ABSTRACT

EHR-based syndromic surveillance during the 2009–2010 H1N1 pandemic

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Objective
This paper describes a national initiative connecting 850 non-affiliated healthcare provider organizations throughout the United States in order to provide situational awareness during the 2009–2010 H1N1 influenza A pandemic. We addressed the challenge of semantic variability between organizations through a centralized data-mapping approach.

Introduction
The global H1N1 influenza A pandemic in 2009 heightened the need for automated disease surveillance capabilities.

After an initial surge in confirmatory testing, clinicians moved to diagnosis based on patient assessment for fever combined with cough or sore throat, the influenza-like indicators (ILI). Although some organizations used automated data capture[1] or national systems with manual data entry (www.cdc.gov/flu/weekly/fluactivity.htm), there was not a turnkey national automated system in place to support syndromic surveillance for ILI among non-affiliated organizations. Semantic interoperability through standards utilization is widely expected to simplify large-scale data initiatives but is challenging with widely disparate uses of terminology.

Participating Facilities
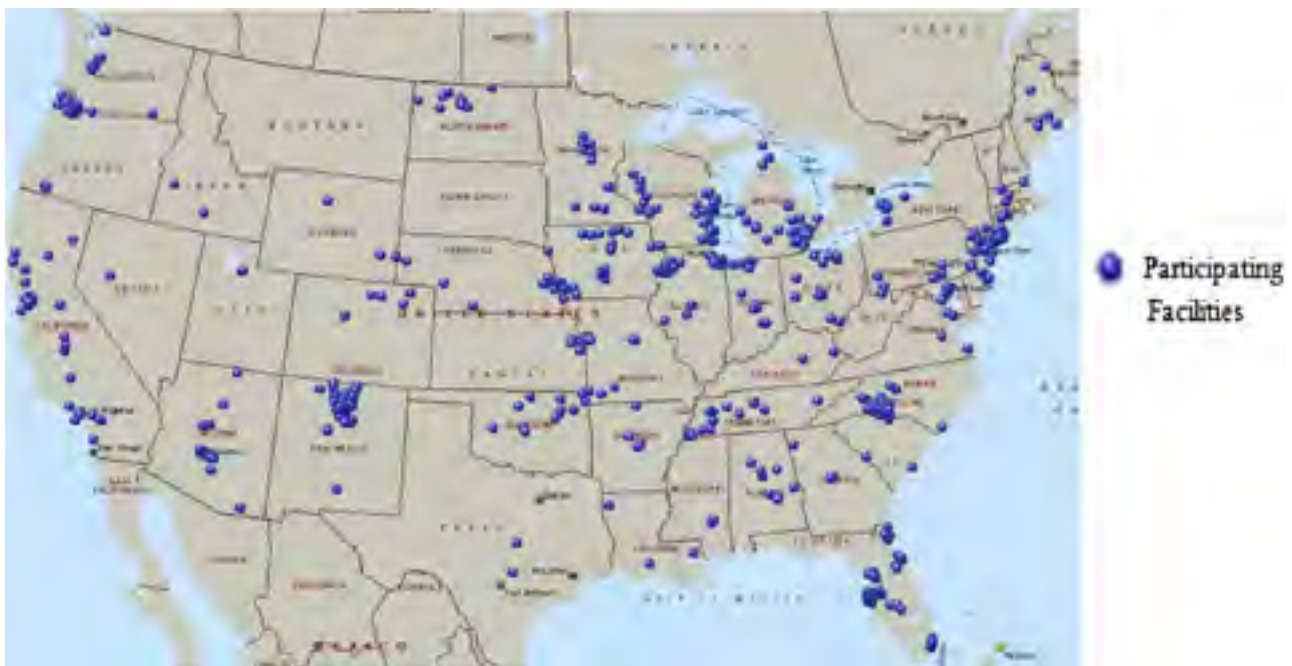
Methods

Organizations utilizing Cerner electronic health record (EHR) systems were invited to participate in the HealthAware Flu Initiative. 166 organizations in 48 states representing 850 healthcare provider facilities are currently participating. Local terminologies from all participating organizations were reviewed by Cerner terminology curators. Data elements associated with ILI were mapped to a core vocabulary. Participating organizations installed an automated query that ran every 24 h and summarized the prevalence of patients with ILI, diagnostic test orders and positive influenza A results. These data, with limited demographic information and no personal health identifiers, were uploaded to the Cerner data operations team, aggregated and published to participating health organizations daily. Local (34), state (33) and national public health organizations (CDC) also received access to the system.

Results

The reference data models from the 166 organizations demonstrated widely disparate terminologies for the key ILI data elements. For example, 88 participating systems captured 'cough' using 101 potential prompt labels, with one organization using 17 different prompts. Fever was captured by 75 organizations using 72 potential prompts, whereas sore throat was captured by 26 organizations with only nine possible prompts. The responses to these prompts varied widely. By 1 September 2009, 57 million patient encounters were monitored by this system for either syndromic or laboratory indications.

Conclusions

The HealthAware initiative implemented a large-scale nationwide network to monitor indicators of influenza. Participating organizations included ambulatory clinics, private hospitals, pediatric hospitals, academic medical centers and smaller regional medical centers. We found limited use of standard terminology amongst these organizations, highlighting the value of human-mediated curation until standards become more widely adopted.

Acknowledgements

Reference

1 Schirmer P, Lucero C, Oda G, Lopez J, Holodniy M. Effective detection of the 2009 H1N1 influenza pandemic in the US Veterans Affairs medical centers using a national electronic biosurveillance system. *PLoS One* 2010;**5**:e9533.