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Which Sections of Electronic Medical Records Are Most Relevant for Real-Time Surveillance of Influenza-like Illness?

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Objective

To investigate which section(s) of a patient's electronic medical record (EMR) contains the most relevant information for timely detection of influenza-like illness (ILI) in the emergency department (ED).

Introduction

Effective real-time surveillance of infectious diseases must strike a balance between reliability and timeliness for early detection. Traditional syndromic surveillance utilizes limited sections of the EMR, such as chief complaints and/or diagnosis. However, other sections of the EMR may contain more pertinent information than what is captured in a brief chief complaint. These other EMR sections may provide relevant information earlier in the patient encounter than at the diagnosis or disposition stage, which can appear in the EMR up to 24 hours after the patient's discharge. Comprehensive analysis may identify the most relevant section of EMRs for surveillance of all major infectious diseases, including ILI.

Methods

This was a retrospective, cross-sectional study. The sample consisted of 100 randomly selected ED ILI-positive patients at an academic medical center. These patients came to the emergency department during the 2014-2015 ILI season (September 1, 2014 to April 30, 2015). Geographic Utilization of Artificial Intelligence in Real-Time for Disease Identification and Alert Notification (GUARDIAN) – a syndromic surveillance program – was used to identify the positive ILI patients by applying the Centers for Disease Control and Prevention case definition of ILI (i.e., fever with cough and/or sore throat) to the entire EMR.

For each patient, the presence or absence of each ILI symptom was documented by a board-certified emergency physician for each section of the EMR, specifically: registration/arrival complaints, triage chief complaints, flow sheet/ vital signs data, history of present illness (HPI), review of systems (ROS), physical exam, assessment plan, diagnosis, free-text clinical notes, and discharge instructions, among others. In addition, efficacy of each EMR section in detecting ILI was documented.

Results

The ILI symptoms documented in the HPI section of the EMR captured 80% of ILI cases (Table 1). Thirty-nine percent of ILI cases had ILI symptoms documented in registration arrival complaints/ screening questions/triage chief complaints, while 91% of ILI cases had symptoms listed in the free-text sections of ROS and/or HPI plus flowsheet vital signs. In addition, only 46% of ILI cases had ILI symptoms documented in the discrete data fields of the EMR.

Conclusions

The HPI, ROS, and nursing notes sections of the EMR were information rich and the most relevant sections for ILI surveillance. Since 61% of cases reported ILI symptoms in areas of the EMR other than the commonly-used triage and registration sections, it is warranted that expanding ED syndromic surveillance to other areas of the EMR may increase sensitivity. Thus, reliable real-time syndromic surveillance systems need to be capable of processing both discrete and free-text data from various sections of the EMR.

Table 1: Percent of each section of EMR that meets the definition of ILI

Sections(s) of EMR	% ILI Cases (n=100)
History of present illness (HPI)	80%
Review of systems (ROS)	70%
Nurses	46%
Attending notes	32%
Assessment plan	24%
Screening questions	20%
Triage chief complaint (CC)	18%
Registration arrival complaints	8%
Diagnoses	3%
Physical exam	1%
Residents	1%
Others	1%
Nurse practitioner (NP) notes	1%
Flowsheet vital signs	0%
Flowsheet vital signs & HPI & ROS	91%
HPI & ROS	81%
Registration arrival complaints & Screening questions & Triage CC & Flowsheet vital signs	46%
Registration arrival complaints & Screening questions & Triage CC	39%
Attending & Resident & NP Notes	34%

Keywords

Influenza-like illness; GUARDIAN; Electronic Medical Records

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