

Improvement of epidemiology business processes through the evolution of biosurveillance

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Objective

This paper reviews the evolution of biosurveillance in Duval County, FL, and characterizes the subsequent improved execution of epidemiology functions as a result of the implementation of the Early Notification of Community-based Epidemics (ESSENCE) system.

Introduction

In the last decade, the scope of public health (PH) surveillance has grown, and biosurveillance capacity has expanded in Duval County. In 2004, the Duval County Health Department (DCHD) implemented a standalone syndromic surveillance (SS) system, which required the manual classification and entry of emergency department (ED) chief complaints by hospital staff. At that time, this system, in conjunction with other external systems (e.g., CDC ILInet, FluStar and NRDM) were used to conduct surveillance for health events. Recommendations from a 2007 ISDS panel were used to strengthen surveillance within Duval County. Later that year, the Florida DOH moved to a statewide SS system and implemented ESSENCE, which has been expanded to include (1) ED record data from 176 hospitals (8 within Duval County); (2) reportable disease case records from Merlin; (3) Florida Poison Information Network consultations; and, (4) Florida Office of Vital Statistics death records (1). ESSENCE has subsequently become a platform for rapid data analysis, mapping and visualization across several data sources (1). As a result, ESSENCE has improved business processes within DCHD well beyond the initial scope of event detection. These improvements have included (1) expansion of the ability to create visualizations (e.g., epi-curves, charts and maps); (2) reduction in the time required to produce reports (e.g., newsletters and media responses); (3) reduction in staff training needs; and (4) augmentation of epidemiology processes (e.g., active case finding, emergency response and quality improvement [QI]) and closing the PH surveillance loop.

Methods

To quantify the impact of ESSENCE on PH activities, an evaluation of epidemiology business processes pre- and post-ESSENCE was conducted. Staff time, computer programs/systems utilized and computational steps were compared for tasks within three quantifiable areas: visualization creation, report production and activities during PH responses. Visualizations included production of a map, chart, table and epidemic curve for the same data. Report production tested the ability to create nontextual documents with multiple graphics. Conducting ad hoc ED surveillance was compared between ESSENCE and e-mail/telephone methods. QI reviews were compared between ESSENCE and Merlin Analysis Tools. The number

of software or systems requiring training, which were replaced by ESSENCE, was reviewed. Computational steps included page clicks, exporting/importing data between systems and data management. Testing was conducted by a single reviewer proficient in current systems performing the task a single time to completion. Time and computational steps were measured from the initiation of a task to the completion of a usable product and then averaged across the three quantifiable areas.

Results

ESSENCE created visualizations on average 89% faster than previous methods, requiring 43% fewer computational steps. For the production of reports ESSENCE was 86% faster, requiring only 4.55 minutes compared to 27.83. For tasks relating to PH responses, initiating ad hoc ED surveillance was 96% faster through ESSENCE without comparing resource savings during follow-up monitoring. However, conducting QI reviews was faster using previous systems with modules designed for such tasks. ESSENCE also reduced the need for staff training, as one system was used for most tasks instead of five (Excel, ArcGIS, Access, SAS/SPSS and Merlin).

Conclusions

Using ESSENCE had advantages compared to previous methods that extended beyond basic processes. The analytic and computational abilities of the system are more advanced, more accessible and more user friendly than those of previous systems. The ability to save and share queries and visualization dashboards as well as the added efficiency of navigation reduce redundancy and improve user functionality. Ultimately, the user experience is enhanced, and resources are optimized. In the future, ESSENCE will continue to expand available data sources as well as increase analytical capacity based on user feedback and identified system needs.

Keywords

Biosurveillance; syndromic; epidemiology; business processes

Reference

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