

A Syndrome Track and Reporting System in Hillsborough County Florida: Findings from a Systematic Evaluation

Y. Zhu¹, Ph.D., W. Wang¹, Ph.D., D. Atribun,² MPH, C. Carrubba MD³, J. Kintz², MPH, and G. Elliot² MPH

¹*Department of Epidemiology and Biostatistics, University of South Florida, Tampa, Florida*

²*Hillsborough County Health Department, Tampa, Florida*

³*Tampa General Hospital, Tampa, Florida*

OBJECTIVE

To evaluate the Syndromic Tracking and Reporting System (STARS) with respect to quality of syndrome diagnoses, timeliness and completeness of data collection and processing, performance of aberration detection methods, and aberration investigation.

BACKGROUND

One of the first county-wide syndromic surveillance systems in the nation, STARS has been in operation since 11/01/2001, and now covers Hillsborough, Pinellas and Collier counties. STARS uses hospital emergency department visit data to detect aberrations of non-specific syndromes and serves as an earlier warning system for public health threats. Patient's syndrome is collected upon arrival, separately from routine collection of clinical and administrative data; but in some hospitals the process is being streamlined with routine data collection. Aberration detection is done twice daily using the statistical system EARS developed by the CDC. Upon flagging of an aberration, follow-up investigation is conducted to verify cases, and identify source of exposure following a sequence of decision procedure. After several years of operation and some instituted enhancements, a systematic evaluation was called to (1) assess if STARS has met the operation specifications and (2) characterize system efficacy and effectiveness.

METHODS

Following CDC's evaluation guideline [1], this study focused on the quality of syndrome diagnosis, operation efficiency, characteristics of aberration detection, and guidance procedure for aberration investigation. Syndrome data were sampled from selected hospitals. Sensitivity, specificity, and uncertainty of syndrome diagnoses were assessed by comparing with ICD-9 discharge diagnosis according to CDC's diagnostic algorithm [2]. Data on operation efficiency were collected from all hospitals to assess the timeliness and completeness of data processing and submission. Case information of aberration investigation was also gathered and analyzed. The evaluation of aberration detection algorithms was done through modeling of real data and extensive simulations [3].

RESULTS

The sensitivity and specificity of syndrome diagnoses varied by syndrome. Uncertainty in syndrome verification remains high under the ICD9 conversion algorithm [2], depending on factors such as whether a single or multiple ICD9 codes is used. Data completeness and timeliness in data submission were inversely related. System efficiency varied between hospitals, yet stayed somewhat constant within each hospital. Under the default configuration all aberration detection algorithms had unexpectedly higher false alarm rate, and could also be extremely low in sensitivity. Simulation studies revealed the weakness of some algorithms (e.g. C1). The lack of a consistent and unified communication channel and unavailability of designated staff at local hospitals hindered the effectiveness of aberration investigations.

CONCLUSIONS

Uncertainty in syndrome data is an intrinsic limitation in syndrome diagnosis and misdiagnosis will affect the performance of any aberration detection method in ways yet to be quantified. Manual data collection suffers low quality especially when data collection is a side-job for the ED staff. Streamlined data collection is an advantageous alternative. Statistical methods for aberration detection must be calibrated for each local and each syndrome in order to meet required specifications; calibration requires computer simulations. A unified approach to follow-up investigation and designated hospital staff are necessary to efficient follow-up investigations. There remain urgent needs for systematic evaluation of syndromic surveillance. Findings of this study help further the understanding of similar systems.

REFERENCES

- [1] Centers for Disease Control and Prevention (2003). Framework for evaluating public health surveillance systems for early detection of outbreaks.
- [2] Centers for Disease Control and Prevention (2003). Syndrome definitions for diseases associated with critical bioterrorism-associated agents.
<http://www.bt.cdc.gov/surveillance/syndromedef/>
- [3] Zhu Y, Wang W, et al. Initial evaluation of the early aberration reporting system—Florida. *MMWR Morb Mortal Wkly Rep.* 2005 Aug 26; 54 Suppl: 123-30.