

Automated Monitoring of Exposures Using the BioSense System

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OBJECTIVE

To identify hospital visits with chief complaints concerning exposures, characterize them, and develop methods for detecting exposure clusters.

BACKGROUND

BioSense is a national automated surveillance system designed to enhance the nation's capability to rapidly detect and quantify public health emergencies, by accessing and analyzing diagnostic and prediagnostic health data¹. The BioSense system currently receives near real-time data from more than 540 civilian hospitals, as well as national daily batched data from over 1100 Department of Defense (DoD) and Veterans Affairs (VA) medical facilities.¹ BioSense maps chief complaint and diagnosis data to 11 syndromes and 78 sub-syndromes (indicators). This project was spurred by the recent detection of several clusters with chief complaints containing the term "exposure" only some of which map to current BioSense subsyndromes. BioSense currently does not have a generic "exposure" subsyndrome.

METHODS

Free-text chief complaints from emergency department (ED) visits, outpatient (OP) reasons for visit, and inpatient (IP) reasons for admit were examined among visits at BioSense civilian hospitals from May 2006 to May 2008. Visits with complaints containing the text "EXPOSURE" or "EXPOSED TO" were included in this analysis. Exposure visits were characterized on patient class, subsyndrome, disease, and exposure categories. Eight exposure categories were constructed, as follows (1)chemical (e.g. paint, gas, mercury); (2)biological (e.g. blood, saliva); (3)environmental (e.g. heat, smoke); (4)bioterrorism-related (e.g. anthrax, nationally notifiable diseases, food-borne illnesses); (5)drugs (e.g. methamphetamine cocaine.); (6)occupational; (7)sexually transmitted disease (e.g. Chlamydia); or (8)other/unknown.

RESULTS

A total of 26,627 exposure-related visits were identified, 22,437 to ED, 3,987 to OP, and 203 to IP facilities. The ED was the patient class with the highest exposure-related visit rate: 14.3/1000 ED chief complaint visits. Exposure-related visits for OP reason for visit and IP reason for admit were 1/1000 OP visits and 0.02/1000 IP visits, respectively.

Only 29% mapped into a current BioSense defined subsyndrome, most frequently carbon monoxide (17.2%), cough (13.3%), fever (9.1%), and influenza-like illness (8.4%). Among exposure categories, chemical was the most frequent for all patient classes among visits with a known or specified exposure (Table 1). Visits with unknown or exposures not mapping to the constructed categories accounted for only 23% of ED visits, but more than half of inpatient visits. Seasonal trend peaks were observed among exposure-related visits mapping to the carbon monoxide poisoning (winter), excessive heat (summer), and CNS, inflammatory disease (winter) subsyndromes.

Table 1. Percentage of exposure related BioSense visits, by patient class and exposure category, May 2006- May 2008

	All N=26,627	Patient Class		
		ED N=22,437	OP N=3,987	IP N=203
Total Exposure Visits				
Exposure Category				
Bioterrorism-related.....	11.9	12.0	11.5	12.8
Biological.....	11.8	12.8	6.8	1.5
Chemical.....	19.4	20.1	15.8	13.8
Environmental.....	6.9	6.4	9.4	9.4
Occupational.....	5.8	4.3	14.2	1.5
Recreational drugs.....	1.1	0.9	2.0	4.4
STDs.....	17.9	20.0	4.4	2.4
Other or unknown.....	25.2	23.1	35.9	54.6

Within the other or unknown exposure category, line list reviews also identified complaints with descriptions of events, locations, and the specific agents of trauma, illness, and/or exposures.

CONCLUSIONS

Hospital visits for various types of exposures, many of which have public health importance, are common. These visits could be captured by addition of a generic "exposure" subsyndrome or by subsyndromes corresponding to the categories we constructed. Furthermore, several of these visits are events that could require emergency response such as exposure to infectious disease. In addition to infectious diseases, automated surveillance of exposures and other injuries may assist in prevention efforts.

REFERENCES

[1] CDC. BioSense, Fact Sheet Atlanta, GA. Available at http://www.cdc.gov/BioSense/files/fact_sheet.pdf

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