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Use of an electronic health record system for public health surveillance

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Objective

To develop a robust, sensitive and specific local, regional and national public health surveillance system utilizing an electronic clinical information system.

Introduction

Although development of computerized medical record systems in the United States is a high priority, there are relatively few instances of such systems supporting disease surveillance systems. The Indian Health Service (IHS) has had an electronic record database for over 30 years; however, implementation of point of care electronic health records (EHR) and use of these data for public health surveillance have begun only over the past 4 years.

Methods

The IHS health database is distributed across the United States with most data maintained at 465 local care facilities. Among these 465 facilities, there are over 235 EHR deployments, using similar but separately maintained configurations of the IHS EHR. Data are entered into the EHR system as part of daily clinical care or transcribed from paper for results of clinical referrals or outside tests. We developed a surveillance system that identifies reportable cases, notifies providers and provides data to a dedicated national surveillance database. Cases are found using a locally deployed extension to the local data system that searches for a combination of ICD-9 codes, clinical data and laboratory data, based on Council of State and Territorial Epidemiologists (CSTE) case definitions, on a nightly basis. Reports for situational awareness and response are made locally, regionally and nationally using an a priori established priority ranking of the public health importance of a case or outbreak.

Results

Pandemic influenza (pH1N1) was the first health condition targeted for surveillance in 2009. Through an iterative process, a combination of ICD-9 codes and measured fever at the time of visit yielded the highest sensitivity and specificity using the case definition for influenza-like illness (ILI) found in the Centers for Disease Control and Prevention's (CDC) ILInet surveillance system. Formal evaluation of ILI surveillance using review of local medical records (electronic and paper) in one region of the country found that the system had a sensitivity of 96.4% and specificity of 97.8%. IHS is expanding EHR surveillance to capture cases of chlamydia, syphilis, HIV, invasive pneumococcal disease, measles, *Haemophilus influenza* type b (Hib), meningococcal disease, hepatitis B, hepatitis C and tuberculosis.

Conclusions

Development of highly sensitive and specific surveillance systems using EHR is possible when using clinical and laboratory data to supplement physician diagnosis as recorded with ICD-9 codes. Because there is minimal action required on the part of healthcare providers, EHR-based surveillance has the potential to improve the simplicity, flexibility, timeliness and reliability of most surveillance systems.

Keywords

Electronic health records; surveillance; pandemic influenza

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