

# Detection of Carbon Monoxide Poisoning in Chief Complaint Data

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## Objective

To assess the ability to identify cases of carbon monoxide (CO) poisoning from chief complaints (CC) in hospital emergency department (ED) records submitted daily to the New York State (NYS) Department of Health (DOH) Electronic Syndromic Surveillance System.

## Background

Following an Oct 12-13, 2006 snowstorm, almost 400,000 homes in western New York lost power, some for up to 12 days. News reports said that emergency rooms saw many patients with CO exposure; 3 deaths were attributed to CO poisoning.

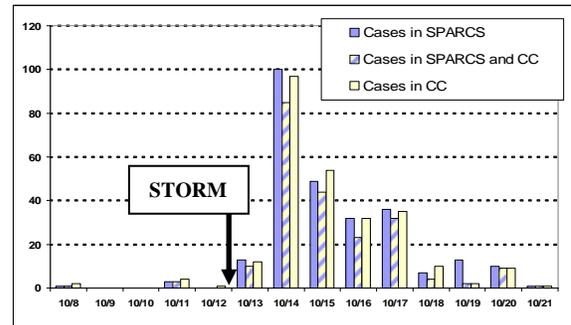
As part of NYS DOH's syndromic surveillance system, electronic ED records with a free-text CC field listing the symptoms reported by the patient are sent to NYS DOH daily. Each CC is searched for text strings indicating complaints in one or more of 6 syndromes (asthma, fever, gastrointestinal (GI), neurological, respiratory, rash). The system also allows nonroutine searches of CCs for complaints of interest. NYS hospitals also submit ED records to the Statewide Planning and Research Cooperative System (SPARCS) that include diagnostic codes assigned after evaluation of the patient (due within 30 days of each calendar quarter).

## Methods

The study included 12 hospitals in Erie (10) and Niagara (2) counties submitting CC data. Because 8 of the 12 hospitals did not submit data until 3 days after the storm, identification of CO-related visits in real time was not feasible. Retrospectively, SPARCS and ED surveillance records from Sep 11 to Nov 11, 2006, were analyzed. Chief complaints were classified as CO-related if they contained text strings such as 'CARBON' or 'CO POI' (including incorrect spellings or abbreviations, such as 'CO2 EXP') or references to gas appliances. SPARCS records with ICD9 codes of 986, E868, E8683, E8688, E8689, or E9821 (in the primary or one of 3 supplemental diagnosis fields) were classified as CO-related. Records from the two data sources were matched by medical record number (MRN), a field included in both.

## Results

From Oct 13 to 20, 302 people visited EDs with complaints of CO exposure and/or SPARCS



diagnoses of CO poisoning. Of these, 209 had CO-related CCs and SPARCS diagnoses, 51 were identified by SPARCS alone and 42 by CC alone. Of the 260 diagnosed cases, 51 (19.6%) were not identified as CO-related by CC. Of the 251 ED patients with CO-related complaints, 209 (83.3%) received CO-related diagnoses. The daily number of ED visits with CO-related CCs closely followed the epidemic curve as determined by diagnostic codes in SPARCS records.

During the week, there were no large increases and no CuSum signals in the routinely monitored syndromes. Of the 260 ED visits with CO-related diagnoses, only 59 had CCs that met the definition of one or more of these syndromes (neurological, 46; GI, 23; respiratory, 8; fever, 3; asthma, 1). A CuSum signal was generated for the respiratory syndrome on Oct 14, but only 2 of these patients were diagnosed with CO poisoning (most others suffered from a variety of upper respiratory complaints or asthma).

## Conclusions

Although monitoring of CC data for the usual syndrome categories did not result in an alert, ED CC surveillance can provide indication of CO poisoning if a new syndrome category is created to search for the appropriate terms. Our syndromic data is more readily available than other data sources. In addition, ED records are submitted with MRNs, which can be used to trace patients for investigation or follow-up.

Use of syndromic surveillance systems for event-related analysis is possible only if the ED records are available, but storm-related power, transportation, and workforce difficulties may delay data transmission. These contingencies highlight the need for data submission systems that are automated to the greatest extent possible.