Towards Interoperability for Public Health Surveillance: Experiences from Two States

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Objective

To characterize the use of standardized vocabularies in real-world electronic laboratory reporting (ELR) messages sent to public health agencies for surveillance.

Introduction

The use of health information systems to electronically deliver clinical data necessary for notifiable disease surveillance is growing. For health information systems to be effective at improving population surveillance functions, semantic interoperability is necessary.

Semantic interoperability is "the ability to import utterances from another computer without prior negotiation" (1). Semantic interoperability is achieved through the use of standardized vocabularies which define orthogonal concepts to represent the utterances emitted by information systems. There are standard, mature, and internationally recognized vocabularies for describing tests and results for notifiable disease reporting through ELR (2). Logical Observation Identifiers Names and Codes (LOINC) identify the specific lab test performed. Systematized Nomenclature of Medicine-Clinical Terms (SNOMED CT) identify the diseases and organisms tested for in a lab test.

Many commercial laboratory and hospital information systems claim to support LOINC and SNOMED CT on their company websites and in marketing materials, and systems certified for Meaningful Use are required to support LOINC and SNOMED CT. There is little empirical evidence on the use of semantic interoperability standards in practice.

Methods

To characterize the use of standardized vocabularies in electronic laboratory reporting (ELR) messages sent to public health agencies for notifiable disease surveillance, we analyzed ELR messages from two states: Indiana and Wisconsin. We examined the data in the ELR messages where tests and results are reported (3). For each field, the proportion of field values that used either LOINC or SNOMED CT codes were calculated by dividing the number of fields with coded values by the total number of non-null values in fields.

Results

Results are summarized in Table-1. In Indiana, less than 17% of incoming ELR messages contained a standardized code for identifying the test performed by the laboratory, and none of the test result fields contained a standardized vocabulary concept. For Wisconsin, none of the incoming ELR messages contained a standardized code for identifying the test performed, and less than 13% of the test result fields contained a SNOMED CT concept.

Conclusions

Although Wisconsin and Indiana both have high adoption of advanced health information systems with many hospitals and laboratories using commercial systems which claim to support interoperability, very few ELR messages emanate from real-world systems with interoperable codes to identify tests and clinical results. To effectively use the arriving ELR messages, Indiana and Wisconsin health departments employ software and people workarounds to translate the incoming data into standardized concepts that can be utilized by the states' surveillance systems. These workarounds present challenges for budget constrained public health departments seeking to leverage Meaningful Use Certified technologies to improve notifiable disease surveillance.

Table 1 – Proportion of "Raw" ELR Data Samples with LOINC or SNOMED CT Concepts

Sample	% OBX-3 Fields with LOINC	% OBX-5 Fields with SNOMED CT
INPC Messages	16.5%	0.0%
WDHS Messages	0.0%	12.3%

Keywords

Standards; Interoperability; Electronic Laboratory Reporting; Public Health Surveillance; Computerized Medical Records Systems

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