Connecticut Epidemiologist

Carbon Monoxide Incidents Resulting From Tropical Storm Irene, Connecticut — 2011

Carbon monoxide (CO) is a colorless, odorless, and tasteless gas produced by incomplete combustion of fossil fuels. CO is highly toxic and can lead to poisoning through disruption of oxygen delivery and transport, for the most part by binding to hemoglobin. Symptoms of CO poisoning include headache, dizziness, weakness, nausea, and fatigue. Significant exposure can be fatal.

During major storms, loss of power to homes and businesses can result in increased incidents of CO poisoning, often due to improper use of portable generators (*1,2*). According to the Consumer Product Safety Commission, most incidents of CO poisoning are due to use of portable generators indoors or in partially-enclosed spaces (*3*). In Connecticut, Tropical Storm Irene hit the coastline on August 27, 2011 with high winds and heavy rain. Significant power outages were reported as the storm passed through the state. At the peak of the power outage, 149 towns with approximately 700,000 residents lost power. Over a million homes reported power loss at some time due to the storm.

The Connecticut Department of Public Health (DPH), Environmental and Occupational Health Assessment Program (EOHA) collects and monitors CO exposure data using 2 main sources of information: calls made to the Connecticut Poison Control Center (CPCC), and laboratory/physician reports sent to EOHA as required by the lists of reportable diseases and laboratory significant findings. CO poisoning is monitored to determine exposure trends, and to identify when the risk for significant exposures may occur. With the risk of significant exposures the public is alerted through public service announcements and provided with CO poisoning prevention information. Public service announcements are typically sent out every winter and before major storm events.

This report describes data obtained by the EOHA on the number of CO exposures during the week following Tropical Storm Irene (August 28 – September 3, 2011).

CPCC Data:

Following Tropical Storm Irene, 5 incidents of CO poisoning were reported to the CPCC, and all were the result of improper use of portable generators. A total of 7 individual case-patients were involved in 4 of the exposure incidents, and 7-9 case-patients were involved in a group home incident (the person reporting was unsure of the total number of residents involved). In 3 incidents, the generator was located outside the home and still resulted in exposure. Of the total number of people exposed, 1 was hospitalized; there were no deaths. An additional person concerned about exposure, was evaluated in the emergency department where it was determined no exposure occurred.

Individual case-patients ranged in age from 2 to 65 years; 4 were male. For case-patients exposed in the group home, information on age and sex were unavailable. Calls to the CPCC were made from 4 towns: Greenwich, Meriden, New Haven and Stamford (1 caller did not provide any location information). Since CO calls often come from hospitals, the caller's town may not indicate the town where the exposure occurred. During the same time period in 2008-2010, CPCC records showed only 3 cases of possible CO exposure.

Laboratory/Physician Reports:

Carboxyhemoglobin (COHb) levels $\geq$9% indicate potential CO poisoning and are reportable to the DPH by laboratories and physicians. The DPH received 18 laboratory reports of elevated COHb levels during the week following Tropical Storm Irene; there were no physician reports. Of the 18 CO poisoning cases, 11 (61%) were male, the median age was 37 (range 8—66 years), and the mean COHb level was 13.4%% (range 9%-23.0%). Fairfield County reported the highest proportion of cases (89%). Case-patients resided at 10 different addresses in 5 different towns.

The number of elevated COHb reports received in the week following Tropical Storm Irene represents a 6 to 9-fold increase in the number of reports received during the same week from 2008-2010 (2, 0, and 3 respectively) (Figure 1).
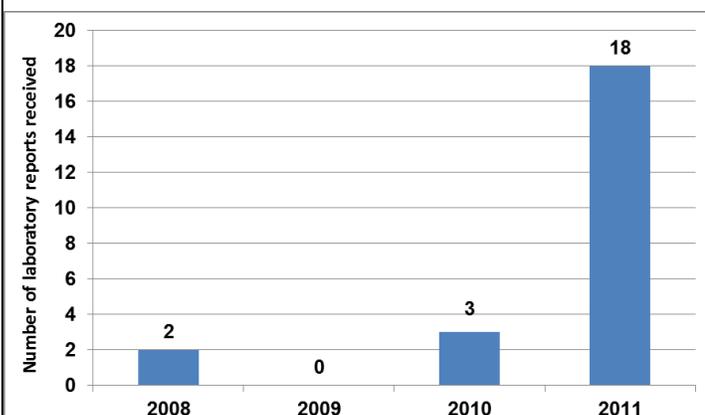
Reported by

D Kallander, PhD, P Przysiecki, MPH, Environmental and Occupational Health Assessment Program, Connecticut Department of Public Health; B Sangalli, MS, DABAT, Connecticut Poison Control Center.

Editorial

Reports of CO exposure spiked as a result of Tropical Storm Irene when compared to data from the same time period during the previous 3 years. Verbal reports to the CPCC showed that the use of portable generators was the cause of CO exposures in those cases. Reports from laboratories did not include the suspected cause of the exposure. We conclude that in an effort to better prepare its residents, DPH should conduct targeted outreach to those areas that have had previous power outages, warning individuals of CO exposure and the proper use of portable generators.

1. Lutterloh EC, Iqbal S, Clower JH, et. Al. Carbon Monoxide Poisoning After an Ice Storm in Kentucky, 2009. CDC Public Health Reports 2011;Sup 1:Vol126.
2. Daley WR, Smith A, Paz-Argandona E, Malilay J, McGeehin M. An outbreak of carbon monoxide poisoning after a major ice storm in Maine. J Emerg Med 2000;18:87-93.
3. Consumer Product Safety Commission Safety Alert. Portable Generator Hazards. Accessed online: http://www.cpsc.gov/cpscpub/pubs/portgen.html. November 2, 2011.

Figure 1. Number of elevated COHb laboratory reports, August 28-September 3, 2008-2011, Connecticut.

Community Associated *Clostridium difficile* Infection in Select Towns; Laboratory-based Active Surveillance, Connecticut - 2010

Clostridium difficile is an anaerobic, spore-forming, gram positive bacillus that is a well-known cause of infectious diarrhea. Symptomatic infection is commonly preceded by antibiotic use and is frequently seen in health care settings. In the past decade, the emergence of more toxigenic strains has changed the epidemiology of *C. difficile* infection (CDI), particularly in healthcare settings. The recognition of these strains in the community led the Connecticut Department of Public Health to make community-onset CDI physician reportable in 2006, which yielded a statewide incidence of community associated (CA) CDI of approximately 7 cases per 100,000 persons. In 2009, the Connecticut Emerging Infections Program (EIP) initiated active population-based laboratory surveillance to monitor the incidence of CDI including community associated cases (CA-CDI). Due to anticipated high rates of CDI, surveillance in Connecticut was limited to catchment areas around 2 cities.

Surveillance was conducted in a 23 town catchment area around the cities of New Haven and Waterbury (2010 population ≥1 year of age, 643,934). Lists of all *C. difficile* toxin positive tests were obtained from 4 hospital laboratories (Yale-New Haven, Hospital of St. Raphael's, St. Mary's, and Waterbury Hospital), and one outpatient reference laboratory serving the same catchment area populations. To determine which infections were healthcare-associated, and which were community-associated, chart reviews were conducted for all inpatients with a positive laboratory test. All persons were then classified according to the case definition.

An incident case of CDI was defined as a person >1 year of age with a *C. difficile* toxin positive stool assay who resided in the surveillance catchment area. Incident cases were initially classified as either healthcare facility onset (HCFO) cases or community onset (CO). HCFO cases had a positive specimen that was collected from either a long term care facility resident or greater than 3 days after admission to a health care facility. CO cases had a positive specimen that was collected in an outpatient setting or within 3 days of a health care facility admission. CO cases were further characterized as either community onset health care facility associated (CO-HCFA), cases who have

stayed overnight in a health care facility at any time in the prior 12 weeks; or community associated (CA), cases with no overnight health care facility exposure in the prior 12 weeks. All consenting suspected CA case-patients were interviewed by telephone to confirm or reclassify their status.

In 2010, 887 incident cases of *C. difficile* were identified for a rate of 138 cases per 100,000 persons. A majority of cases involved persons who were white (74%), female (62%), and ≥ 65 years of age (71%) (Table 1, page 48). Of the incident cases, 551 (62%) were classified as HCFO, 151(17%) CO-HCFA, and 184 (21%) CA (29/100,000); one CO case was not able to be further classified (Figure 1).

CA cases were significantly younger than both HCFO and CO-HCFA cases (58.3 ± 21.7 years vs 76.1 ± 15.7and 67.4 ±18.3, p≤0.001 for each) with 47% of CA cases occurring among those aged 25-64 years. Among case-patients with known race or ethnicity, CA cases did not differ in gender, race or ethnicity from combined HCFO and CO-HCFA cases. Of the 184 CA case-patients, 64 (35%) were hospitalized, of which, 46 (72%) had at least one underlying medical condition, 34 (53%) took an antibiotic in the 14 days prior to stool collection, 17 (27%) took a proton pump inhibitor, 16 (25%) received immunosuppressive therapy in the 14 days prior to stool collection, and (2%) took H2 blockers.

Reported by

C Lyons, MS, MPH, H Fowler, DVM, MPH, J Meek, MPH, J Hadler, MD, MPH, R Heimer, PhD, CT Emerging Infections Program, Yale University School of Public Health.

Editorial

The findings from active laboratory-based surveillance expand on the previous findings from physician/hospital provider-based surveillance for persons with CA CDI (*1*). The CA CDI problem is fourfold larger than that measured through passive physician-based surveillance, and CA CDI accounts for approximately one fifth of all diagnosed CDI. CDI is a substantial burden in the community. The rate of 29 cases of CA CDI per 100,000 persons was higher than that for salmonellosis (14 per 100,000) or campylobacteriosis (16 per 100,000) in 2010, the 2 most common foodborne bacterial pathogens causing gastrointestinal illness.
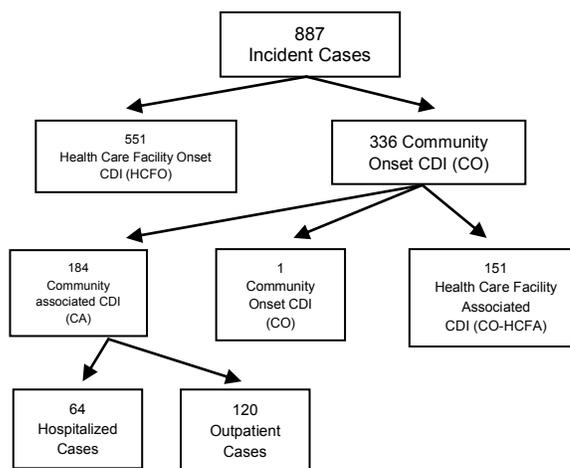
Previous epidemiologic studies suggest that CDI is most commonly seen in whites, females, and the elderly (*1*). Like HCFO CDI, we found CA CDI to be strongly age-associated, however, CA cases are considerably younger. While CA cases were more likely to be female, our data, while incomplete, suggest that blacks and whites have similar rates of CA CDI, an observation meriting follow-up. Medical risk factors for CDI have been well documented in the literature (*2,3,4*). Predispositions to CDI include having at least one underlying medical condition, as well as receiving antibiotics, proton pump inhibitors, H2 blockers, or immunosuppressive therapy (*2,5*). Nearly 75% of hospitalized CA cases had at least one underlying medical condition, and the majority received antibiotics within the 14 days prior to specimen collection.

Incidence rates for HCFO and CO-HCFA cases were not calculated due to the inability to determine the appropriate denominator for these groups. However, the number of person years of eligibility for each is much smaller than the size of the general population. Correspondingly, relative rates for each are likely to be many-fold higher than those for CA CDI or for the overall population rates for CDI.

The substantial burden of CA-CDI in Connecticut merits continued surveillance to monitor trends in incidence and disease severity. Additional analyses will focus on whether there are socioeconomic factors associated with CDI distribution and on true rates of HCFO and CO-HCFA CDI. Continued surveillance activities will also monitor the distribution of *C. difficile* strains among community associated infections.

Figure 1: Flow diagram of *Clostridium difficile* surveillance and case classification, greater New Haven and Waterbury area, Connecticut, 2010.

References

1. CDC. Surveillance for Community-Associated *Clostridium difficile --- Connecticut, 2006*. MMWR, 2008; 57(13);340-343.
2. Hirschhorn LR, Trnka Y, Onderdonk A, Lee ML, Platt R. Epidemiology of community-acquired *Clostridium difficile-associated diarrhea*. J Infect Dis. 1994 Jan;169(1):127-33.
3. CDC. Risk Factors for and Estimated Incidence of Community-associated *Clostridium difficile* Infection, North Carolina, USA. 2010. EID, 2010; 16 (2).
4. Riley TV, Cooper M, Bell B, Golledge CL. Community acquired *Clostridium difficile–associated diarrhea.* Clin Infect Dis. 1995;20(Suppl 2):S263–5.
5. Bignardi, GE. Risk factors for *Clostridium difficile* infection. Journal of Hospital infection (1998) 40: 1.

Table 1. Incidence of *Clostridium difficile* infection by place of onset and demographic characteristics in selected areas[1], Connecticut, 2010.

DEMOGRAPHIC CHARACTERISTIC	Healthcare Facility (HCFO)	Healthcare Facility Associated (CO-HCFA)	Community-Associated (CA)		TOTAL	
	No. (%)	**No. (%)**	**No. (%)**	**Rate***	**No. (%)**	**Rate***
	551(62)	151 (17)	184(21)	28.6	887**	138
AGE						
1-4 years	1(<1)	0	3(2)	10.1	4(<1)	13.4
5-14 years	2(<1)	0	3(2)	3.7	5(<1)	6.2
15-24 years	3(<1)	6(4)	10(5)	11.3	19(2)	21.6
25-44 years	19(3)	9(6)	27(15)	16.1	55(6)	32.8
45-64 years	73(13)	41(27)	60(33)	34.0	174(20)	98.7
>65 years	453(82)	95(63)	81(44)	87.5	629(71)	679.8
SEX						
Male	210(38)	70(46)	64(35)	20.7	345(39)	112
Female	341(62)	81(54)	120(65)	35.8	543(61)	161.8
RACE						
White	403(73)	116(77)	134(73)	28.8	653(74)	140.2
Black	77(14)	22(15)	22(12)	23	121(14)	126.3
Unknown	71(13)	12(8)	26(14)		109(12)	
Other	0	1(<1)	2(<1)		2(<1)	
ETHNICITY						
Hispanic	26(5)	8(5)	7(4)	7.2	41(5)	42.2
Non-Hispanic	486(88)	140(93)	159(86)	29.1	786(89)	143.8
Unknown	39(7)	3(2)	18(10)		60(7)	

PLACE OF ONSET — Community Onset (CO) spans Healthcare Facility Associated (CO-HCFA) and Community-Associated (CA).

* rate per 100,000 population, ** includes one CO case not able to be further classified.

[1] 23 town catchment area=Bethlehem, Plymouth, Thomaston, Watertown, Woodbury, Beacon Falls, Bethany, Branford, East Haven, Guilford, Hamden, Middlebury, Naugatuck, New Haven, North Branford, North Haven, Orange, Prospect, Southbury, Waterbury, West Haven, Wolcott, and Woodbridge.