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Public Health Decisions Using Point of Care Data from Open Source Systems in Africa

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Objective

We demonstrate an architecture for driving regional public health decisions with automated and semi-automated data collected from open source point of care systems in resource constrained environments.

Introduction

Ministries of Health in Low and Middle Income Countries (LMIC) are making or trying to make public health decisions for infectious disease conditions like HIV using data garnered from sentinel events and disease tracking in the community. The process of gathering and aggregating data for these case-based reports for is, in all too often a cumbersome or paper-based process. The Center for Disease Control (CDC) was interested in prototyping and piloting approaches that could improve the efficiency and reliability of case reports in resource-constrained environments. One of their primary goals was to demonstrate how electronic data gathered in the front lines of care could be leveraged to automate and improve the reliability of data within case reports driving public health decisions at regional and country levels. OpenMRS is an open source medical record system platform often used in resource constrained environments.[1] Since OpenMRS is used as an electronic medical record system in several African countries and has been connected to regional or country-level health exchanges, the CDC was interested in building a working solution for electronic case based reporting using OpenMRS and a health information exchange.

Methods

Working closely with the CDC, we developed a Case-Based Reporting (CBR) module for OpenMRS, using HIV as an initial use case. Trigger events were defined based on sentinel events and key clinical monitoring conditions and these were mapped or added to standard terminologies. We use Health Level 7 (HL7) messaging standards to deliver case reports from OpenMRS to the health information exchange.[2] We used existing manual workflows and EPI officers to define the needs for a surveillance officer role and the requirements for the CBR module. The module was developed as open source using agile methodologies. OpenHIE (ohie.org) was selected to demonstrate the ability of OpenMRS module to submit an electronic case report to a health information exchange.

Results

We have a working, open source case-based surveillance module for OpenMRS that comes with nine pre-defined HIV-specific triggers:

- New Case
- New Disease
- New Treatment
- Evidence of Lack of Monitoring
- Evidence of Treatment Failure
- Switched to Second Line Regimen
- Treatment Stopped
- Lost to Follow Up
- Patient Died

We have been able to demonstrate the automatic creation of HIV-based case reports based on data within an electronic medical record system, placement of these proposed case reports into a work queue for a surveillance officer, and successful electronic submission of these case reports into a health information exchange.

Conclusions

This work demonstrates the ability to develop open source point of care software solutions for LMIC that can be used for sentinel awareness as well as longitudinal monitoring of individual patient care. The current scenarios, trigger identification standards, and messaging specifications are easily accessible and published on the OpenMRS Wiki.[3] Our incorporation of user centered design through EPI officer engagement helped ensure that our solution is responsive to the end user. The CDC is able to use this solution to demonstrate the feasibility of incorporating electronic case reporting in LMICs and to demonstrate the benefits and promote the adoption of electronic medical record systems and health information exchanges in resource constrained environments. In the next phase of this work, we will be working with the CDC to identify sites within Africa for deployment and refinement of the CBR module.

Keywords

Open Source; HIV; Case Reporting; Africa

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