Unvented Residential Heating Appliances — Continued

gases in living spaces. Other prevention strategies include conducting media campaigns detailing the potential hazards of unvented combustion space heaters during the colder months and encouraging the proper use of CO detectors in homes.

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Outdoor Carbon Monoxide Poisoning Attributed to Tractor Exhaust — Kentucky, 1997

Carbon monoxide (CO) intoxication is a common cause of reported unintentional fatal poisonings in the United States (*1*). From 1979 through 1988, an average of 1140 deaths per year were attributed to unintentional CO poisoning (*2*). Most of these deaths resulted from exposures in enclosed spaces; CO poisoning associated with outdoor activities occurs rarely. This report describes the investigation of CO poisoning in a farmer in Kentucky resulting from exposure to exhaust from a tractor in an open field and provides recommendations for preventing similar exposures.

In June 1997, a 37-year-old female farmer who had been working in a field for 5 hours was admitted to a Kentucky hospital emergency department (ED) because of CO inhalation, dehydration, and heat exhaustion. A nurse from the Community Partners for Healthy Farming (CPHF) Project* was notified of the incident, and an investigation was conducted by the CPHF nurse, staff from the Kentucky Injury Prevention and Research Center (KIPRC), and CDC's National Institute for Occupational Safety and Health (NIOSH).

At 1 p.m. on June 20, the woman and two family members who were co-workers on a family farm began planting tobacco in a 4½-acre field. The outdoor ambient temperature exceeded 90 F (32 C), with humid conditions and minimal breeze. The woman and one co-worker (co-worker A) rode on a two-seat tobacco setter, a device on which workers sit side by side with their backs to the tractor and set tobacco plants into the ground as the tractor tows the setter at 2–3 mph. The tractor was driven by the other co-worker (co-worker B). The woman sat on the side nearest the tractor's exhaust

*CPHF is a national program conducted by CDC's National Institute for Occupational Safety and Health (NIOSH) that brings together rural communities with researchers and state health departments. NIOSH supports 16 such surveillance and intervention research projects to assist in reducing the risk for occupational illness and injury in agricultural populations.

Outdoor Carbon Monoxide Poisoning — Continued

pipe, which was beneath the tractor and directed exhaust gases toward the setter riders.

By 4 p.m., both the woman and co-worker A had had onset of headaches, and the woman reported dizziness and fatigue. Co-worker A stopped work at 4:30 p.m., at which time another family member (co-worker C) replaced him on the setter. The woman continued to work despite an increasingly severe headache, drowsiness, and dizziness. Her co-workers noticed that she appeared drowsy and had begun to fail setting some of the plants, a task requiring good hand-eye coordination; however, the woman insisted on continuing the job. At 6:30 p.m., she collapsed while on the setter.

Co-worker B notified emergency medical services (EMS) at 7:30 p.m., reporting that he thought the woman had CO poisoning. Initial vital signs, obtained by EMS at 7:42 p.m., were blood pressure, 140/100 mm Hg; heart rate, 96 beats per minute; and respiratory rate, 20 breaths per minute. She was transported to the local ED, where she reported dizziness, light headedness, headache, nausea, "heart pounding," and wheezing. Diagnostic studies were initiated and treatment instituted, including 100% oxygen through a non-rebreathing mask and intravenous fluids; albuterol was administered because of a history of asthma. Her initial arterial carboxyhemoglobin (COHb) level was 23.3% (normal COHb concentrations are <2% for nonsmokers and 5%–9% for smokers). All other laboratory and diagnostic tests were normal. Repeat COHb at 11:05 p.m. was 7.2%, and she was discharged from the ED at 12:10 a.m.

During the follow-up investigation, environmental CO sampling was performed. With the tractor stationary and its engine running, a monitor was placed where someone working on the setter would sit; CO levels of an average of 477 parts per million (ppm) were detected during a 15-minute sampling period.[†] Four other gasoline-powered tractors with comparable exhaust configurations, manufactured between 1947 and 1979 (the tractor used while the woman was working was manufactured in 1967), were similarly tested. Fifteen-minute CO levels were 38, 364, 507, and 706 ppm. Tests conducted on a diesel-powered tractor resulted in zero ppm CO for the 15-minute testing period. Finally, CO sampling performed using the woman's equipment and simulating planting procedures detected levels of 384 ppm in 15 minutes.

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Editorial Note: CO is a colorless, odorless gas that induces its toxic effects by binding to hemoglobin to form COHb. Because the affinity between hemoglobin and CO is substantially greater than that of hemoglobin and oxygen, CO does not dissociate from hemoglobin as readily as does oxygen, which results in a reduction of oxygen-carrying capacity and tissue hypoxia. Diagnosis of CO poisoning may be missed or delayed because symptoms are nonspecific (e.g., headache, dizziness, weakness, nausea, visual disturbances, confusion, dry mouth, diarrhea, and vomiting) (*1,5*). The relations among CO exposure, COHb levels, and symptoms are functions of 1) the concentration of CO in the environment; 2) the duration of exposure to CO; and 3) the

[†]The NIOSH-recommended ceiling limit for CO exposure, which should not be exceeded at any time, is 200 ppm (*4*). The Occupational Safety and Health Administration permissible exposure limit for CO is 50 ppm as an 8-hour time-weighted average (*3*), and the NIOSH-recommended exposure limit for CO is 35 ppm as an 8-hour time-weighted average (*4*).

Outdoor Carbon Monoxide Poisoning — Continued

interval between exposure and clinical assessment (*1*). Although the first measured COHb level in the patient described in this report was 23.3%, based on back-extrapolation (using the half lives of COHb in 100% oxygen and in room air conditions), the patient's estimated COHb probably exceeded 40% at the end of her exposure, which is consistent with her reported symptoms. Treatment recommendations for moderate to severe CO poisoning frequently include hyperbaric oxygen therapy (*6*); however, access to facilities equipped to provide such therapy may not be readily available in rural areas.

CO poisoning is rare in nonenclosed spaces. In the on-site investigation of this case, other possible sources of exposure to CO (e.g., home appliances and motor vehicles) were sought but not identified. On the day of this episode, the woman had smoked four to five cigarettes. Although she and her co-workers had used the equipment on previous occasions, none had reported symptoms of CO poisoning. Co-worker A, who reported a headache, and co-worker C, who was asymptomatic, also may have been exposed to high levels of CO during this episode; however, the duration of their exposure was shorter, and they were farther from the exhaust source during the exposure.

The risk for episodes such as that described in this report can be reduced through use of a tractor equipped with an upward-directed exhaust or by reconfiguring an existing rearward-directed exhaust system to vent upward. The cost of retrofitting the tractor involved in this case to direct its exhaust upward would be approximately $576 for parts, with additional costs for installation. Additional precautions to prevent excessive exposure, particularly if such structural modifications are prohibitive, should include informing workers of the potential hazard and alerting them to the symptoms of CO poisoning; encouraging workers to take frequent breaks; rotating positions to limit exposure time; and promptly removing workers from exposure if any symptoms appear. Although emissions may be reduced by keeping the engine properly tuned, this measure is not a substitute for other preventive measures. Use of diesel tractors may be associated with a smaller risk for CO poisoning than gasoline models. Health-care providers in regions where similar equipment is used (e.g., in orchards, tree planting, and strawberry and tomato operations) should consider CO poisoning when workers present with characteristic symptoms, and a thorough occupational history should be obtained. Other agricultural occupationally associated illnesses mimicking CO poisoning are pesticide poisoning, heat stroke, dehydration, and green tobacco sickness.

In this investigation, only five additional tractors (including only one diesel) were monitored for potential CO exposure. Because these tractors were monitored in a stationary position, the results may not represent actual CO exposure during the setting process, and weather conditions during testing may not have duplicated those during the episode. To assess the broader implications of this episode, the CPHF project and NIOSH will continue active surveillance for similar cases and will monitor CO emissions on a larger sample of tractors with rear-directed and upward-directed exhaust systems. The Kentucky Department for Public Health through KIPRC will disseminate information on CO poisoning to health-care professionals, poison-control centers, equipment manufacturers, and agricultural safety organizations. The Kentucky Cooperative Extension Service will disseminate information on potential hazards and prevention measures to farm operators and workers. Information about cases identified

Outdoor Carbon Monoxide Poisoning — Continued

in other states can assist in estimating and evaluating the extent of this hazard and can be reported to the KIPRC, telephone (606) 257-4955.

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As part of its commemoration of CDC's 50th anniversary in July 1996, MMWR *is reprinting selected* MMWR *articles of historical interest to public health, accompanied by current editorial notes. Reprinted below is a report dated March 6, 1971, and released March 12 as a rare supplement. This report was the first publication presenting information about what would later be recognized as the largest and most lethal known outbreak of nosocomial infection associated with widespread distribution of a contaminated medical product in the United States. The report demonstrates the benefit of the emphasis that CDC had placed on nosocomial infection surveillance and control programs starting in the 1960s and illustrates the importance of being able to rapidly assemble data from multiple, widely scattered sites to resolve complex outbreaks.*

EPIDEMIOLOGIC NOTES AND REPORTS
NOSOCOMIAL BACTEREMIAS ASSOCIATED WITH INTRAVENOUS FLUID THERAPY — USA

Between October 1970 and March 1, 1971, eight United States Hospitals in seven states experienced 150 bacteremias caused by *Enterobacter cloacae* or Gram-negative organisms of the Erwinia group. There were nine deaths; all were associated with intravenous (IV) fluid therapy. The Enterobacter bacteremias in all hospitals were substantially increased as compared to previous time periods. Four hospitals which isolated and identified Erwinia had not previously encountered infections with these organisms. In-depth epidemiologic investigations were performed in three of the hospitals (Figure 1).

All eight hospitals utilize fluids and systems manufactured by Abbott Laboratories, which produces approximately 45 percent of all IV fluids sold within the United States. In approximately 30 cases, the same organisms were isolated from blood cultures and

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MORBIDITY AND MORTALITY WEEKLY REPORT

Cigarette Smoking Among Adults — United States, 1995

One of the national health objectives for 2000 is to reduce the prevalence of cigarette smoking among adults to no more than 15% (objective 3.4) (*1*). To assess progress toward meeting this objective, CDC analyzed self-reported information about cigarette smoking among U.S. adults from the Year 2000 Objectives Supplement of the 1995 National Health Interview Survey (NHIS). This report summarizes the findings of this analysis, which indicate that, in 1995, 24.7% (47.0 million) of adults were current smokers.

The 1995 NHIS was administered to a nationally representative sample (n=17,213) of the U.S. noninstitutionalized civilian population aged ≥18 years; the overall response rate for the supplement was 80.9%. Participants were asked, "Have you smoked at least 100 cigarettes in your entire life?" and "Do you now smoke cigarettes every day, some days, or not at all?" Current smokers were persons who reported having smoked ≥100 cigarettes during their lifetimes and who smoked every day or some days at the time of interview. Former smokers were those who had smoked ≥100 cigarettes during their lifetimes but who did not smoke currently. Interest in quitting was determined by asking current smokers, "Would you like to completely quit smoking cigarettes?" Attempts to quit were determined by asking current every-day smokers, "During the past 12 months, have you stopped smoking for one day or longer?" Data were adjusted for nonresponse and weighted to provide national estimates. Confidence intervals (CIs) were calculated using SUDAAN.

In 1995, an estimated 47.0 million adults (24.7% [95% CI=±0.8 percentage points]), including 24.5 million men (27.0% of adult men [95% CI=±1.2]), were current smokers (Table 1). Overall, 20.1% (95% CI=±0.8) were every-day smokers, and 4.6% (95% CI=±0.4) were some-day smokers (every-day smokers constituted 81.2% [95% CI=±1.5] of all smokers). Prevalences of current smoking were higher among American Indians/Alaskan Natives (36.2% [95% CI=±10.6]), non-Hispanic blacks (25.8% [95% CI=±2.6], and non-Hispanic whites (25.6% [95% CI=±1.0]) than among Hispanics (18.3% [95% CI=±1.8]) and Asians/Pacific Islanders (16.6% [95% CI=±4.6]). Current smoking prevalence was highest among persons with nine to 11 years of education (37.5% [95% CI=±2.9]) and lowest among persons with ≥16 years of education (14.0% [95%