Novel Surveillance Tool Enables Public Health Use of Poison Control Calls

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OBJECTIVE

A new tool allowing analysis of poison control center data and integration of that data into public health surveillance efforts is described.

BACKGROUND

Regional poison control centers (RPC) receive calls about a variety of poisoning exposures. Callers' symptoms may not otherwise enter traditional public health (PH) surveillance systems. I report a 16-week pilot study of a new tool to enable the RPC to analyze and integrate call data with the PH, to augment ongoing disease surveillance efforts.

METHODS

RPC hotline calls are already entered into a national electronic database, the Toxic Exposure Surveillance System (TESS)[1]. These records include demographic information, clinical effects, and treatments. We used a proprietary system to extract and analyze in real time the case start time, zip code, clinical effects, and treatments from our case encounters. This data was transferred in HIPAA-compliant manner to the off-site data analysis tool (FirstWatch www.firstwatch.net). This tool, originally designed for EMS surveillance, was adapted to accept RPC data. The system analyzed sixteen clusters of clinical effects and treatments. For each cluster, three statistical tests were compared to 12 months of historical data: 1. Case Count compared hourly cluster volume to expected averages based on day of week and hour of day; 2. Event Ratio compared the ratio of cluster events to all events, to control for unrelated volume increases; 3. Modified Cumulative Sum Control Chart incorporated time-series analysis over a rolling 14-day calendar. Triggers were set to alarm when all 3 of these tests were ≥ 3 standard deviations from the expected mean. A fourth test, geographical mapping, looked for case clustering based on zip code. A secure web page displayed a "dashboard" of each cluster's current status, with password access granted to PH surveillance staff.

RESULTS

During 112 days the RPC received 23,366 cases, of which ~ half (11,486) were human exposure cases. The system performed the four tests on each of the 16 triggers every 3–5 minutes, for ~19,200 tests/day. FirstWatch reported 29 outliers on 19 days, "detecting" one true-positive event, food poisoning of 101 victims which had been recognized as a major event during the first RPC call (figure). During the same period, the national TESS-based system reported 82 outliers on 48 days, and also "detected" the 101-victim event

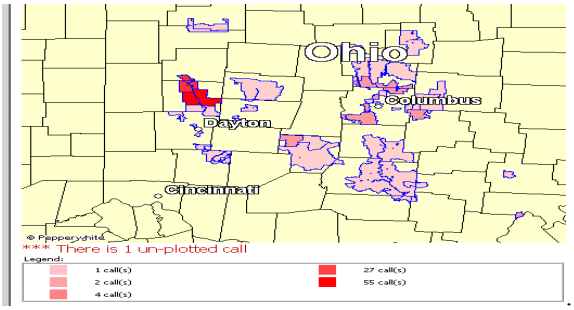

Figure: Poison center data are mapped, allowing GIS "detection" of an outbreak involving 101 victims of *S. aureus* food poisoning.

CONCLUSIONS

Surveillance systems are tools which complement the RPC's primary disease surveillance instruments: the experienced nurses and pharmacists on the hotline. Although the impetus for RPC-based toxicosurveillance was to detect terrorism, the sustainable use of these tools is to detect events of PH significance. RPC data have been used for regional (e.g. detect carbon monoxide and food poisoning cases after hurricanes[2]) and national surveillance (CDC analyzes TESS data[3]). The tool tested here has several advantages over the TESS-based surveillance: users can define specific triggers and adjust alarm parameters. During this pilot, RPC data were analyzed in isolation, but the system can merge RPC data with EMS call center and 911 dispatch data. An export feature allows HD staff to incorporate raw data into existing surveillance systems.

Poison centers collect valuable data, which could serve a greater PH good if properly analyzed and shared. This system securely and efficiently enabled use of RPC data for disease surveillance. Further research is needed to define statistical parameters giving optimal sensitivity and specificity.

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[1] Watson et al. Toxic Exposure Surveillance System. MMWR 2004; 53 (suppl):262.

[2] Schulte. Surveillance Data from Poison Control Centers after Hurricane Dennis – Florida, July 2005. Secure posting on CDC's Epi-X, July 11, 2005.

[3] Funk et al. Using the Toxic Exposure Surveillance System to Detect Potential Chemical Terrorism Events. MMWR 2004; 53 (suppl): 239.