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An Evaluation of Heat-Related Emergency Department Visits Based on Differences in Heat Syndrome Definitions in Northern Illinois

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Objective

To determine differences in case detection using different syndrome definitions for heat-related health effects.

Introduction

Comparison of heat-related health effects across regions or among different syndromic surveillance systems is problematic due to the lack of a standardized heat-related syndrome definition. While a national standard for common heat-related syndromes would facilitate data comparisons, local customization of syndromes to adjust for unique public health events or characteristics is often necessary to optimize use of syndromic surveillance data.

Methods

Four heat-related syndrome definitions were applied to Emergency Department (ED) data collected on individuals who visited ESSENCE participating hospitals in Northern Illinois from May 1, 2012 through August 31, 2012.

The four syndrome definitions were: (1) a locally-defined 'heat' syndrome extracted from the chief complaint (CC), (2) a locally-defined 'heat' syndrome from the discharge diagnosis (DD), (3) excessive heat' syndrome defined by ESSENCE, and (4) 'heat excessive' syndrome defined by BioSense 2.0. The Query Portal of the Cloud version of ESSENCE was used to create the four syndrome definitions and to analyze the 2012 data.

Line listings for each definition were examined manually, by two separate individuals, to determine concordance with each syndrome definition. Refined heat syndrome definitions were developed based on discordant results from all four syndrome definitions. The refined syndrome definitions were applied to data from June 1-July 31, 2013 in ESSENCE and BioSense, and summary statistics by age and gender were generated to characterize the burden of heat related emergency department visits.

Results

The total number of records matching one of the four queries ranged from 308-686 visits, with 90% or greater being accurately classified. For 454 records that contained both a chief complaint and a discharge diagnosis, the combined classifier produced 348 (77%) discordant pairs (Table 1).

The most frequently unmatched chief complaint was dizzy or dizziness and for discharge diagnosis it was heat followed by syncope. The chief complaint terms that resulted in the most frequent inappropriate matches were cheat or cheating, Wheaton, and theater. The heat term in the original classifier was modified to "heat (space)" to exclude these while keeping the exclusion term, cheat. The diagnosis codes that resulted in the most frequent inappropriate matches were 3799.2, so 7992 was added as an exclusion term.

The refined heat syndrome definitions that were created are in Table 2.

Conclusions

Each syndrome definition for heat resulted in different line lists. The results were used to determine which terms could be included or excluded to produce an "ideal" syndrome definition. A classifier that combines terms in the chief complaint or the discharge diagnosis detected the largest number of cases, but resulted in a large number of discordant pairs, indicating that source data originating from patients verses physicians will result in different analytical results.

The jurisdiction's purpose of conducting syndromic surveillance should influence how the definitions are applied. If the intent is to capture the largest number of cases affected by a public health event, then a combined classifier is best. For routine monitoring of unexpected or unusual public health events, the chief complaint, particularly in free text form, provides a robust context to assess community health or illness, while physician-based diagnosis may provide a consistent, standardized clinical categorization of illness.

The refined heat definition is composed of inclusion and exclusion terms that could improve a standard definition applied nationally, and could be utilized as a base for local definitions after taking into account local nuances.

Table 1. Difference in line list by syndrome definition

Accuracy	CC (local) N (%)	DD (local) N (%)	ESSENCE-defined N (%)	BioSense 2.0-defined N (%)
Correct	417 (91.2)	338 (98.5)	305 (99.0)	616 (89.8)
Incorrect	36 (7.9)	5 (1.5)	0 (0)	45 (6.6)
Likely	4 (0.9)	0 (0)	3 (1.0)	25 (3.6)
Total	457	343	308	686

Table 2. Refined heat syndrome definitions

Heat Syndrome Definition	Terms / Codes
Chief complaint (CC)-based	"*heat *", "*overheat*", "*over heat*", "*too hot*" AND EXCLUDE "*cheat*"and "*wheat*"
Discharge diagnosis (DD)-based	"*heat*", "*E900*", "*992*" AND Exclude "*7992*"and"*cheat*"and"*sheath*"
Combined CC and DD	CC= "*heat *", "*overheat*", "*over heat*", "*too hot*" AND EXCLUDE "*cheat*"and "*wheat*" DD="*heat*", "*E900*", "*992*" AND Exclude "*7992*"and"*cheat*" and"*sheath*"

Keywords

Heat; Syndromic; Comparison

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