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Using Emergency Department Data for Detection of a Synthetic Marijuana Outbreak

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Objective

The aims of this presentation is to use ED chief complaint data, to test BioSense 2.0 for detection of a novel public health event (i.e., serious adverse events related to synthetic marijuana use) not currently categorized in the BioSense syndromic surveillance library.

Introduction

Timely access to Emergency Department (ED) Chief Complaint (CC) data, before the definitive diagnosis is established, allows for early outbreak detection and prompt response by public health officials.BioSense 2.0 is a cloud-based application that securely collects, tracks, and shares ED data from participating hospitals around the country. Denver Health (DH) is one of several Colorado hospitals contributing ED Chief Complaint data to BioSense 2.0. In August 2013, ED clinicians reported an increase in patients presenting with excited delirium, possibly related to synthetic marijuana (SM). We used this event to test the use of CC field of ED data for detection of a novel public health event (i.e., serious adverse events related to synthetic marijuana use) not currently categorized in the BioSense syndromic surveillance library.

Methods

Daily routines retrieved DH hospital data from BioSense 2.0 to local public health servers: 1. 'R' programs access BioSense servers that contain the Raw, Binned and Exceptions syndromic data; 2. UNIX CRON jobs were created to schedule these 'R' jobs to run on a regular daily basis and pull the results down to the DH Servers; 3. Scheduled SAS batch job that APPENDS the retrieved data into one SAS dataset. Using SAS INDEX functions, we searched for specific keywords likely related to SM-usage in the CC field. For example, "if (index(cc, "blueberry") > 0 or index(cc, "boogie") > 0 or index(cc, "cannabinoid") > 0 or index(cc, "cannabis") > 0 or ….The 'IF' logic grew quickly as the list of possible keywords/exclusions and the criteria became unmaintainable. To develop a maintainable code solution, a custom built library containing 89 SM-related keywords and exclusion words was developed. SM-related keywords were provided by ED clinicians. Exclusion words were words in the CC field that came back as "hits" but were not SM-related. For example, "spice" is a keyword but "hospice" is an exclusion word. Not all 89 keywords were found in the CC data; only 20 keywords provided significant numbers of hits for possible SM-use. Because of the sheer volume of records returned and lack of specificity of some keywords, 15 of the 20 keywords were further excluded.

To assess the sensitivity and specificity of this method, we compared the patients seen at DH ED with a known SM-related diagnosis (gold standard) during the event period (September 4-19, 2013) with the patients with a CC where a SM-related keyword was observed.

Results

Between August 2013-April 2014, using the 5 keywords (mamba, marijuana, mj, spice, thc), 106 SM- related records were identified in the analysis. During the outbreak period (September 4-19, 2013), 21 cases of SM-related illness presented to the DH emergency department and a total of 27 of SM-syndrome associated records were identified. Sensitivity and specificity analysis was based on the sample of these 27 records. Using this method to detect SM-related events was highly specific (99.6%) but only moderately sensitive (44%).

Conclusions

Keywords and exclusions were used to identify a novel synthetic marijuana outbreak with adverse health effects through analysis of ED record CC field. Keyword data were difficult to analyze due to many acronyms, abbreviations, misspellings, and truncation of words. As triage personnel may be unfamiliar with SM-related terms and enter the target keyword efforts may be required to educate ED clinicians during the event to improve sensitivity.

Keywords

syndromic surveillance; synthetic marijuana; emergency department

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