

Performance of a Syndromic Surveillance System for Detecting Carbon Monoxide Poisoning Following a Severe Windstorm

Atar Baer¹, Ph.D., Jeff Duchin^{1,2}, M.D.

Public Health – Seattle & King County (PHSKC)¹,
University of Washington Department of Epidemiology²

OBJECTIVE

We evaluated the performance of our emergency department (ED) syndromic data for detecting visits associated with carbon monoxide (CO) poisoning.

BACKGROUND

On December 14th, 2006, a severe windstorm in western Washington caused hundreds of thousands of residents to lose power. On December 15, 2006, there was a surge in ED visits for patients presenting with signs of acute CO poisoning. A Public Health investigation was initiated following the storm to determine the extent of CO poisoning due to the windstorm. A retrospective analysis was later undertaken to evaluate how well our syndromic surveillance system was able to identify patients who presented to area EDs with carbon monoxide poisoning.

METHODS

In the days following the windstorm, records of all patients presenting with CO poisoning complaints at King County EDs between 12/15/06 and 12/24/06 (n=279) were abstracted; after chart review, 20 cases were ruled out as being unrelated to carbon monoxide poisoning. We sought to describe the ability of our syndromic surveillance system to identify cases of CO poisoning. Data collected by our syndromic surveillance system, which included 19 King County EDs at the time of the storm, were compared with the chart abstraction records according to date, time, age, sex, home zip code, chief complaint, and diagnoses. Records from two hospitals (n=10) which did not participate in our syndromic surveillance system were excluded. The remaining 249 records abstracted by chart review were compared with the ED data collected by the syndromic surveillance system and were designated as either exact matches, possible matches, or unmatched with the syndromic data based on these fields. Chief complaints and diagnoses collected by the syndromic surveillance system were classified using the SAS software (version 8.2) to identify the most common reasons that patients sought care.

RESULTS

From 12/15/06 through 12/24/06, 16,141 ED visits were captured by our syndromic surveillance system. Of these, 121 patients presented with a chief complaint or diagnosis matching one or more of the following terms: CO INGES, CO₂, CO POIS, CO EXP, CARBON, MONOX, FUEL, PROPANE, CHARCOAL, FUME, INHAL, EXPOSURE, TOX, BBQ,

GAS INHAL, CO INGES, KEROSENE (patients presenting for reasons unrelated to CO poisoning, such as complaints of alcohol or drug toxicity, were excluded from this tally). The volume of ED visits was higher on the second day after the storm (31%) compared with the first day (23%). The majority (61%) of patients were female; 44% were ages 18-44 years, and 28% were ages 45-64 years (mean=36 years). About one-quarter (26%) of patients provided home zip codes which mapped to the Eastside region of Seattle; 19% mapped to South King County and 18% mapped to Southwest King County.

Of the 249 records identified by hospitals as related to CO poisoning, 155 (62.3%) were identified by the syndromic surveillance system as exact matches, 47 (18.9%) were possible matches, and 47 (18.9%) could not be matched based on the available fields. The unmatched records came from 6 of the 19 EDs, of which 57.5% were from a single hospital. Among records with a possible or exact match (n=202), 56.6% had a chief complaint or diagnosis that included one or more of the following keywords: CARBON, CO₂, CO POIS, CO EXP, CARBON, MONOX, TOX, CO INGES, TOX, SMOKE, FUME, INHAL, EXPOSURE. An additional 22.9% of patients presented with other complaints or diagnoses; the most commonly recorded non-specific complaints were headache (11.9%), nausea (5.9%), and dizziness (4.5%). The remaining 20.5% of records had a missing chief complaint and diagnosis. Most patients identified via chart review were female (65%); the mean patient age was 28 years.

CONCLUSIONS

Our syndromic surveillance system was able to definitively identify 62.3% of patients who presented to EDs with CO poisoning. Many records could not be matched either because chart review data was incomplete; syndromic data was missing a chief complaint and diagnosis; or values of individual fields, such as patient age, zip code, or gender, did not match. The majority of unmatched records came from a single hospital. Additional evaluations are needed of discrepancies between clinical records and electronic syndromic data, and of completeness of reporting for syndromes under surveillance.

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Further Information: Atar Baer, atar.baer@metrokc.gov