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

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Editorial

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

Abstract

Health data derived from electronic health records are increasingly utilized in large-scale population health analyses. Going hand in hand with this increase in data is an increasing number of data breaches. Ensuring privacy and security of these data is a shared responsibility between the public health researcher, collaborators, and their institutions. In this article, we review the requirements of data privacy and security and discuss epidemiologic implications of emerging technologies from the computer science community that can be used for health data. In order to ensure that our needs as researchers are captured in these technologies, we must engage in the dialogue surrounding the development of these tools.

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

Abstract

This paper continues an initiative conducted by the International Society for Disease Surveillance with funding from the Defense Threat Reduction Agency to connect near-term analytical needs of public health practice with technical expertise from the global research community. The goal is to enhance investigation capabilities of day-to-day population health monitors. A prior paper described the formation of consultancies for requirements analysis and dialogue regarding costs and benefits of sustainable analytic tools. Each funded consultancy targets a use case of near-term concern to practitioners. The consultancy featured here focused on improving predictions of asthma exacerbation risk in demographic and geographic subdivisions of the city of Boston, Massachusetts, USA based on the combination of known risk factors for which evidence is routinely available. A cross-disciplinary group of 28 stakeholders attended the consultancy on March 30-31, 2016 at the Boston Public Health Commission (BPHC). Known asthma exacerbation risk factors are upper respiratory virus transmission, particularly in school-age children, harsh or extreme weather conditions, and poor air quality. Meteorological subject matter experts described availability and usage of data sources representing these risk factors. Modelers presented multiple analytic approaches including mechanistic models, machine learning approaches, simulation techniques, and hybrids. Health department staff and local partners discussed surveillance operations, constraints, and operational system requirements. Attendees valued the direct exchange of information among public health practitioners, system designers, and modelers. Discussion finalized design of an 8-year de-identified dataset of Boston ED patient records for modeling partners who sign a standard data use agreement.

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

Abstract

Objective To evaluate the case-based Measles surveillance system in Kaduna State of Nigeria and identify gaps in its operation. Introduction In Africa, approximately 13 million cases of measles and 650,000 deaths occur annually, with sub-Saharan Africa having the highest morbidity and mortality (1). Measles infection is endemic in Nigeria and has been documented to occur all year round despite high measles routine and supplemental immunisation coverage (2,3). The frequent outbreaks of Measles in Kaduna State prompted the need for the evaluation of the Measles case-based surveillance system. Methods We interviewed stake holders and adapted the updated 2001 CDC guidelines on surveillance evaluation to assess the systems usefulness, representativeness, timeliness, stability and acceptability. A retrospective record review of the measles case-based surveillance data from 2010– 2012 was carried out to assess data quality and representativeness. We calculated the annualized detection rate of measles and non-measles febrile rash, proportion of available results, proportion of Districts (LGAs) that investigated at least one case with blood, proportion of cases that were IgM positive and the incidence of measles. We compared the results with WHO (2004) recommended performance indicators to determine the quality and effectiveness of measles surveillance system. Results According to the Stake holders, the case-based surveillance system is useful and acceptable. Median interval between specimen collection and release of result was 38 days (Range: 16 – 109) in 2011, 11 days (Range: 1 – 105) in 2012. The best median turnaround time of 7days (1 – 25) was recorded in 2010. The annualized detection rate of measles rash in 2011 was 1.0 (target: ≥2), in 2012 it was 1.4 (target: ≥2). The annualized detection rate of non-measles febrile rash in 2011 was 0.6 (target: ≥2) while it was 0.8 (target: ≥2) in 2012. Case definitions are simple and understood by all the operators. We found a progressive decline in timeliness and data quality in the years under review. Conclusion This evaluation showed that the surveillance system was still useful. Also, the efficiency and effectiveness of the laboratory component as captured by the "median interval between specimen collection and the release of results improved in 2010 and 2012 compared to 2011. However, there was a progressive decline in the timeliness and completeness of weekly reports in the years under review. Keywords: Measles; Case-based; Surveillance; Evaluation; Nigeria

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

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Background: It is challenging to assess the quality of care and detect elder abuse in nursing homes, since patients may be incapable of reporting quality issues or abuse themselves, and resources for sending inspectors are limited. Objective: This study correlates Google reviews of nursing homes with Centers for Medicare and Medicaid Services (CMS) inspection results in the Nursing Home Compare (NHC) data set, to quantify the extent to which the reviews reflect the quality of care and the presence of elder abuse. Methods: A total of 16,160 reviews were collected, spanning 7,170 nursing homes. Two approaches were tested: using the average rating as an overall estimate of the quality of care at a nursing home, and using the average scores from a maximum entropy classifier trained to recognize indications of elder abuse. Results: The classifier achieved an F-measure of 0.81, with precision 0.74 and recall 0.89. The correlation for the classifier is weak but statistically significant: = 0.13, P < .001, and 95% confidence interval (0.10, 0.16). The correlation for the ratings exhibits a slightly higher correlation: = 0.15, P < .001. Both the classifier and rating correlations approach approximately 0.65 when the effective average number of reviews per provider is increased by aggregating similar providers. Conclusions: These results indicate that an analysis of Google reviews of nursing homes can be used to detect indications of elder abuse with high precision and to assess the quality of care, but only when a sufficient number of reviews are available.

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Background: Minnesota enacted legislation in 2007 that requires all health care providers in the state to implement an interoperable electronic health record (EHR) system by 2015. 100% of hospitals and 98% of clinics had adopted EHR systems by end of 2015. Minnesota's 2008 health reform included a health care home (HCH) program, Minnesota's patient centered medical home. By end of 2014, 43% of HCH eligible clinics were certified with 335 certified HCHs and 430 eligible but not certified clinics. Objectives: To study the association between adoption and use of EHRs in primary care clinics and HCH certification, including use of clinical decision support tools, patient registries, electronic exchange of patient information, and availability of patient portals. Methods: Study utilized data from the 2015 Minnesota Health Information Technology Clinic Survey conducted annually by the Minnesota Department of Health. The response rate was 80% with 1,181 of 1,473 Minnesota clinics, including 662 HCH eligible primary care clinics. The comparative analysis focused on certified HCHs (311) and eligible but not certified clinics (351). Results: HCH clinics utilized the various tools of EHR technology at a higher rate than non-HCH clinics. This better utilization was noted across a range of functionalities: clinical decision support, patient disease registries, EHR to support quality improvement, electronic exchange of summary care records and availability of patient portals. HCH certification was significant for clinical decision support tools, registries and quality improvement. Conclusions: The rapid uptake in EHR technology, combined with health reform efforts focusing on accountability and care coordination, pose opportunities and challenges for providers. Opportunities are availability of tools that support decision making, quality improvement and reporting. Challenges remain for clinics to optimize health information exchange. The need to meet various care coordination requirements were likely drivers for better EHR utilization by HCH clinics. This research presents the synergy between complementary initiatives supporting EHR adoption and HCH certification.

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Objectives: To introduce the Canadian Network for Public Health Intelligence's new Knowledge Integration using Web-based Intelligence (KIWI) technology, and to perform preliminary evaluation of the KIWI technology using a case study. The purpose of this new technology is to support surveillance activities by monitoring unstructured data sources for the early detection and awareness of potential public health threats. Methods: A prototype of the KIWI technology, adapted for zoonotic and emerging diseases, was piloted by end-users with expertise in the field of public health and zoonotic/emerging disease surveillance. The technology was assessed using variables such as geographic coverage, user participation, and others; categorized by high-level attributes from evaluation guidelines for internet based surveillance systems. Special attention was given to the evaluation of the system's automated sense-making algorithm, which used variables such as sensitivity, specificity, and predictive values. Event-based surveillance evaluation was not applied to its full capacity as such an evaluation is beyond the scope of this paper. Results: KIWI was piloted with user participation = 85.0% and geographic coverage within monitored sources = 83.9% of countries. The pilots, which focused on zoonotic and emerging diseases, lasted a combined total of 65 days and resulted in the collection of 3243 individual information pieces (IIP) and 2 community reported events (CRE) for processing. Ten sources were monitored during the second phase of the pilot, which resulted in 545 anticipatory intelligence signals (AIS). KIWI's automated sense-making algorithm (SMA) had sensitivity = 63.9% (95% CI: 60.2-67.5%), specificity = 88.6% (95% CI: 87.3-89.8%), positive predictive value = 59.8% (95% CI: 56.1-63.4%), and negative predictive value = 90.3% (95% CI: 89.0-91.4%). Discussion: Literature suggests the need for internet based monitoring and surveillance systems that are customizable, integrated into collaborative networks of public health professionals, and incorporated into national surveillance activities. Results show that the KIWI technology is well posied to address some of the suggested challenges. A limitation of this study is that sample size for pilot participation was small for capturing overall readiness of integrating KIWI into regular surveillance activities. Conclusions: KIWI is a customizable technology developed within an already thriving collaborative platform used by public health professionals, and performs well as a tool for discipline-specific event monitoring and early warning signal detection.

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Purpose: Librarians partnered with the Chief Resident and coordinators of the Internal Medicine residency program to assess how a formalized approach of introducing mobile access to clinical knowledge at the point of care enhanced medical practice. This three-year long study demonstrated that over time residents were able to adapt handheld computing with support on how the technology could facilitate successful completion of their work role-related tasks. Methods: Three cohorts of internal medicine residents were issued iPads at the beginning of their second year and trained in accessing institutional resources from the digital library. Pre- and post-intervention surveys were respectively administered at the beginning of the second year and end of the third year of training. Institutional technical and resource support were made available for each cohort. Pre- and post-intervention responses were compared using two sample methods and summarized through descriptive statistics. Results: 68 residents (38% women, mean age = 35.1, SD = 5.1 years) completed the pre-intervention survey questionnaires and 45 completed the post-intervention surveys. There were significant improvements in the residents' level of computer experience, familiarity with medical information Apps, and appreciation for the electronic medical record. Additionally, residents preferred a highly capable computer system for clinical purposes and positively perceived the potential effects of computers and electronic medical record on medicine. Conclusion: Study findings suggested that institutions played a critical role in providing technology training to their resident physicians, especially in mobile access to clinical information at the point of care. The residents showed appreciation of iPads and library support that facilitated successful completion of their work role-related tasks. Replicating this study with a larger sample size derived from multiple sites is suggested for future studies that should also include mid-level healthcare professionals such as Physician Assistants and Advanced Nurse Practitioners.

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After the bioterrorism-anthrax attacks of 2001, individual public health officials were tasked with planning population-wide medicine dispensing. This planning started with assumptions and then evaluations of seasonal immunization clinics. Research of the 2009 H1N1 pandemic-vaccination campaign showed that an adequately prepared public health system could have prevented over 16% of flu-associated hospitalizations. The 2011 ice storms revealed difficulties with sheltering medically fragile persons with disabilities. Later research showed that training and preparedness levels increased responders' willingness to serve. Also, when triaging disaster survivors to general shelters, medical shelters, or mental health services; sorting to community mass care services improved up to 15% when past traumatic effects, personal care assistance, or service methodology were accounted for. The number of persons who are disabled and dependent on electric medical equipment are increasing. This current study compared the time it takes to dispense medication to two different cohorts: a general-population cohort (n=31) and a special-needs cohort (n=30). The cohort comprised entirely of persons with special needs took 4.1 compared to 2.48 minutes per person in a general population cohort (p=.057). A person with any special needs took 3.73 versus 2.43 minutes for a person with no special needs (p=.082). Modeling of service times per station and cohort type found significant delays at the medical station among persons in the general population who are pregnant (840 seconds, p=.002) and persons in the special needs cohort with a language barrier (750 seconds, p=.001).

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Health data is often big data due to its high volume, low veracity, great variety, and high velocity. Big health data has the potential to improve productivity, eliminate waste, and support a broad range of tasks related to disease surveillance, patient care, research, and population health management. Interactive visualizations have the potential to amplify big data's utilization. Visualizations can be used to support a variety of tasks, such as tracking the geographic distribution of diseases, analyzing the prevalence of disease, triaging medical records, predicting outbreaks, and discovering at-risk populations. Currently, many health visualization tools use simple charts, such as bar charts and scatter plots, that only represent few facets of data. These tools, while beneficial for simple perceptual and cognitive tasks, are ineffective when dealing with more complex sensemaking tasks that involve exploration of various facets and elements of big data simultaneously. There is need for sophisticated and elaborate visualizations that encode many facets of data and support human-data interaction with big data and more complex tasks. When not approached systematically, design of such visualizations is labor-intensive, and the resulting designs may not facilitate big-data-driven tasks. Conceptual frameworks that guide the design of visualizations for big data can make the design process more manageable and result in more effective visualizations. In this paper, we demonstrate how a framework-based approach can help designers create novel, elaborate, non-trivial visualizations for big health data. We present four visualizations that are components of a larger tool for making sense of large-scale public health data.

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To better understand existing capacity and help organizations plan for the strategic and expanded uses of data, a project was initiated that deployed contemporary, Hadoop-based, analytic technology into several multi-site community health centers (CHCs) and a primary care association (PCA). An initial data quality exercise was carried out after deployment, in which a number of analytic queries were executed using both the existing electronic health record (EHR) applications and in parallel, the analytic stack. Each organization carried out the EHR analysis using the definitions typically applied for routine reporting. The analysis using the analytic stack was carried out using those common definitions established for the Uniform Data System (UDS) by the Health Resources and Service Administration. In addition, interviews with health center leadership and staff were completed to understand the context for the findings. The analysis uncovered many challenges and inconsistencies with respect to the definition of core terms (patient, encounter, etc.), data formatting, and missing, incorrect and unavailable data. At a population level, apparent underreporting of a number of diagnoses, specifically obesity and heart disease, was also evident in the results of the data quality exercise, for both the EHR-derived and stack analytic results. Data awareness, that is, an appreciation of the importance of data integrity, data hygiene and the potential uses of data, needs to be prioritized and developed by health centers and other healthcare organizations if analytics are to be used in an effective manner to support strategic objectives. While this analysis was conducted exclusively with community health center organizations, its conclusions and recommendations may be more broadly applicable.

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Background: Influenza (flu) surveillance using Twitter data can potentially save lives and increase efficiency by providing governments and healthcare organizations with greater situational awareness. However, research is needed to determine the impact of Twitter users' misdiagnoses on surveillance accuracy. Objective: This study establishes the importance of Twitter users' misdiagnoses by showing that Twitter flu surveillance in the United States failed during the 2011-2012 flu season, estimates the extent of misdiagnoses, and tests several methods for reducing the adverse effects of misdiagnoses. Methods: Metrics representing flu prevalence, seasonal misdiagnosis patterns, diagnosis uncertainty, flu symptoms, and noise were produced using Twitter data in conjunction with OpenSextant for geo-inferencing, and a maximum entropy classifier for identifying tweets related to illness. These metrics were tested for correlations with World Health Organization (WHO) positive specimen counts of flu from 2011 to 2014. Results: Twitter flu surveillance erroneously indicated a typical flu season during 2011-2012, even though the flu season peaked three months late, and erroneously indicated plateaus of flu tweets before the 2012-2013 and 2013-2014 flu seasons. Enhancements based on estimates of misdiagnoses removed the erroneous plateaus and increased the Pearson correlation coefficients by .04 and .23, but failed to correct the 2011-2012 flu season estimate. A rough estimate indicates that approximately 40% of flu tweets reflected misdiagnoses. Conclusions: Further research into factors affecting Twitter users' misdiagnoses, in conjunction with data from additional atypical flu seasons, is needed to enable Twitter flu surveillance systems to produce reliable estimates during atypical flu seasons.

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The health care system in China is facing a multitude of challenges owing to the changing demographics of the country, the evolving economics of health care, and the emerging epidemiology of health as well as diseases. China's many national health care policies are documented in Chinese text documents. It is necessary to map the policies synoptically, systemically, and systematically to discover their emphases and biases, assess them, and modify them in the future. Using a logically constructed ontology of health care policies based on the common bodies of knowledge as a lens, we map the current policies to reveal their 'bright', 'light', and 'blind/blank' spots. The ontological map will help (a) develop a roadmap for future health care policies in China, and (b) compare and contrast China's health care policies with other countries'.

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AbstractBackground: The Personal Health Record (PHR) is an electronic record that allows patients to maintain, manage and access their health information in one secure location. However, despite these potential capabilities, the adoption rate of the PHR has been slow due to various challenges. Objectives: This study, being the first of its kind in Saudi Arabia, investigates the perceived barriers and /or challenges for PHR adoption in the Ministry of National Guard Health Affairs (MNGHA). The study explored perceived barriers and /or challenges from two different perspectives; a technical perspective and a social perspective. Methods: The study was conducted using a mixed methods approach. A cross-sectional study design using a questionnaire was used to measure patients' perceptions of the PHR and a qualitative approach through focus groups was used to capture comments and opinions from technical personnel for perceived technical barriers to PHR adoption. Result: Results from 424 patients revealed a positive perception for PHR adoption with almost all of the participants (96.7%) indicating interest in using the PHR and the majority (73.3%) expressing no confidentiality concerns for the online accessibility of their health information. Patients with higher levels of education indicated higher interest in using the PHR and expressed more concern with confidentiality than patients with lower levels of education. However, the majority of patients (78.3%) expressed their lack of awareness of existing patient e-services on the MNGHA website. The themes that emerged from the focus groups reinforced lack of awareness of e-services as a potential barrier for PHR adoption as well as the role of policy in the regulation and business process for PHR adoption. Conclusion: This study has highlighted the perceived challenges and barriers for adoption of the PHR in MNGHA-Riyadh. In order to ensure an efficient PHR with a strong adoption rate, effective steps need to be undertaken by building PHR awareness as well as setting clear guidelines and regulations from policy makers.

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Good quality data on Aboriginal and Torres Strait Islander peoples are needed to assess the effectiveness of programs and interventions, and to evaluate policies that are designed to improve the status of, and service delivery to, Aboriginal and Torres Strait Islander peoples. Due to the lack of longitudinal data it is difficult to gain knowledge on the specific causes or consequences of changes in indigenous outcomes. Variables such as name, date of birth and address variables for Aboriginal and Torres Strait Islanders may be subject to more variation and be less consistently reported among Aboriginal and Torres Strait Islander Australians than among other Australians. Improving the collection and management of key identifying variables for Aboriginal and Torres Strait Islanders are key to providing more quality information on this population group.

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