System Monitoring for Near Real-Time Surveillance for Infectious Diseases

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OBJECTIVE

To explore the utility of a system monitoring program for infectious disease surveillance with real time proactive notification.

BACKGROUND

Events of recent years, particularly concern about a possible avian (H5N1) influenza pandemic, have focused increasing attention on the need for timely surveillance[1], with real time surveillance as the ultimate goal. In a previous study[2], we reported on the utility of monitoring clinical laboratory results as a means of estimating the incidence of influenza in the U.S. within 24 hours using the Quest Diagnostics Corporate Informatics Data Warehouse (QIDW). We have now begun to explore the feasibility of near real time surveillance using an internal application capable of providing alerts on unusual conditions within minutes of their occurrence. Our first application of this technology to infectious disease is monitoring activity related to the possible emergence of avian (H5N1) influenza in the United States.

METHODS

A robust system monitoring tool is incorporated into the Quest Diagnostics Information Technology (IT) environment for monitoring system performance, business metrics and other operational issues critical to the functioning of the company's IT environment. This commercial software package is widely used by government institutions and provides multiple security options. Based on our success with this tool in the past, we have developed an application that provides a real time monitoring solution including correlation (by geographic location) and alert notification for infectious diseases. This enables us to send automated proactive notification to Quest Diagnostics Syndromic Surveillance team members in a matter of minutes compared to the hours or days previously required to access this information. The system is fully automated and monitors 24/7 with no user intervention required. The alerts can be sent through various channels (i.e. E-mail, pager, cell or home phones). During the pilot, the alert "body" may include limited de-identified geographical and demographic information. The correlation module allows us to filter "pseudo epidemic" events to improve notification accuracy. In the event of an apparent imminent threat to health, alert data could be further processed to allow real time plotting of the information to satellite based imagery of North America, thus providing a near real time visual representation of the geographic spread of an infectious disease.

The pilot implementation is being conducted in our Teterboro, NJ business unit, which serves the NY-NJ region, including the greater New York City metropolitan area. The pilot is intended to focus on detecting any activity related to avian (H5N1) influenza testing; however, it also includes seasonal influenza and West Nile Encephalitis to assure sufficient testing activity occurring during any season to effectively evaluate the performance of the system.

RESULTS

During our initial development work for the Syndromic Surveillance Module, we were able to accurately collect and alarm on infectious disease test ordering data within the context of a development data base, gathering and displaying not only test orders data and descriptions, as well as Zip3 and lab information. We are continuing development and testing to ensure scalability of the module. Currently the environment has been tested with up to 18,000 orders from 15 labs during a 15 minute interval, which translates into 70,000 orders per hour. Data analysis from the pilot implementation of infectious disease monitoring is expected to begin in July 2006.

CONCLUSIONS

This project demonstrates how test order and result data from a large national warehouse of commercial laboratory testing data can be analyzed in near real-time to provide information for public health surveillance. This approach of near-real time evaluation of test orders and test results data on a national basis also merits further evaluation for surveillance of other infectious diseases.

REFERENCES

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