Case Studies in the Use of the National Poison Data System (NPDS)

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Background

The National Poison Data System (NPDS) is maintained and operated by the American Association of Poison Control Centers (AAPCC) for the analysis, visualization, and reporting of call data from all 61 regional poison centers (PCs) in cooperation with CDC's National Center for Environmental Health (NCEH). NCEH collaborates with AAPCC toxicologists using NPDS to facilitate early recognition and monitoring of illness due to intentional or unintentional chemical or toxin exposures. NPDS algorithms identify statistically significant increases in callers' reported signs and symptoms - 131 clinical effects (CEs) such as rash and diarrhea - for detection of national poison exposure anomalies. Each day AAPCC toxicologists make decisions about NPDS anomalies' public health importance. Regional PCs are contacted as required for additional information about potentially important anomalies. NPDS also allows for individual case tracking through user-defined "case-based definitions." This additional method is especially useful during an outbreak when the agent and/or symptoms of affected persons are known.

Methods

We examined NPDS national CEs daily anomalies from 15 February to 15 June 2008. Each anomaly's public health significance was classified by AAPCC toxicologists at the time of the anomaly as yes, no, or unknown using an empirically derived decision process that characterizes the number and geographic dispersion of case reports, magnitude above threshold, illness severity, and evidence of a shared exposure agent. We also describe how ad-hoc case-based definitions querying groups of CEs, demographic characteristics, and/or particular exposures were used during multi-state selenium exposures, March to May 2008, due to an improperly formulated nutritional supplement.

Results

During the study period, NPDS identified statistically significant CEs anomalies on 83 of 122 days (68%). The median number of CEs anomalies each day was 2 (range 1 to 7). Initial classification of the 83 anomalies revealed: 78 (94%), no public health significance; 2 (2.4%), unknown importance; and 3 (3.6%), public health importance. Review of the two anomalies of unknown importance indicated one was due to miscoding of a single caller's CEs while the other was a hospital emergency department (ED) treating 15 adults with chest pain from acute exposure to a pool algicide. Further analysis indicated the latter event was of public health importance. Of the three anomalies of importance, two were school exposures. In the first, school officials contacted the regional PC about 38 children with symptoms of nausea, rash, and dyspnea after exposure to cologne sprayed in a classroom. In the second, the ED contacted the regional PC about 36 students and one adult exposed to chlorine gas emitted from a swimming pool drain. The third anomaly of importance included 65 calls regarding exposure to tomatoes potentially contaminated with salmonella due to a nationwide outbreak. It was not known if any of these were true salmonella cases. During the selenosis outbreak, regional PCs were contacted about the formulation problem and a product code was created to assist in capturing these exposures. This enabled CDC to identify cases meeting the case-based definition. From 11 March to 4 June 2008, 170 exposures were reported from the public and healthcare providers in 8 states. Of these, 136 (80%) reported CEs including generalized pain (25.3%), diarrhea (24.1%), and nausea (12.4%). PCs collaborated with state health departments (HDs) to report potential cases for public health follow-up.

Conclusions

NPDS has utility for cluster detection, identifying four events of public health significance nationwide. The finding that one anomaly was originally classified as not of public health significance shows that criteria for defining events of public health significance require further research. During the selenium exposure event, NPDS identified potential cases that were reported by PCs to state HDs, and PCs provided toxicological advice to the public and health care providers. Such events allow for system testing and augmenting relationships between CDC, state HDs, and PCs. AAPCC toxicologists provide both subject matter expertise and a link between NCEH and the regional PCs when additional information or case follow-up is needed. AAPCC and CDC plan to continue to enhance and evaluate NPDS, refine case-based definitions, finalize protocols for anomaly characterization, and develop a community of practice to build best practices for the use of PC data for public health surveillance.