased (25 deaths, while 14 were expected as baseline). Cumulativeexcess mortality was estimated at 3,900 deaths occurring duringthe 11 weeks of the 2015/2016 influenza epidemic and at 6,085during the total winter season (44 weeks running from week 40 up toweek 20).ConclusionsIn terms of number of deaths during the winter season (weeks40-20) and during the influenza epidemic (weeks 1-11), the 2015/2016season in the Netherlands was of moderate severity compared with theprevious five years (and was of similar magnitude as the 2011/2012winter). Notable was the short three-week time span with a higherpeak in mortality in 65-74 year olds than has been observed in recentyears. Although the influenza epidemic reached its peak in week7, the mortality data showed a dip in week 7. The reason for thetemporary decrease is unknown but there was a partial overlap witha public holiday.

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Abstract

ObjectiveTo determine if all-cause and cause-specific school absencesimprove predictions of virologically confirmed influenza in thecommunity.IntroductionSchool-based influenza surveillance has been considered forreal-time monitoring of influenza, as children 5-17 years old play animportant role in community-level transmission.MethodsThe Allegheny County Department of Health provided virologicallyconfirmed influenza data collected from all emergency departmentsand outpatient providers in the county for 2007 and 2011-2016.All-cause school absence rates were collected from nine schooldistricts within Allegheny County for 2010-2015. For a subset ofthese schools, in addition to all-cause absences, influenza-like illness(ILI)-specific absences were collected using a standard protocol:10 K-5 schools in one school district (2007-2008), nine K-12 schoolsin two school districts (2012-2013), and nine K-12 schools from threeschool districts (2015-2016). We used negative binomial regressionto predict weekly county-level influenza cases in Allegheny County,Pennsylvania, during the 2010-2015 influenza seasons. We includedthe following covariates in candidate models: all-cause school absencerates with different lags (weekly, 1-3 week lags, assessed in separatemodels using all other covariates) and administrative levels (county,school type, and grade), week and month of the year (assessed inseparate models), average weekly temperature, and average weeklyrelative humidity. Separately, for the three districts for whichILI-specific and all-cause absences were available, we predictedweekly county-level influenza cases using all-cause and ILI-specificabsences with all previously stated covariates. We used several cross-validation approaches to assess models, including leave 20% of weeksout, leave 20% of schools out, and leave 52-weeks out.ResultsOverall, 2,395,020 all-cause absences were observed in nineschool districts. From the subset of schools that collected ILI-specificabsences, 14,078 all-cause and 2,617 ILI-related absences werereported. A total of 11,946 virologically confirmed influenza caseswere reported in Allegheny County (Figure 1). Inclusion of 1-weeklagged absence rates in multivariate models improved model fits andpredictions of influenza cases over models using week of year andweekly average temperature (change in AIC=-4). Using grade-specificall-cause absences, absences from lower grades explained data best.For example, kindergarten absences explained 22.1% of modeldeviance compared to 0.43% using 12thgrade absences in validation.Multivariate models of week-lagged kindergarten absences, week ofyear, and weekly average temperature had the best fits over othergrade-specific multivariate models (change in AIC=-6 comparingK to 12thgrade). The utility of ILI-specific absences compared to totalabsences is mixed, performing marginally better, adjusting for othercovariates, in 2 years, but markedly worse in 1 year. However, theseresults were based on a small number of observations.ConclusionsOur findings suggest models including younger student absencesimprove predictions of virologically confirmed influenza. We foundILI-specific absences performed similarly to all-cause absences;however, more observations are needed to assess the relativeperformances of these two datasets.

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

Abstract

ObjectiveUsing active surveillance approaches to investigate the transmissiondynamics of rabies on Pemba Island and across Southern Tanzania,whilst a large-scale dog vaccination program was underway1, to gaina greater understanding of the dynamics of infection as the disease isdriven towards elimination.IntroductionRabies is endemic in Tanzania and has circulated on Pemba Islandsince the late 1990s. In 2010, an elimination programme was initiatedin Southern Tanzania to demonstrate that human rabies deathscan be eliminated through mass dog vaccinations. We used activesurveillance approaches2to investigate the dynamics of rabies acrossthe area where this programme was implemented.MethodsGovernment census data and post-vaccination transects were usedto estimate the dog population and coverages achieved by vaccinationcampaigns. Routine surveillance of animal bite injuries using a mobilephone-based surveillance system3and active contact tracing wereused to identify animal rabies cases and human exposures. Epidemictrees were constructed using spatiotemporal distances between casesand used to estimate the effective reproduction number (Re). Weexamined factors affecting rabies incidence and transmission usinggeneralized linear mixed models.ResultsWe estimated a small dog population of 4095 and low dog:humanratio on Pemba (1:105). Overall island-wide vaccination coverageincreased from 16.8% in 2011 to 68.2% in 2014. We found a further48 human exposures (343%), who either were not reported or did notobtain post exposure prophylaxes (PEP). Routine surveillance wasfound to detect less than 10% (~8.75%). There was a rapid declinein cases detected on Pemba, from 42 before mass dog vaccinationswere implemented in 2011, to 2 cases in 2014 (Figures 1). Since May2014, no rabies cases have been detected. Similarly, Redeclined from1.02 to 0 and a significant relationship was found with rabies casesdecreasing with increasing vaccination coverage (p= 0.013, Figure 2).Across seven other districts on the Tanzanian mainland we alsoobserved major declines in rabies cases with very few cases of rabiesin dogs detected in 2016 (Figure 3).ConclusionsWe conclude that rabies has been eliminated from domestic dogpopulations on Pemba over the five years since vaccination campaignshave been implemented. Continued surveillance and investigationsof any bite incidents are therefore needed to ensure any subsequentincursions are controlled and freedom from rabies is maintained.On the Tanzanian mainland, it has taken longer to control rabies,however trajectories look promising with several districts close toeliminating the disease. However, detection of some wildlife casesin the last 12 months in these districts indicates the need to furtherinvestigate remaining foci and the role of wildlife in maintenance.

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

Abstract

ObjectiveTo examine the baseline influenza-like illness (ILI) rates in theemergency departments (ED) of a large academic medical center(AMC), community hospital (CH), and neighboring adult andpediatric primary care clinics.IntroductionThe primary goal of syndromic surveillance is early recognitionof disease trends, in order to identify and control infectious diseaseoutbreaks, such as influenza. For surveillance of influenza-like illness(ILI), public health departments receive data from multiple sourceswith varying degrees of patient acuity, including outpatient clinicsand emergency departments. However, the lack of standardization ofthese data sources may lead to varying baseline levels of ILI activitywithin a local area.MethodsGeographic Utilization of Artificial Intelligence in Real-Timefor Disease Identification and Alert Notification (GUARDIAN) – asyndromic surveillance program – was used to automate ILI detectionusing free text chief complaint/reason for visit fields and vital signsfor a large AMC - ED, CH - ED, and neighboring outpatient clinicsduring the summer (June 15, 2016 to August 18, 2016) in order tocreate a baseline. The GUARDIAN system defined ILI as fever(temperature≥100°F) and cough and/or sore throat. Descriptiveanalysis of the observed ILI rates along with bivariate ANOVA withpost hoc Bonferroni and t-test were utilized to examine the differencewithin the settings.ResultsThe average ILI rate for EDs is higher than the clinics by at least0.39%. The CH- ED had 4.23% baseline ILI rate as compared to1.35% for AMC-ED. While the AMC – Clinics have 0.96% baselineILI rate as compared to 0.25% for CH – Clinics. The CH- ED andAMC – Clinics represented higher variations. Based on bivariate test,CH – ED was significantly different than AMC – ED, AMC - Clinics,and CH – Clinics (F= 10.58, df = 1238, p<0.05). For the AMC –Clinics, the average ILI rate for clinics providing services to adultpatients was 0.66% (SD: 4.5%) as compared to 2.03% (SD: 10.81%)for pediatric clinics, which was not statistically significant.ConclusionsThe CH - ED has higher baseline ILI rates compared to othersettings, as well as the CDC Region 5’s baseline (1.9% for 2015-2016). Based on previous studies1, this is likely due to providers’use of chief complaint free text fields. Thus, the CH – ED will havehigher thresholds for widespread ILI activity. In addition, differencesin baseline ILI rates between AMC - ED, AMC - Clinics, and CH -Clinics may result in different thresholds for widespread ILI activity(i.e., Average + 3 Standard Deviations). The CH – ED and AMC –Clinics had higher baseline standard deviations, indicting variationsin underlying patient populations. In addition, pediatric clinics havehigher baseline ILI activity but also higher variations, indicating theunique characteristics of pediatric patients. Thus, due to the abovefindings, there is a need to closely monitor the ILI rates at varioushealthcare sites for both timing of onset, as well as the intensity ofILI activity.

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

Abstract

ObjectiveTo estimate mortality attributable to influenza adjusted for othercommon respiratory pathogens, baseline seasonal trends and extremetemperatures.IntroductionAssigning causes of deaths to seasonal infectious diseases is difficultin part due to laboratory testing prior to death being uncommon. Sinceinfluenza (and other common respiratory pathogens) are thereforenotoriously underreported as a (contributing) cause of death in death-cause statistics modeling studies are commonly used to estimate theimpact of influenza on mortality.MethodsUsing primary cause of death (Statistics Netherlands) we modeledweekly timeseries of1) respiratory deaths (ICD10 codes J00-J99) and2) circulatory deaths (ICD10 codes I00-I99).We used regression models with an identity link and Poissonerror to relate mortality to counts of influenza A & B diagnoses.We adjusted for other common respiratory pathogens (all pathogendata was at population level from the national laboratory surveillance),temperature (from the Dutch Royal Meteorological Institute), andbaseline linear and cyclical (i.e. seasonal) trends. To account forthe yearly variation in the severity of the main circulating influenzaA strain we used time dependent variables for influenza A (fixedat lag 0 – assuming a direct effect of influenza. For influenza Band the confoundig pathogens we considered a 0 tot -4 time lag(thus allowing infection to precede death for up to 4 weeks).We performed the analyses separately per death cause group and by3 different age groups (0-64, 65-74,75+ years) over a 14-year time-period (mid 1999-mid 2013, thus 14 complete winter seasons).ResultsIn the Netherlands on average 2,636 all cause deaths occurper week varying by season (lower in summer min: 2,219 and higherin winter max: 3,564) with yearly incidence ranging from 20/10,000in 0-64 year olds to 885/10,000 in 75-plus year olds.Circulatory mortality (31% of total deaths) was higher thanrespiratory mortality (10% of total deaths) and both showed clearseasonality in all age-groups. Overall, 0.14% of all deaths wereactually coded as influenza deaths.Preliminary model estimates showed that the proportion ofrespiratory deaths attributable to influenza A were quite similar for 0-64and 65-74 year olds but higher in 75+ (5.1%, 5.7%, 7.0% respectively)while this proportion was stable across age-groups for circulatorydeaths (approximately 1.5% in all agegroups for influenza A).Influenza B was significantly associated with respiratory deathsand circulatory deaths in the oldest age group of 75+ years(with proportions of 0.7% and 0.2% respectively) while in the65-74 year olds it was associated only with circulatory deaths (0.2%).Influenza B was not significantly associated with either respiratory orcirculatory mortality in the 0-64 year age group.On average, yearly in the 75+ age group 70/10,000 respiratorydeaths and 39/10,000 circulatory deaths were attributable to influenzaA. For influenza B the incidences were 7 to 10 fold lower (7/10,000and 6/10,000 respectively).ConclusionsInfluenza A was significantly associated with respiratory andcirculatory mortality in all age groups while influenza B wassignificantly associated with respiratory and circulatory mortality inthe elderly only.

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

Abstract

ObjectiveTo improve timeliness and sensitivity of legionellosis clusterdetection in New York City (NYC) by using all addresses availablefor each patient in one analysis.IntroductionThe Bureau of Communicable Disease (BCD) at the NYCDepartment of Health and Mental Hygiene performs daily automatedanalyses using SaTScan to detect spatio-temporal clusters for37 reportable diseases.1Initially, we analyzed one address per patient,prioritizing home address if available. On September 25, 2015, aBCD investigator noticed two legionellosis cases with similar workaddresses. A third case was identified in a nearby residential facility,and an investigation was initiated to identify a common exposuresource. Four days later, after additional cases living nearby werereported, the SaTScan analysis detected a corresponding cluster.In response to this signaling delay, we implemented a multiple address(MA) analysis to improve upon single address (SA) analyses by usingall location data available on possible exposure sites.2MethodsPositiveLegionellatest results for NYC residents are reported toBCD with patient demographic and address data. BCD interviews allcases to elicit additional locations of potential exposure and enters theaddresses into a disease surveillance database (Maven). Addressesare assigned X/Y coordinates in near real-time via integration with ageocoding webservice.We used the prospective space-time permutation scan statistic inSaTScan,3enabling the advanced input feature on the spatial neighborstab to “include location ID in the scanning window if at least one setof coordinates is included.” This option considered a case as includedin a given cluster ifanyof the case’s addresses were within the cluster.The case file included: unique case ID (as the location ID), number ofcases, onset date, and day of week. The coordinate file included: caseID and X/Y coordinates for each address per case, resulting in one ormore rows per case. We searched for alive clusters with a temporalrange of 2 to 30 days and a maximum spatial size of 50% of observedcases. The study period was 1 year. Monte Carlo simulations (N=999)were used to determine statistical significance.We mimicked prospective surveillance to determine when theSeptember 2015 cluster would have been detected had this analysisbeen in place, by performing daily SA and MA analyses fromSeptember 21 (when the first outbreak-linked case was reported)to September 29 (when the initial SaTScan analysis signaled). Anycluster with a recurrence interval (RI)≥100 days was summarized ina map and linelist. Prospective, automated analyses were launchedin April 2016 and run daily using Microsoft Task Scheduler, SAS9.4, and SaTScan 9.4.1. Signals through July 2016 were summarized.ResultsIn mimicked prospective analysis, the SA and MA SaTScananalyses identified clusters of 13 and 11 cases, respectively, startingSeptember 27, 2015. The MA cluster was more spatially focused(2.11 km vs. 5.42 km) and more unlikely to occur by chance alone(RI of 16,256 days vs. 8,758 days). In prospective analyses, a MAcluster of 6 cases was identified on July 5, 2016 with a radius of1.69 km (RI=100 days). On July 6, the MA cluster case countincreased to 7 and maintained the same radius (RI=685 days), whilea cluster of the same 7 cases was identified by the SA analysis witha larger radius (1.97 km) and lower RI (292 days). The RI for bothclusters peaked on July 7 (MA: 2348 days, SA: 713 days).ConclusionsIn preliminary evaluation, the MA analysis facilitated clusterdetection using non-residential possible exposure sites, such asworkplaces. Timeliness was slightly improved, but the larger practicalbenefit was identifying more spatially focused clusters. Smallerclusters are useful for more precisely targeting legionellosis infectionsource identification and remediation activities, especially in urbanenvironments with high population and building densities.

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

Abstract

ObjectiveTo assess whether the change in death swabbing policy in SierraLeon has begun to affect community death reporting, we analyzedtrends in death reporting before and after the policy change.IntroductionStemming from the 2014-6 Ebola virus disease (EVD) outbreak,community event based surveillance (CEBS) was implemented inSierra Leone using community health workers to generate alerts fortrigger events suggestive of EVD transmission. Through September30, 2015 (last month of active EVD transmission), the majority (86%)of alerts reflected community deaths; this was beneficial as Ebola-related deaths were detected with delay during the epidemic’s peak.The Government had implemented a policy of mandatory swabbingand testing of all dead bodies. The policy changed on June 30, 2016wherein only swabbing of deaths deemed to be high-risk for EVD isrequired. To assess whether this policy change has begun to affectcommunity death reporting, we analyzed trends in death reportingbefore and after the policy change.MethodsThis analysis was conducted using data from nine districts duringperiod 1 (January-June 2016) and period 2 (July 2016). Weeklychanges in the reporting of death alerts during the two periods wereassessed. An interrupted time series analysis (ITS) with a segmentedlinear regression was also used to assess the immediate impact of thepolicy change.ResultsDuring period 1, monthly changes in death alerts across districtswere variable (-8% to 16%). Comparison of the weekly averagebetween periods 1 and 2 showed a 33% reduction in death alerts.During period 1 (before the policy change), there was an overallsignificant increase of 3.2 death alerts per week (p=0.00) andno immediate impact or changes in the trend afterwards. At thedistrict level, on average 354 death alerts were generated weekly inJune, compared to 237 in July (33% reduction); Moyamba districtexperienced the largest drop in death alerts from 46 to 16 (65%).ConclusionsCommunity death reporting provides early warning of EVDtransmission by rapidly capturing death alerts where vital registrationis not fully functional. Although we have one month of data post-policy change, this preliminary analysis suggests that the changein swabbing policy may have halted an observed increase in deathreporting. Further community mobilization efforts and training arewarranted to prevent a drop in death reporting.

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

Abstract

ObjectiveDescribe how the Georgia Department of Public Health (DPH) usessyndromic surveillance to initiate review by District Epidemiologists(DEs) to events that may warrant a public health response (1).IntroductionDPH uses its State Electronic Notifiable Disease SurveillanceSystem (SendSS) Syndromic Surveillance (SS) Module to collect,analyze and display results of emergency department patient chiefcomplaint data from hospitals throughout Georgia.MethodsDPH prepares a daily SS report, based upon the analysis ofdaily visits to 112 Emergency Department (EDs). The visits areclassified in 33 syndromes. Queries of chief complaint and dischargediagnosis are done using the internal query capability of SendSS-SSand programming in SAS/BASE. Charting of the absolute countsor percentage of ED visits by syndromes is done using the internalcharting capability of SendSS-SS. A daily SS report includes thefollowing sections:Statewide Emergency Department Visitsby Priority Syndromes(Bioterrorism, BloodyRespiratory,FeverRespiratory, FeverChest, FeverFluAdmit, FeverFluDeaths,VeryIll, andPoxRashFever, Botulism, Poison, BloodyDiarrhea,BloodyVomit, FeverGI, ILI, FeverFlu, RashFever, Diarrhea,Vomit).Statewide Flag Analysis: Is intended to detect statewideflags, by using theChartscapability in SendSS SS.Possible caseswith presumptive diagnosis of potentially notifiable diseases: Isintended to provide early-warning to the DEs of possible cases thatare reportable to public health immediately or within 7 days usingqueries in the Chief Complaint and Preliminary Diagnosis fields ofSendSS-SS.Possible clusters of illness: Since any cluster of illnessmust be reported immediately to DPH, this analysis is aimed atquerying and identifying possible clusters of patients with similarsymptoms (2).Possible travel-related illness: Is intended to identifypatients with symptoms and recent travel history.Other events ofinterest: Exposures to ill patients in institutional settings (e.g. chiefcomplaint indicates that other children in the daycare have similarsymptoms).Trend Analysis: Weekly analysis of seasonality andtrends of 14 syndromes. Finally, specific events are notified to andreviewed by the 18 DEs, who follow up by contacting the InfectionPreventionists of the hospitals to identify the patients using medicalrecords or other hospital-specific identification numbers and followup on the laboratory test results.ResultsSince 05/15/2016, 12 travel-related illnesses, 29 vaccine-preventable diseases, 14 clusters, and 3 chemical exposures havebeen notified to DEs. For instance, a cluster of chickenpox in childrenwas identified after the DE contacted the Infection Preventionist ofa hospital, who provided the DE with the laboratory results and thephysician notes about the symptoms of the patients. These actionshave resulted in earlier awareness of single cases or cluster of illness,prompt reporting of notifiable diseases, and successful interactionbetween DEs and health care providers. In addition, SS continues totrack the onset, peak, and decline of seasonal illnesses.ConclusionsThe implementation of SS in the State of Georgia is helping withthe timely detection and early responses to disease events and couldprove useful in reducing the disease burden caused by a bioterroristattack.

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

Abstract

ObjectiveTo describe how the state syndromic surveillance system(NC DETECT) was used to initiate near real time surveillance forendocarditis, sepsis and skin infection among drug users.IntroductionRecreational drug use is a major problem in the United States andaround the world. Specifically, drug abuse results in heavy use ofemergency department (ED) services, and is a high financial burdento society and to the hospitals due to chronic ill health and multipleinjection drug use complications. Intravenous drug users are at highrisk of developing sepsis and endocarditis due to the use of a dirty orinfected needle that is either shared with someone else or re-used. Itcan also occur when a drug user repeatedly injects into an inflamedand infected site or due to the poor overall health of an injection druguser. The average cost of hospitalization for aortic valve replacementin USA is about $165,000, and in order for the valve replacement tobe successful, patients must abstain from using drugs.MethodsWe examined temporal trends of drug-related visits to hospitalEDs, as well as drug-related related ED admissions complicated withendocarditis, bacteremia and sepsis.ResultsThe trends in Endocarditis/Sepsis and drug-related relatedadmissions appear to echo overdose related ED admissions increase.Patients ED return visits and hospitalizations for the same problem arealso growing compare to the previous years. We will discuss the NCDETECT case definition used to monitor drug overdose/dependenceand infection, case definition transition from ICD-9 to ICD-10 codes,and will share surveillance analysis results.ConclusionsNC DETECT's system flexibility has been important in rapidlyestablishing surveillance of infections among drug users. Near realtime analysis on hospital, county and state levels can be performedusing NC DETECT system reports to provide state officials, hospitalsand LHDs with situational awareness. Limitations: Syndromicsurveillance ED data contains less accurate information about thediagnosis codes, procedures, length of stay, and severity comparingto the hospital discharge data.

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

Abstract

ObjectiveTo estimate the velocity of Zika virus disease spread in Brazil usingdata on confirmed Zika virus disease cases at the municipal-level.IntroductionLocal transmission of Zika virus has been confirmed in67 countries worldwide and in 46 countries or territories in theAmericas (1,2). On February 1, 2016 the World Health Organizationdeclared a Public Health Emergency of International Concern due tothe increase in microcephaly cases and other neurological disordersreported in Brazil (2). Several countries issued travel warnings forpregnant women travelling to Zika-affected countries with Brazil,Colombia, Ecuador, and El Salvador advising against pregnancy(3-7). The risk of local transmission in unaffected regions is unknownbut potentially significant where competent Zika vectors are present(8) and also given the additional complexities of sexual transmissionand population mobility (9,10). Despite the rapid spread of Zikavirus across the Americas and global concerns regarding its effectson fetuses, little is known about the pattern of spread. Knowledge ofthe direction and the speed of movement of disease is invaluable forpublic health response planning, including the timing and placementof interventions.MethodsData for this analysis were obtained from the Brazil Ministryof Health and consisted of confirmed cases of Zika virus disease.The centroids of the municipalities were taken in meters from theshapefiles and used to perform a surface trend analysis. Surfacetrend is a spatial interpolation method used to estimate continuoussurfaces from point data. The continuous surface of time to infectionwas estimated by regressing it against the X and Y coordinates. Timewas in days and X and Y coordinates were meters. Parameters wereestimated using least squares regression and velocity (in km per day)was obtained by inverting the final magnitude of the slope.ResultsData provided from the Brazil Ministry of Health on May 31,2016, indicated that Zika had been confirmed in 316 of the 5,564municipalities in Brazil representing 26 states, with six additionalmunicipalities identified from other reporting sources. Our modelsindicated a southward pattern of introduction of Zika starting fromthe northeast coast towards the southeastern coastal states of Rio deJanerio, Espírito Santo, and São Paulo. There was also a pattern ofwestern movement towards Bolivia. Overall, the average speed ofdiffusion was 42.1 km/day across all models was 6.9 km/day to amaximum of 634.1 km/day. The municipalities in the Northeast andNorth regions had the slowest speeds whereas the municipalities inthe Central-West and Southeast regions had the highest speeds. Thisis due to proximity of cases in time and space, with more cases havingoccurred closer in time and over larger areas in South, Southeast, andCentral-West regions resulting in faster rates of introduction.ConclusionsThe average speed of spread was 42 km per day and it tookapproximately five to six months for Zika to spread from thenortheastern coast to the southeastern coast and western border ofBrazil. The rapid spread of Zika can help us understand its possiblefuture directions and the pace at which it travels, which are key fortargeted mosquito control interventions, public health messaging, andtravel advisories. A multi-country analysis is needed to understand thecontinental spatial and temporal patterns of dispersion of Zika virus.

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

Abstract

ObjectiveThe objective is to discuss two decades of international experiencein health information and disease surveillance systems strengtheningand synthesize lessons learned as applicable to implementation of theGlobal Health Security Agenda (GHSA).IntroductionRTI International has worked on enhancing health informationand disease surveillance systems in many countries, includingThe Democratic Republic of the Congo (DRC), Guinea, Indonesia,Kenya, Nepal, Philippines, Tanzania, Zambia, and Zimbabwe.Strengthening these systems is critical for all three of the Prevent,Detect and Respond domains within the Global Health SecurityAgenda.We have deep experience in this area, ranging from implementingDistrict Health Information Software (DHIS), electronic medicalrecords, health facility registries, eHealth national strategies,electronic Integrated Disease Surveillance and Response system(eIDSR), mobile real-time malaria surveillance and response, nationalweekly disease surveillance, patient referral system, and communitybased surveillance. These experiences and lessons learned can informwork being done to advance the GHSA.We will discuss several examples, including activities in Zimbabweand Tanzania. RTI has been working in Zimbabwe for over six yearsto strengthen the national health information system. This workhas included the configuration and roll-out of DHIS 2, the nationalelectronic health information system. In doing so, RTI examinedand revitalized the weekly disease surveillance system, improvingdisease reporting timeliness and completeness from 40% to 90%.Additionally, RTI has integrated mobile technology to help morerapidly communicate laboratory test results, a laboratory informationmanagement systems to manage and guide test sample processing,and various other patient level systems in support of health servicedelivery at the local level. This work has involved capacity buildingwithin the ministry of health to allow for sustainable support of healthinformation systems practices and technology and improvements todata dissemination and use practices.Similarly, RTI has worked for more than five years to helpstrengthening the National HIS in Tanzania. These activities haveincluded stakeholder coordination, developing national eHealthstrategy and enterprise architecture, harmonizing indicators,redesigning routine reporting instruments, national DHIS 2 roll-out,information technology infrastructure management and user helpdesk support, reducing the number of parallel information systems,data dissemination and use, development of district health profiles,development of the national health facility registry, and supportingroll-out of the electronic integrated disease surveillance system.MethodsWe will profile selected projects and synthesize critical lessonslearned that pertain to implementation of the GHSA in resourceconstrained countries.ResultsWe will summarize our experience and lessons learned withhealth information and disease surveillance systems strengthening.Topics such as those that relate to advancing the GHSA RealTime Surveillance and Reporting Action Package areas will bediscussed, including: indicator and event based surveillance systems;interoperable, interconnected, electronic real-time reporting system;analysis of surveillance data; syndromic surveillance systems;systems for efficient reporting to WHO, FAO and OIE; and reportingnetwork and protocols in country.ConclusionsOur experience working over the past 14 years in 9 countrieson different HIS and disease surveillance system strengtheningprojects has led to a deep understanding of the challenges aroundimplementation of these systems in limited resource settings. Theseexperiences and lessons learned can inform initiatives and programsto advance the GHSA.

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

Abstract

ObjectiveTo assess essential support functions for Integrated DiseaseSurveillance and Response(IDSR) in the Kingdom of Swaziland andmake recommendations for a national IDSR Roadmap.IntroductionImplementation of the IDSR framework for fulfillment of theInternational Health Regulations (2005) ([IHR 2005]) has beenchallenging in Swaziland due to distribution of IDSR functions acrossunits within the Strategic Information Department (SID) and otherexternal departments within the Ministry of Health. We conducted aqualitative assessment and a Strength, Weaknesses, Opportunities andThreats (SWOT) analysis of current public health surveillance (PHS)support structures to inform implementation of IDSR.MethodsKey informant interviews, focus group discussions, and a deskreview were performed. Participants were personnel at essential units,departments and programs at the national level as well as at healthfacilities and clinics at regional and local levels. Transcripts werecoded into SWOT matrices using MAXQDA for each building blockof PHS: structures, workforce, resources, processes (detect, report,assess/analyze, respond, feedback), and informatics.ResultsSelected Strengths included existence of immediate notifiabledisease reporting through the Epidemic and Pandemic Response unit(EPR) and reporting of summary health facility data to the HealthManagement Information System (HMIS) unit and laboratorynetwork. Weaknesses included lack of clear roles and responsibilitiesfor IDSR among SID units, limited coordination between SID units,lack of data sharing, lack of Standard Operating Procedures (SOPs),uncoordinated case investigations and response, minimal analysisconducted for public health surveillance and limited feedback forreporters..Identified opportunities were political will for establishing ofroles and responsibilities and mechanisms for coordination anddata sharing. Threats were limited data access, limited funding forfeedback, lack of analysis for IDSR and paper-based reportingConclusionsCurrently there is limited use of surveillance data for decisionmaking due to lack of coordination. Findings were presented at adissemination meeting to representatives of relevant departments,and there was consensus on the need to clearly define the role andresponsibilities of different programs for IDSR. In March 2016, aconsensus meeting was held to designate roles and responsibilitiesfor IDSR, a direct result of this assessment. Additional resourcesand funding is needed to support these highly important initiatives toensure the safety and health security of the Swazi nation.

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

Abstract

ObjectiveTo identify Cause of deaths among children below age of 5yearsfrom a prospective cohort of women in one urban and four peri-urbansettings of Karachi, PakistanIntroductionPakistan ranks 26th in Childhood mortality rates, globally. Pakistan,with other 4 countries is responsible for about half of the deaths ofchildren age under 5. Despite such burden vital registration systemis not well established, health facilities are not easily accessible andmostly deaths occur at home, making identification of cause of death(COD) difficultMethodsFrom Jan 2007-Dec 2012 under-5 mortality was identifiedby CHWs during their 3-monthly visits. A Research Assistantconducted Verbal Autopsies (VA). Each VA form was analyzed by2 physicians, independently, and assigned a cause. VA is analyzedby a third physician in case two physicians do not agree on a cause.Cause Specific Mortality Fractions (CSMF) were calculated for eachidentified COD.Results833(58%) neonatal deaths and 591(42%) Under-5 deaths (excludingneonates) were identified. Among neonates most common CODswere perinatal asphyxia(30.4%), neonatal sepsis/meningitis(28%),pre-term birth complication(11%) and neonatal pneumonia(6%).For Post-neonatal deaths most common CODs were sepsis (19%),diarrheal disease (17%), Pneumonia (17%) and meningitis (8%).ConclusionsWe describe the CSMF for different CODs among neonated andchildren under 5. Strategies for prevention of most common causesand making health facilities easily accessible will decrease thisburden.

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

Abstract

ObjectiveIn the spring of 2014, people from vulnerable households in allmarzes of Armenia were examined with the aim of active surveillance.IntroductionBrucellosis is a serious disease caused by bacteria of the Brucellagenus. It principally affects ruminants but may be transmitted tohumans. Registration of cases in cattle farms causes considerableeconomic losses and creates favorable conditions for mass infectionamong humans. In Armenia the expansion of animal industries andurbanization are the main reasons for occurrence and developmentof brucellosis.MethodsBlood was sampled from people on farms reported as havinginfected animals. Blood samples were tested by the Wright-Huddleston method. The standard case definition of brucellosis wasused for diagnosis. A questionnaire-based interview was carried outamong the population to identify the form of contact with animals andto analyze epidemiological links. During the investigation provisionswere followed in governmental decree RA 19.01.2006 N480-Nand brucellosis prevention, epidemiology, diagnosis, treatment,preventive measures.ResultsA total of 11160 people from 1054 households were enrolled in thestudy, of which 3625 (32.5%) underwent a laboratory examination.Nearly 6% (641) refused to be tested. Over 6% of those tested (226)were positive for antibodies to Brucellae. Of these, 129 (3.5%) hadchronic brucellosis. Those testing positive for brucellosis were treatedappropriately. These included 203 (90%) adults and 23 (10%) below14 years old; 147 (65%) were male and 79 (35%) were female.Of those diagnosed with brucellosis, working in animal husbandryaccounted for 46.6% (106), while those who harvested milk accountedfor 37.6% (85) and those using raw milk made up 15.4% (35).ConclusionsCases were most frequently reported among people 20-55 years ofage; the highest percentage of positives were among 41-45 year oldmales who had contact with infected animals. The main risk factor foracquiring brucellosis is animal husbandry.

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

Abstract

IntroductionEpiCore draws on the knowledge of a global community of human,animal, and environmental health professionals to verify informationon disease outbreaks in their geographic regions. By using innovativesurveillance techniques and crowdsourcing these experts, EpiCoreenables faster global outbreak detection, verification, and reporting.MethodsThrough a secure online platform, members are able to easily andquickly provide local information to expedite outbreak verification.EpiCore volunteer applications are vetted to ensure that they possessthe public health and epidemiologic expertise necessary to contributeto the platform.ResultsEpiCore currently has over 1600 members that span 135 countries.During the first 8 months of EpiCore’s launch, 172 requests forinformation to volunteers have been posted with an average responserate of over 80%.ConclusionsWith its geographical distribution of members and high responserate, EpiCore is poised to enable the world to verify potential outbreaksignals faster. By improving situational awareness, de-escalatingrumors or false information, and corroborating using other existingsources, EpiCore is able to reduce the signal to noise ratio in diseasesurveillance. Hence, by detecting and verifying outbreaks faster,health officials can generate early responses that can curb epidemicsand save lives.

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

Abstract

ObjectiveTo describe the process of operation of the system and assessits key attributes, to determine the effectiveness and efficiency ofthe surveillance system and make appropriate recommendations tostakeholders for its improvement.IntroductionMalaria is a parasitic disease caused by Plasmodium falciparum.About 3.2 billion people worldwide are at risk of malaria.1Childrenand pregnant women are particularly vulnerable to the disease. Sub-Saharan Africa carries a high share of the global malaria burden.2Effective malaria surveillance system is essential in the control andelimination of malaria. Worldwide, there were an estimated 198million cases of malaria in 2013 and 584,000 deaths.1,3,4MethodsThis study was conducted using the "CDC's Updated Guidelinesfor Evaluating Public Health Surveillance System, 2001". Keystakeholders and Malaria Focal Persons were interviewed. IntegratedDisease Surveillance and Response case summary data from Januaryto December 2014 was reviewed. Data analysis was done usingMicrosoft Excel 2016 and Epi-info 7.ResultsThe system provides information on malaria trends, morbidityand mortality. Case definitions are well understood by participants.All Malaria focal persons (MFPs) were willing to continue usingthe system. Standardized data collection tools are available in 91%of Health Facilities (HF). The system was rated flexible by 91%of MFPs. The system was however not representative because datawere essentially from public health facilities only. The system hasan average timeliness of 37.7% and completeness of 59.4%, bothparameters were below the State's 80% target. About 91% MFPs hadrefresher training, while 78% MFPs received supportive supervision.Main challenges identified were lack of commodities in all HFs, andinadequate mobile facilities in 70% of HFs.ConclusionsThe Kaduna state Malaria surveillance system is meeting itsobjectives. However, challenges are observed in its timeliness,representativeness, and data quality. Efforts should be made tointegrate tertiary and private health facilities into the system. MFPsneed more training on malaria reporting to improve timeliness anddata quality. There is the need to improve on the supply of malariatreatment commodities to all health facilities within Kaduna state.

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

Abstract

ObjectiveThe session will discuss strategies for outbreak prevention,detection, and response for global health security and explore howthese activities inform both domestic and international initiatives.Innovations in epidemiology, laboratory, informatics, investment, andcoordination for disease surveillance will be discussed.IntroductionMultiple agencies are involved in global disease surveillance andcoordination of activities is essential to achieve broad public healthimpact. Multiple examples of effective and collaborative initiativesexist. The WHO/AFRO developed Integrated Disease Surveillanceand Response (IDSR) framework, adopted by 43 of the 46 AFROmember states and applied in other WHO regions, was the firstframework designed to strengthen national disease surveillance andresponse systems. The WHO International Health Regulations (IHR)2005 are an agreement between 196 countries to prevent, detectand respond to the international spread of disease. In 2013 CDCworked with Uganda and Vietnam to demonstrate the developmentof surveillance, laboratory, and emergency response center capacityand link data systems for six outbreak prone diseases. More recently,the Global Health Security Agenda (GHSA) was launched with thesupport of 28 countries, WHO, OIE and FAO just as Ebola wasbeginning to emerge in West Africa. This panel brings togetherCDC, local implementing partners, academic technical partners, andinternational non-government donor to discuss current and evolvingstrategies for prevention, detection, and response activities needed forglobal health security.

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

Abstract

ObjectiveWe present lessons learned from over a decade of HIV bio-behavioral risk study implementation and capacity-building inAfrican militaries.IntroductionCircumstances within the military environment may place militarypersonnel at increased risk of contracting sexually transmittedinfections (STI) including HIV. HIV bio-behavioral risk studiesprovide a critical source of data to estimate HIV/STI prevalenceand identify risk factors, allowing programs to maximize impact byfocusing on the drivers of the epidemic.MethodsSince 2005, RTI has provided technical assistance (TA) to supportHIV/STI Seroprevalence and Behavioral Epidemiology Risk Surveys(SABERS) in 14 countries across Sub-Saharan Africa and Asia.SABERS are cross-sectional studies consisting of a survey to assessknowledge, attitudes and behaviors related to HIV, coupled with rapidtesting for HIV and other STIs. RTI tailored each survey instrument tobe culturally appropriate in content and methodology, trained militarypersonal to serve as data collection staff, and provided logisticalsupport for study implementation.ResultsKey lessons learned are summarized below:Data collection mode varied from paper-based to computer-assisted surveys, depending on country preference, in-country staffcapabilities, and the country’s technological capacity. Computer-assisted data collection systems were preferable because theyimproved data quality through the use of programmed skip patterns,range, and consistency checks. By eliminating the need for data entry,computer-assisted systems also saved program resources and enabledfaster access to the data for analysis.Survey administration method varied from self-administeredto interviewer-administered surveys. Literacy rates, technologicalfamiliarity, and confidentiality concerns were key drivers indetermining the best data collection method. Self-administeredsurveys such as computer-assisted self-interview (CASI) werepreferable due to the high-level of confidentiality they provide,but required a high-level of literacy and computer familiarity.If confidentiality was a big concern in low-literacy settings, audiocomputer-assisted self-interview (ACASI) was used if the populationhad some computer familiarity. Interviewer-administered surveyssuch as computer-assisted personal interview (CAPI) were used inmost low-literacy settings.Tailoring the survey instrument and administration for culturalappropriateness was vital to the acquisition of sound, viable data.Sexual behaviors and the definition of “regular sexual partner”and other terms varied according to local custom. The sensitivenature of the survey questions also impacted survey administrationoperationally. The preference for same-sex or opposite sexinterviewers varied by country and military setting. It was imperativeto pre-test the survey.A skilled workforce and staff retention are essential to providehigh quality data. Literacy levels, technological familiarity, HIVknowledge, and time commitments must all be considered whenselecting data collection staff. Retention of staff throughout theduration of data collection activities can be a major issue especiallyamong military personnel who were often called away from studyactivities to perform military duties.Host military ownership was integral to the success of the SABERSprogram. By engaging military leadership early and involving themin all decision making processes we ensured the partner military wasinvested in the study and its success and found value in the resultingdata and findings. Host militaries were actively involved in SABERSby providing staff for data collection, leading sensitization activities,and monitoring data collection activities in the field.Inclusion of capacity building elements during studyimplementation led to increased host military buy-in. Capacitybuilding included staff trainings and practical experience in surveymethodology, use of electronic data collection instruments, studylogistics and data monitoring.Confidentiality of survey data and HIV test results was of increasedconcern given that these studies were conducted in a work placeenvironment. For this reason, it was imperative to assure participantsthat disclosures of drug or alcohol use and positive HIV/STI testresults would remain confidential and would not affect their militaryemployment.ConclusionsBased on our experience, the following are required for thesuccessful implementation of an HIV Bio-behavioral Risk Study inresource-poor military settings: (1) selection of a data collection modeand survey administration method that is context-appropriate, (2)utilization of local wording and customs, (3) a skilled workforce, (4)local buy-in/partnership, (5) inclusion of capacity building elements,and (6) assurance of confidentiality.

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

Abstract

ObjectiveWe aim to assess the implementation of malaria prevention,diagnosis and treatment strategies, to assess implementation trendsfrom 2011 to 2014 and if surveillance targets were met.IntroductionMalaria is a preventable disease but 3.4 billion people at riskglobally with 207 million cases and 627 deaths reported in 2013.Africa accounts for 80% of cases and 90% of all malaria deaths.Nigeria accounts for 25% of malaria burden in Africa. The goal ofmalaria control is to reduce malaria –related transmissions, cases anddeaths to a level where it is no longer a public health concernMethodsKaduna state, north western Nigeria with estimated populationof 7.3 million has 23 districts and 1252 health facilities. Of these461 sent malaria surveillance data to National Health ManagementInformation System monthly. Data from January 2011 to December2014 was analysed. We evaluated variables related to malariainterventions strategies such as malaria diagnosis, malaria treatment,malaria prevention in pregnancy. Frequencies, proportions andtrend analysis were done and odd ratios for associations betweenvariables were calculated with confidence interval set at 95%. Epiinfo statistical software was used for the analysis.ResultsData completeness was 89.8%. Of the 1,008,728 people thatvisited health facilities, 56.6% presented with fever. Among thefever cases, 34.2% was tested with rapid diagnostic test (RDT) and5.5% with microscopy. Artemisinin based combination therapy wasgiven to 361,464 of which 36.4% had confirmed malaria. Those aged< 5 years with suspected fever were 1.28 (95% confidential interval(C.I), 1.27-1.29; p<0.01)) more likely not to be tested with eitherRDT or microscopy and they are 2.62 (95% C.I., 2.63 – 6.67;p<0.01) times more likely to have ACT for confirmed malaria. ACTprescription to presumptive malaria increases from 31.8% in 2013to 200.2% in 2014. There is a progressive increase of long lastinginsecticidal net distribution and access to second dose of IntermittentPreventive Therapy (IPT-2) for pregnant women.ConclusionsGenerally, progress in Malaria control transition to Eliminationin Kaduna State, Nigeria is favorable with malaria prevalence at36.4%. Some targets were met within the period and recommendstrengthening of these malaria control strategies with focus onvulnerable groups and prevent uncontrolled ACT prescription forpresumptive malaria.

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

Abstract

ObjectiveThe study was carried out to determine physicians’ knowledgeof notifiable reporting and to identify the barriers to reporting inGrenada.IntroductionDespite the significance of disease reporting to any health system,Grenada like most countries struggle with underreporting of notifiablediseases by physicians. In order to improve the national diseasesurveillance system in Grenada, it is critical understand the reasonsfor any underreporting. The study was conducted to determinephysicians’ knowledge of notifiable reporting and to identify thebarriers to reporting.MethodsThe Grenada Medical and Dental Council identified a total of129 registered and practicing physicians. A cross-sectional studydesign was developed to obtain information from all registeredand practicing physician. The survey tool included questions ondemographics; training history and medical practice details, as wellas knowledge, practice and barriers to reporting notifiable diseases.The survey was administered to physicians in both paper-based andelectronic formats.ResultsTo date only 13 surveys have been returned. Preliminary data showthat 61.5% of respondents rated an “average” on their knowledge ofwhich diseases are reportable and of those only 46 % knew where toobtain a list of notifiable diseases (NDs). Fifty three percent (53%)of respondents said that they have reported NDs to the relevantauthorities in the past. Thirty eight percent (38.5%) believed it shouldbe the responsibility of nurses to report NDs and 30.8% stated itshould be the physician. The major barriers to reporting, identifiedby the respondents were being too busy, too much time required, andlack of infrastructure or reporting systems. When asked about waysto improve reporting, 38.5% identified improvements to the reportingform, and 30.8% identified education of physicians on reportingprotocol and importance.ConclusionsWhile this is still preliminary data, the majority of the physicianssurveyed had some knowledge of reporting NDs. The barriers toreporting identified were being too busy and lack of infrastructure.Future improvements to the reporting system in Grenada shouldfocus on making forms electronic and less lengthy, and on educatingphysicians on the importance and protocol of reporting NDs.

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

Abstract

ObjectiveTo identify and address gaps in acute flaccid surveillance for polioeradication in Buchi stateIntroductionPoliomyelitis a disease targeted for eradication since 19881still pose public health challenge. The Eastern Mediterranean andAfrican Regions out of the six World Health Organization (WHO)Regions are yet to be certified polio free2. The certification of theWHO Africa region is largely dependent on Nigeria, while the WHOEastern Mediterranean is dependent on Pakistan and Afghanistan.Surveillance for acute flaccid paralysis (AFP) is one of the criticalelements of the polio eradication initiative. It provides the neededinformation to alert health managers and clinician to timely initiateactions to interrupt transmission of the polio disease and evidence forthe absence of the wild polio virus.3,4One of the core assignments ofthe certification committee in all regions is to review documentationto verify the absence of wild poliovirus.5Good and completedocumentation is the proxy indication of the quality of the systemwhile poor documentation translates to possibilities of missing wildpoliovirus in the past. We evaluated the performance of the AFPsurveillance system in Bauchi, which is among the 11 high risks statesfor wild polio virus in Nigeria to identify and address gaps in thesurveillance system.MethodsWe conducted a cross-sectional study in Bauchi State. We assessedthe material and documentations on AFP surveillance in eighteen of thetwenty Local Government Areas (LGAs). We assessed the knowledgeof the clinician at focal and non-focal sites on case definition of AFP,the number and method of stool specimen collection to investigate acase and types of training received for AFP surveillance. We verifiedAFP case investigations for the last three years: The caregivers(mothers) were interviewed to authenticate the reported informationof AFP cases, the method used for stool specimen collection andfeedbacks. Community leaders' knowledge on AFP surveillance wasalso assessed. Data was entered and analyzed in excel spread sheet.ResultsReview of the expected deliverables of 18 out of the 20 LGAdisease surveillance and notification officers (DSNO) revealed thatonly 2(11%), 5(28%), 6(33%) and 7(39%) had evidence of poliooutbreak investigation, supervisory reports, minutes of meeting andsurveillance work plan respectively. Of the 31 AFP cases investigated,correct and complete information was 39% for birth day, 26% forbirth month of the child, 23% for date of onset of paralysis and 23%for date of investigation. Contacts of informants, AFP 001-3 weredeficient in the focal and non-focal sites. The non-focal also lackedguidelines for integrated disease surveillance and response (IDSR)and terms of reference for surveillance focal person.Knowledge of case definition of AFP was 71% and 30% amongclinician at the focal and non-focal sites, respectively and 88% and55% for method of stool collection among clinician at focal and non-focal sites. Among the 38 care givers (mothers) interviewed 16 (42%)did not remember the day or month the investigation for the AFPwas conducted, 36(95%) gave the correct number of stool samples,15(40%) mentioned that the stool samples were collected 24 hoursapart and only 12 (32%) received feedbacks. Majority (79%) of thecommunity leaders interviewed were aware of AFP and knew thatstool was the specimen for investigation of the AFP but 21% did notknow whom to report a case of AFP in their communityConclusionsOur study revealed knowledge and documentations gaps in AFPsurveillance for certification of polio-free in Nigeria. The stateministry of health and the WHO consultants in the polio eradicationunit should update the knowledge of the health care workers at theoperational levels on AFP surveillance. The state ministry of healthand the WHO consultants should also provide all essential documentsrequired for quality AFP surveillance and ensure their judicious use.

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

Abstract

ObjectiveThe objective of this survey was to study vaccination coverage andquality in dogs in Georgia through the detection of post-vaccinationantibodies.IntroductionRabies is endemic in Georgia with up to 100 confirmed cases inanimals per year. There is an estimated 350,000 domestic and straydogs/cats in Georgia. The prophylactic vaccination of domesticanimals against rabies was reestablished in Georgia in 2013. Each yearsince 2013, coverage has increased aiming to cover approximately70% of the total population of dogs/cats in Georgia.MethodsOnly vaccinated dog populations were included in the sero-survey. Using random selection, five locations were selected. Thesurvey was conducted over a period of 4-8 weeks after vaccination.In order to study vaccination coverage, the total dog population wasregistered. Samples were taken only from vaccinated dogs (confirmedby vaccination papers) and samples were sent to the Laboratory ofthe Ministry of Agriculture where they were tested for the presenceof antibodies using ELISA. Epidemiological information and GPScoordinates were recorded in the electronic integrated diseasesurveillance system (EIDSS) and geographic information system(GIS).ResultsOut of 572 dogs in sampled villages, 373 animal's vaccination wasconfirmed leading to 65% vaccination coverage. Out of 255 samples,241 were suitable for testing; 237 samples (98.3%) were positive forthe existence of antibodies. Antibody titer was not measured.ConclusionsBased on the results of the survey, it can be seen that vaccinationcoverage is generally not high (65%) and needs improvement.The vaccination quality (as determined through the existence ofantibodies) is good (98.3%). In further surveys, antibody titersmust be measured in order to extract more information regardingvaccination quality.

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

Abstract

ObjectiveTo determine burden, timing and causes of stillbirths in aprospective cohort of pregnant from a low income community settingin peri urban KarachiIntroductionStillbirth remained a neglected issue absent from mention inMillennium Development Goals. An estimated 2.6 million babies arestillborn every year withhighest rate in Pakistan, 43.1 stillbirths/1000births. There is lack of good quality prospective population based datain Pakistanregarding burden, timing and causes of stillbirthsMethodsFrom Jan – Dec 2012, Community Helath Workers (CHWs)identified pregnant women through 3 monthly household visits.Pregnant women were then followed up till end of their pregnancy.In case of a stillbirth, a detailed verbal autopsy (VA) interview wasundertaken 2 weeks after the outcome by a research assistant. VAforms were then reviewed by 2 independent Physicians who assigneda cause for stillbirth. In case of disagreement, VA form was reviewedby a third physician. A consensus between two physicians wasrequired for a definitive cause.ResultsThere were a total of 273 stillbirths (3.04%) reported. Stillbirthrate was 30.7/1000 births. Distribution of antepartum and intrapartumstillbirths was 83% and 17%. Three most common causes of stillbirthsincluded pregnancy induced Hypertension(37%), antepartumhemorrhage (10%) and obstructed labor(6%) (fig. 1).ConclusionsWe have reported a high burden of stillbirths that take placeduring the intrapartum period. This reemphasizes need for goodquality antenatal care in these settings. Appropriate measure needsto be taken targeting most common causes of stillbirths, focusing onimproved antepartum health care 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

ObjectiveTo determine the IgM and IgG antibodies of rubella viruscirculating among pregnant women in Kaduna State Nigeria.IntroductionRubella virus causes -“German measles,” also known as “three-daymeasles.” This is usually a milder disease than red measles. Red/Hardmeasles or just measles is caused by Rubeola virus. The result of acuteinfection of the virus is a benign systematic rash which is significantlypathogenic to humans. This virus is a, positive-strand RNA virus thatreplicates in the cytoplasm of the infected cell.(Brooks et al., 2007).If placental infection of the virus spread during 8-10 weeks gestationit causes a chronic infection of the fetus leading to the developmentof congenital rubella syndrome (CRS) (Matthewset al., 2011) Theeffect of the infection of the several organ systems which include theeyes, ears, heart, brain, and endocrine system is known as congenitalrubella infection (CRI) (Chantleret, al.,2001)Rubella is endemic in Nigeria. Studies among women of childbearing age in Nigeria put seroprevalence at 66.6% in Imo, 77% inLagos and 93.5% in Oyo (8-10). Thus as part of the control measure,the availability of an effective vaccine to prevent Rubella infectionand therefore CRS, is necessary to evaluate the burden of disease ina country where MMR vaccine is not covered in the immunizationschedule or in vaccination strategyMethodsA cross-sectional study carried out on pregnant women attendingante-natal clinic from the three different senatorial district in Kadunastate. Blood samples were screened for rubella IgM & IgG antibodyusing commercially produced enzyme linked immunosorbent assay(ELISA), Questionnaires were administered to obtain demographicinformation and possible risk factors associated with rubella virus.Data was analzyed using Epi Info 6 Version 3.5.3.ResultsOf the 900 pregnant women screened, 572(63.3%) were positivefor rubella IgG. The prevalence of rubella IgG was highest among theage group 21-25 with 198(34.6%) and IgM was highest among theage group 21-25(51.3%). The IgG test results shows that 317 (66.0%)pregnant women tested positive for their first trimester, while the IgMpositive results shows 17(33.3%) for their first trimester. Although thesouthern senatorial district had the highest seroprevalence 14(35.9%)among the three centres, the differences were not statisticallysignificant (p>0.05). Only 3 people claimed to have been vaccinatedagainst rubella virus. Acquisition of primary education and being ahouse wife were insignificantly associated with raised titres. (p>0.05).ConclusionsThe serological evidence of rubella virus found in pregnant womenamong age group & their first trimester in this study is an indicationthat rubella is prevalent in Nigeria. It is however still necessary toimmunize seronegative women against rubella before they getpregnant.

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Abstract

ObjectiveTo describe the challenges and lessons learned for public healthand providers to successfully implement public health MeaningfulUse readiness guidelines and navigate from intent to submission ofproduction data while simultaneously upgrading surveillance systems.IntroductionThe Syndromic Surveillance Consortium of Southeast Texas(SSCSeT) consists of 13 stakeholders who represent 19 counties orjurisdictions in the Texas Gulf Coast region and receives health datafrom over 100 providers. The Houston Health Department (HHD)maintains and operates the syndromic surveillance system for the GulfCoast region since 2007. In preparation for Meaningful Use (MU) theHHD has adapted and implemented guidance and recommendationsfrom Centers for Disease Control and Prevention, Office of NationalCoordinator for Health Information Technology and others. HHDsgoal is to make it possible for providers meet MU specification byfacilitating the transmission of health related data for syndromicsurveillance. The timing of the transition into MU overlaps with thechange in syndromic surveillance systems.

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

Abstract

ObjectiveOur primary goal is to move towards establishing a causal linkbetween binge drinking, mental health, employment and income.IntroductionOne of the key questions in health economics is what is thedirection of causality: does poverty cause poor health outcomes; doeslow education cause poor health outcomes; does poor health resultin lack of productivity; does poor health cause poor educational andincome outcomes; and how is this all related to mental health if at all.We are used to breaking down data into fragments as researchers:an investigator who is predominantly focused on health outcomeswill approach the problem with disease as the dependent variable andincome as the conditioning variable. However, if we are interested inincome inequality we will reverse the direction and income will bethe dependent variable with health status as the conditioning variable.The representation above allows us to visualize data as a functionof multiple fragments. For example if we want to understand howdepression is related to income, one can look at the figure to observethat with lower income there is a higher likelihood of being depressed.With this simple illustration we can see that establishing causal linkscan be very tricky, if not incredibly challenging.MethodsTwo methods are: applied descriptive analysis and estimation.We approach this without causality in mind, but with an intentionto explore how behavior responds to income, education, labor andhealth. Our descriptive approach looks at trends in binge drinking andmental health as it affects key economic outcomes such as education,employment, and income. For each outcome we then run a simpleprobit model controlling for a variety of characteristics. The keyco-variates in these models are income, employment and health.It is very useful to look at these simple probits because often itis hard to separate the effects of income on health, employment onincome, health on employment, education on employment, health andincome, and finally income, employment, health and education onmental health and substance abuse.ResultsOur estimated results are rather interesting. Examining themarginal probits, e.g. figures 1.3, and 1.5, we show that there isn’ta significant income effect, nor do we find significant education oremployment effects associated with binge drinking. In fact we findthat in Wisconsin binge drinking is a health burden for those whoare eligible to drink irrespective of education and that the effect issignificant; we also find that higher levels of education increase theprobability of being unemployed but not significantly. The secondset of probit estimates, e.g. figure 1.7, show that poor health is indeedassociated with outcomes lower employment as compared to othergroups, and higher probability of depression. The last set of probits,e.g. figure 1.1, show that retired, self employed and employed areless likely to be depressed but not significantly so, and those who areunable to work have a higher estimated probablilty to be depressed.Income doesn’t appear to have a significant estimated effect ondepression.ConclusionsOur analysis provide insights into the question of socio-economicstatus (SES), binge drinking, and depression in three important ways.First, we explore the relationship between SES and binge drinkingand we find that binge drinking is SES invariant. Second we findthat depression is not associated with income it does have a strongrelationship with employment status. We are in the process ofunpacking the effects of SES, binge drinking and depression to movebeyond associational inferences to causal inferences.

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Abstract

ObjectiveTo analyze tobacco use in Georgia to influence policy, systemsand environmental changes as tools to reduce its burden on healthoutcomesIntroductionTobacco use is the leading cause of preventable illness and deathsin Georgia. About 10.1% of deaths among adults in Georgia arelinked to smoking related illnesses. Most first use of cigarettes occursby age 18 (87%), with nearly all-first use by 26 years of age (98%).Although cigarette smoking has declined significantly since 1964,very large disparities in tobacco use remain across different sub-groups of the population. Multiple environmental, psychological, andsocial factors have been associated with tobacco use, including raceand ethnicity, age, SES, educational accomplishment, gender, andsexual orientation. These factors within the social environment havea huge influence on motivation to begin and to continue using tobaccoproducts for not just the individual but also certain community groupwithin the population. Established in 2000, Georgia Tobacco UsePrevention Program (GTUPP) is a program designed to meet theoverall goal of reducing the health and economic burden associatedwith tobacco use for all members of the community. By working withvarious partners, GTUPP plans, implements and evaluates policy,systems, and environmental changes designed to reduce tobacco-related illnesses and deaths. Best practice strategies focus on thefollowing goals: preventing the initiation of tobacco use amongyoung people; promoting quitting among young people and adults(e.g. Georgia Tobacco Quit Line (GTQL); eliminating exposureto secondhand tobacco smoke; and identifying and eliminating thedisparities related to tobacco use among various population groups.MethodsThe following data collection tools were used to educatecommunity members, local coalition groups and policy decisionmakers on the burden of tobacco use in Georgia: Youth TobaccoSurvey (YTS), Youth Risk Behavioral Survey (YRBS) and BehavioralRisk Factor Surveillance System (BRFSS). These tools allows publichealth professionals to create messaging needed to reach differentstakeholders. The following are examples of key data points thatwere used to influence policy, systems, and environmental change:27,000 of middle school students and 79,000 of high school currentlyuse tobacco (cigarettes, smokeless tobacco or cigars). Approximately32,400 of middle school students and 72,900 of high school studentssay they have tried smoking electronic cigarettes (e-cigarettes).Smoking prevalence among adult males 740,000 is significantlyhigher than among females 510,000, and the overall smokingprevalence is highest among adults' ages 25-34 years 292,000.ResultsCurrently, the following policies have been adopted as a resultof using surveillance to educate policy decision makers and multi-sector groups in the community at large: 116 school district are100% tobacco free, 28 parks and recreation are 100% tobacco/smokefree, 46 colleges/universities are tobacco free, 6 cities in Georgiahave a comprehensive smoke free air law, 65 multi-unit housing(private/public) are smoke free, and 132 hospitals are tobacco free.Between June 2015 and July 2016, over 15,000 Georgia tobaccousers used the GTQL services to make a quit attempt, and healthcareproviders through a systems change referral approach referred 13%of the users to the GTQL.ConclusionsWorking with schools (K-12), parks, colleges/universities,hospitals, worksites, and municipalities to adopt tobacco freepolicies and promote cessation services provides an opportunityfor all members of the community to be tobacco free. As tobaccouse is associated with chronic diseases it is imperative to engageall members of the community in tobacco free living. Removingavoidable structural and social barriers and equally implementingtobacco use prevention programs and policies is essential.

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