Fourth, BRFSS does not reach residents who are temporarily or permanently without a land-line telephone, and interviews by cellular telephone are prohibited. Finally, no baseline data were available to compare the emotional and mental health conditions reported by survey participants as a result of the hurricanes with their conditions before the hurricanes.

The findings in this report suggest that BRFSS can be used for rapid assessment of the impact on the lives of residents and the public health consequences of hurricanes. Timeliness of implementing such surveys can be critical to the accurate assessment of conditions directly related to the hurricanes. Within 30 days after the last Florida hurricane of 2004 (Hurricane Jeanne), FDOH began collecting these data, which might not have been captured by other means. Collaboration among state agencies was essential to developing a comprehensive assessment tool. Hurricane preparedness by FDOH now includes educating residents about the danger of carbon monoxide poisoning, planning for mosquito control, and making available a family preparedness guide. Additional information is available at http://doh.state.fl.us.

Acknowledgments

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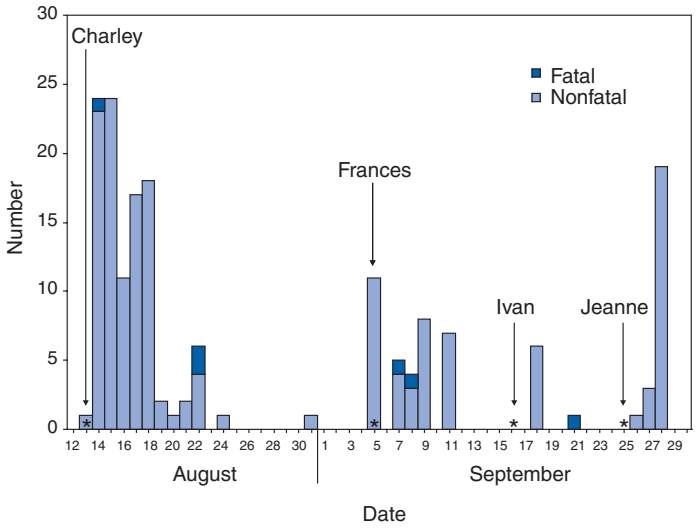
Carbon Monoxide Poisoning from Hurricane-Associated Use of Portable Generators — Florida, 2004

The four major hurricanes that struck Florida during August 13–September 25, 2004, produced electric power outages in several million homes (*1*). After the hurricanes, the Consumer Product Safety Commission (CPSC) investigated six deaths in Florida attributed to carbon monoxide (CO) poisoning (CPSC, unpublished data, 2004). The Florida Department of Health and CDC analyzed demographic and CO exposure data from these fatal poisoning cases and from nonfatal poisoning cases among 167 persons treated at 10 hospitals, including two with hyperbaric oxygen (HBO_2) chambers. This report describes the results of that analysis, which determined that misplacement of portable, gasoline-powered generators (e.g., indoors, in garages, or outdoors near windows) was responsible for nearly all of these CO exposures. Public health practitioners should recognize that post-hurricane environments present challenges to the safe operation of portable generators and should educate the public on the hazards of CO poisoning in these settings.

All medical records were reviewed from participating hospitals in which a patient received a diagnosis of unintentional CO poisoning (*International Classification of Diseases, Ninth Revision* code 986) during August 13–October 15, 2004. These dates correspond to landfall of the first hurricane (Charley) and 3 weeks after landfall of the last hurricane (Jeanne), when active surveillance for CO poisoning was discontinued. Nine participating hospitals, including one with an HBO_2 chamber, were located in landfall counties and involved in post-hurricane surveillance; a tenth participating hospital, which also had an HBO_2 chamber, was located in central Florida. Any case involving a diagnosis of unintentional CO poisoning not related to a fire was included. All available information about the patient's exposure, clinical presentation, laboratory testing (e.g., result of earliest available measurement of blood carboxyhemoglobin [COHb] level), and medical treatment was collected. In addition, investigations into six deaths from five exposure incidents were reviewed for basic demographic information and details about generator location. Because the six persons who were fatally poisoned died before arrival at a medical facility, no clinical information was recorded for them.

A total of 167 persons had nonfatal CO poisoning diagnosed during the study period, representing a total of 51 exposure incidents. The number of cases and incidents peaked within 3 days after landfall of each hurricane (Figure 1).

FIGURE 1. Number of cases of fatal (n = six) and nonfatal (n = 167) carbon monoxide poisoning, by date of exposure — Florida, August–September 2004



* Landfall dates for Hurricanes Charley (August 13), Frances (September 5), Ivan (September 16), and Jeanne (September 25), respectively.

The mean number of persons poisoned per incident was 3.3 (range: one to eight persons per incident). Fifty-four (32.3%) patients were initially treated at emergency departments (EDs) in hospitals outside the surveillance system but were later transferred to one of the two hospitals with HBO_2 chambers.

Of the 167 persons with nonfatal poisoning, 87 (52.1%) were female. The median age was 29 years; 52 (31.1%) were aged ≤16 years, and 11 (6.6%) were aged ≥65 years. Seventy-six (45.5%) of the persons with nonfatal poisoning were white,* 47 (28.1%) Hispanic, 36 (21.6%) black, and six (3.6%) Asian; the race/ethnicity of two (1.2%) persons was not known. The percentages of those poisoned who were Hispanic and black were approximately twice the percentages of Hispanics (14.7%) and blacks (9.1%) reported residing in the hurricane-affected counties by the Florida 2004 Behavioral Risk Factor Surveillance System (BRFSS) survey. Among the six persons who were fatally poisoned, all were white, and five (83.3%) were male; the median age was 45 years (range: 30–58 years).

The most frequently reported symptoms of CO poisoning were headache (80.0%), nausea (51.5%), dizziness (50.9%), vomiting (31.5%), shortness of breath (16.4%), and loss of consciousness (14.5%) (Table). Among the 162 patients for whom COHb levels were available, the mean level of COHb was 19.8% (standard deviation: ±8.7%); median was 21.1% (range: 0.2%–45.1%). Eighty-one (48.5%) patients were treated and released from the ED without HBO_2 treatment. Seventy-three (43.7%) patients were released after HBO_2 treatment. Thirteen (7.8%) patients were hospitalized; 11 of those were discharged after one night. Of the 13 hospitalized patients, four received HBO_2 treatment. Overall, 77 (46.1%) persons were treated with HBO_2.

* For this report, persons identified as white, black, and Asian are all non-Hispanic. Persons identified as Hispanic might be of any race.

TABLE. Number and percentage of patients with nonfatal carbon monoxide poisoning and COHb* level, by symptom and treatment — Florida, August–September 2004

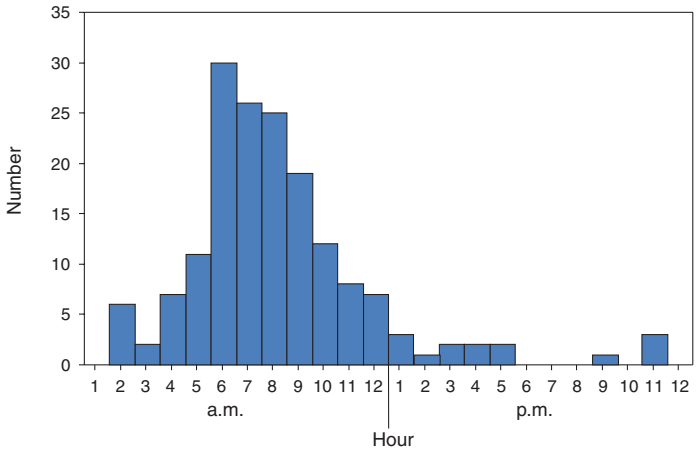
Symptom/Treatment	No.	(%)	Mean COHb level %
Symptom†			
Headache	132	(80.0)	19.9
Nausea	85	(51.5)	20.6
Dizzy or lightheaded	84	(50.9)	19.6
Vomiting	52	(31.5)	19.7
Shortness of breath or dyspnea	27	(16.4)	21.3
Loss of consciousness	24	(14.5)	25.0
Lethargy or fatigue	20	(12.1)	19.6
Confusion or altered mental status	19	(11.5)	24.9
Difficulty walking or ataxia	13	(7.9)	21.6
Weakness	13	(7.9)	19.1
No symptoms	8	(4.8)	14.8
Treatment			
Emergency department only	81	(48.5)	16.3
Emergency department and HBO_2§	73	(43.7)	22.9
Hospitalization	9	(5.4)	19.4
Hospitalization and HBO_2	4	(2.4)	33.5

* Carboxyhemoglobin (COHb) levels were available for 162 patients. Information on symptoms was available for 165 patients. Mean COHb levels were calculated for patients with both COHb and symptom information.
† Includes symptoms experienced by ≥5% of patients. Symptoms experienced by <5% of patients included but were not limited to chest pain, visual disturbances, diarrhea, shaking, abdominal pain, palpitations, chest tightness, sweating, anxiety, and tingling.
§ Hyperbaric oxygen.

The majority of nonfatal poisonings occurred overnight, with patients waking in the early morning with symptoms (Figure 2). One hundred eleven (66.5%) patients arrived at the ED during 5:00 a.m.–10:00 a.m. Medical records indicated that patients typically used generators to power refrigerators, fans, and air conditioners while sleeping. Similar exposure patterns and types of powered appliances were reported among the five incidents with fatalities.

Information regarding the source of CO was available for 49 (96.1%) of the 51 incidents with nonfatal poisonings. Use of portable, gasoline-powered generators was implicated in 47 (96.0%) nonfatal incidents and in the five incidents that resulted in the six fatalities. In two other nonfatal incidents, exposure to CO was attributed to use of a gasoline-powered saw and to a vehicle left idling in a garage. In the 47 nonfatal incidents in which a generator was known to be involved, 16 (34.0%) generators were operated outdoors; 16 (34.0%) inside a garage; six (12.8%) inside a home; four (8.5%) on an attached porch, deck, or patio; one (2.1%) inside a business;

FIGURE 2. Number of patients (n = 167) with nonfatal carbon monoxide poisoning, by hour of arrival at emergency department — Florida, August–September 2004



and one (2.1%) as part of a recreational vehicle. Generator location was unavailable for three (6.4%) incidents. The majority of the 16 generators placed outdoors were reportedly located near windows or window-mounted air conditioners. Medical records for certain patients indicated that generators were placed in homes or garages to protect the devices from the weather or to prevent them from being stolen. Among the five incidents with fatalities, generators were placed inside a home in two incidents, in an office or business in two incidents, and inside a garage in one incident. No mention was made of a home CO detector in any of the medical records.

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Editorial Note: Portable, gasoline-powered generators are a common source of unintentional CO poisoning after power outages (*2*). The devices are used increasingly to provide electricity during temporary outages resulting from adverse weather events, but the CO produced during their operation can be a serious health hazard. The exhaust produced by the typical 5.5 kW generator contains as much CO as that of six idling automobiles (*2,3*). When used indoors or in close proximity to residential dwellings, this exhaust can quickly infiltrate living spaces and incapacitate occupants (*2*).

Data from the 2004 BRFSS indicate that 17.5% of adult respondents in Florida reported that their household used a generator for power after at least one of the hurricanes; a substantial number of these generators were operated inside a home or garage (*4*). This report demonstrates that CO poisoning, although not perceived as an important health problem by the public (*4*), represents an important cause of morbidity and mortality in a post-hurricane environment. In this study, portable generators were the source of CO for all fatal cases and nearly all nonfatal cases of CO poisoning. Misplacement of portable generators indoors, in garages, or outdoors near windows accounted for most exposures. In addition, the majority of CO exposures occurred during overnight use of generators to power air conditioners and appliances.

The findings in this report are subject to at least three limitations. First, investigators used a sample of 10 hospitals to collect cases of CO poisoning; therefore, the findings are not a complete inventory of cases of CO poisoning in Florida during the 2004 hurricane season. Second, only cases of CO poisoning among persons treated at hospital EDs and at two HBO_2 chambers were included in the study; therefore, the results likely reflect more severe poisonings than would occur in a general population. Finally, because the study was limited to data documented in hospital records, the role of previously identified risk factors (e.g., language barriers) (*5*) was not examined in these cases of CO poisoning.

Sales of portable generators have been increasing since 2000 (*6*), primarily because of increased affordability of the devices and disaster preparedness campaigns. With increasing numbers of new generator owners, public health officials can expect a decline in the mean level of user experience with the devices. An above-normal hurricane season was predicted for 2005, with 12–15 tropical storms (average: 10), including seven to nine hurricanes (average: six), with three to five (average: two) of these rated as major (category 3–5) hurricanes. The majority of the storms were expected to form during August–October (*7*). However, as of July 14, the season had already produced five tropical storms, including two that became major hurricanes. Power outages that occur after hurricanes create demand for alternate electricity sources to power air conditioning, ventilation, and refrigeration. The urgent need for interim power supplies, coupled with fear of theft and the risks of shock and electrocution posed by using nonweatherized devices in wet conditions, create challenges to the safe operation of portable generators in post-hurricane settings. Nonetheless, public health campaigns should emphasize that portable generators must never be operated indoors, in garages, or outdoors anywhere near doors, windows, or vents of buildings that might be occupied.

Acknowledgment

This report is based, in part, on data contributed by CPSC.

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Disparities in Universal Prenatal Screening for Group B Streptococcus — North Carolina, 2002–2003

Group B streptococcus (GBS) is a leading cause of neonatal morbidity and mortality in the United States (*1*). Intrapartum antibiotics administered to women at risk for transmitting GBS to their newborns are effective in preventing perinatal GBS infection (*2*). In 2002, CDC, the American Academy of Pediatrics, and the American College of Obstetricians and Gynecologists recommended universal prenatal screening for vaginal and rectal GBS colonization at 35–37 weeks' gestation (*3–5*). To examine prenatal GBS screening among pregnant women in North Carolina, CDC analyzed 2002 and 2003 data from the North Carolina Pregnancy Risk Assessment Monitoring System (PRAMS). The proportions of women reporting prenatal screening for GBS were similar in 2002 and 2003 (70% and 74%, respectively); however, for both years, women of Hispanic ethnicity and women who received prenatal care at a hospital or health department clinic were less likely to report prenatal screening for GBS. These findings underscore the need to increase GBS-related education and prevention activities targeted to these populations.

North Carolina PRAMS is a population-based, random, stratified, monthly mail/telephone survey of women who have recently delivered a liveborn infant. Each month, approximately 200 questionnaires are mailed to women chosen at random from birth-certificate files. After three mailings, attempts are made to contact nonresponders by telephone. Mothers of low-birthweight babies (<2,500 g) are oversampled to ensure adequate coverage. Self-reported survey data are linked to selected birth-certificate data and weighted for sample design, nonresponse, and noncoverage to create the annual PRAMS data sets. These weights make the data representative of all North Carolina women with a liveborn delivery. Because data from 2002 and 2003 were similar for key analysis variables, results are reported for combined data.

This analysis focused on a PRAMS question related to GBS screening that was added to the North Carolina PRAMS survey in 2002. Mothers were asked, "At any time during your most recent pregnancy, did you get tested for the bacteria Group B Strep (or Beta Strep)?" Response categories included "no," "yes," and "I don't know." Because women who responded "I don't know" differed in several demographic characteristics from women who responded "no," these two groups were evaluated separately, with women who responded "yes" as the referent group. Point estimates and confidence intervals were calculated. Predictors of prenatal GBS screening were identified by univariate analysis. All variables associated with GBS screening with p-values <0.2 were evaluated by multivariable analysis by using backwards stepwise logistic regression and controlling for gestational age at delivery. The final multivariable models included main effects (e.g., race, ethnicity, and primary source of prenatal care) that were significant at $p<0.05$. Two multivariable logistic regression models were constructed: 1) comparing women who were screened for GBS with those who were not screened and excluding those who did not know their screening status and 2) comparing women screened for GBS with those who did not know their screening status and excluding those who were not screened.

During 2002–2003, a total of 235,599 live births occurred in North Carolina; 4,128 women were included in the PRAMS sample, and 3,027 responded (the overall response rate was approximately 73%). Twelve percent of mothers were Hispanic, 52% had a high school education or less, and 48% had Medicaid payment of delivery. Sixty-eight percent of respondents received prenatal care primarily from a private physician or health maintenance organization; 28% received care primarily from a hospital or health department clinic. Less than 1% received no prenatal care.

In 2002 and 2003, 70% and 74% of women, respectively, were screened for GBS; 11% and 8%, respectively, were not