



Pathology Biology Section – 2010

G30 Accidental Carbon Monoxide Poisoning: A Review of Environmental and Cultural Risk Factors of Fatal Cases in King County

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After attending the presentation, the attendees will be able to identify certain environmental and cultural factors that may increase accidental death by carbon monoxide inhalation.

This presentation will impact the forensic science community by increasing awareness of environmental and cultural factors that influence the misuse of carbon monoxide producing devices and will suggest ways to decrease the incidence of accidental deaths.

Introduction: Carbon monoxide (CO) is an odorless, colorless gas that forms as a result of incomplete combustion of carbon-containing fuels. While trace levels of CO are found in the atmosphere, fatal levels are found in exhaust from multiple sources including automobiles, generators, propane heaters and charcoal burning grills. Accidental carbon monoxide poisoning is responsible for up to fifty percent of the yearly carbon monoxide related fatalities in King County (five accidental deaths in ten total carbon monoxide deaths in 2007).

Purpose: Risk factors of accidental CO related deaths in King County from 1996 to 2008 were reviewed in an attempt to reveal preventable causes.

Methods and materials: Between 1995 and 2008, 221 cases of carbon monoxide poisoning were identified between 1995 and 2008 within the King County Medical Examiner's information database. Forty-three of which were results of accidental CO poisoning between 1996 and 2008. These cases were analyzed with respect to scene investigation reports and circumstances surrounding fatality.

Findings: CO producing devices were found placed within single family residences in 19 of the 43 accidental deaths. Eleven cases involved CO producing products within vehicles used for residence including trailers, RVs, campers, and vans. Seven of the deceased were found in their cars in their garage, four died from house fires, and the exact location of the source of CO was unclear in two cases (outside versus inside the home). Further review indicated generator exhaust as the most common source of accidental CO poisoning, with 18 of 43 total accidental deaths. Other sources of CO in decreasing incidence included exhaust from vehicles (7), heaters (6), charcoal burning (6), house fires (4), furnaces (2), a hot water heater (1), and an engine from an industrial carpet-cleaning machine. Nine deaths were due to generator exhaust or charcoal burning during power outages, including eight during a windstorm during December 2006. Four incidents included deaths of more than one individual with three paired deaths (6 total deaths) and one Vietnamese family (5 total deaths). 69% (30) of the CO victims during this time were White, 7% (3) were Black, 7% (3) were Hispanic and 16% (7) were Asian/Pacific Islander. The majority of these cases involve people who are unfamiliar with the proper use of generators or charcoal products, either due to inexperience or inability to gain information about certain products in their native language. No carbon monoxide monitors were identified in any scene investigation reports.

Discussion: The most significant environmental and cultural risk factors identified were unfamiliarity with CO producing products and the inability to receive information about these products in various languages. Preventing accidental deaths in cities with multiple ethnic groups begins with increased availability of educational information in several languages. Many of these products are purchased directly before power outages in a rush to provide heat and power and the proper educational information is not exchanged. The Vietnamese family mentioned earlier, had a receipt for their generator, which was purchased one day prior to death.

After identifying these products in stores, many of the instructions and warning labels are written in English and Spanish, however, warning labels in less frequently spoken languages may help prevent CO poisoning. Ways to educate consumers include increasing awareness via television, the internet through downloadable brochures available in multiple languages and product education including the additional or paired purchase of carbon monoxide monitors, especially prior to anticipated power outages. While the most important time to discuss product education occurs during the purchase of the product, education about CO producing products should occur through multiple methods. **Carbon Monoxide, Poisoning, Accidental Death**