

Carbon Monoxide Myths

Carbon monoxide poisoning is the leading cause of unintentional poisoning deaths in the United States, with more than 400 non fire-related unintentional deaths and more than 20,000 emergency department visits each year (*Centers for Disease Control and Prevention MMWR 2014;63:65; Am J Emerg Med 2012;30:657-64*). More than half of poisonings occur during the months of November through February. Despite the fact that EMS and hospital health care providers commonly encounter patients with CO poisoning, there are misbeliefs that result in inappropriate evaluation and therapy. A recent publication by Hampson (*Amer J Emerg Med 2015, available at <http://dx.doi.org/10.1016/j.ajem.2015.10.051>*) addresses and discounts four myths that surround the assessment and treatment of CO poisoning:

Myth #1: "The carboxyhemoglobin (COHb) level correlates with symptoms in acute CO poisoning". Many health care providers are familiar with tables showing signs and symptoms associated with certain COHb levels. The origin of this relationship dates back to a 1922 paper which describes the effects that three volunteers (the authors) experienced when subjecting themselves to CO. COHb levels only ranged from 16% to 28%. In 2012, the Undersea and Hyperbaric Medical Society along with the Centers for Disease Control and Prevention published data collected on 1323 CO-poisoned patients over a two year period. They failed to show any correlation between symptoms and COHb levels (*Undersea Hyperb Med 2012;2:657-65*).

Myth #2: "Without fuel-burning appliances in the home, there is no risk for CO poisoning". In some states, CO alarms are only required in homes with gas appliances. But, CO can penetrate into homes from attached structures and common areas (e.g. garages, hallways). A fireplace may become a CO source if the chimney is blocked. And charcoal grills and gas-powered generators may be brought into the home during power outages. CO detectors should be installed in every home, regardless of the type of appliances.

Myth #3: "Fresh arterial blood samples are needed for accurate determination of COHb levels". Animal and human studies have shown that either arterial or venous samples can be used to accurately measure COHb concentrations (*Crit Care Med 2000; 28:1998-2001*). In addition, COHb levels in anticoagulated venous blood are stable for an extended period of time whether refrigerated or kept at room temperature (*Am J Emerg Med 2008;26:191-5*).

Myth #4: "CO poisoning predisposes to long-term risk for cardiac death". A 2006 study of 230 CO poisonings suggested that cardiac injury is a predictor of long-term mortality (*JAMA 2006;295:398-402*). A more recent study of 1073 moderately to severely CO poisoned patients who received hyperbaric oxygen therapy found an increase in mortality from non-cardiac events (e.g psychiatric illness, trauma, suicide, coexisting diseases), especially in those with intentional CO poisoning, but no increase in mortality from cardiac causes regardless of age or intent (*Crit Care Med 2009;37:1941-7*).

Lisa Booze, PharmD, CSPI

Did you know?

Hyperbaric oxygen (HBO) may be useful to treat potentially severe CO poisonings but there is little consensus on when or how it should be implemented.

The mainstay of treatment for acute CO poisoning is 100% oxygen to hasten the dissociation of CO from hemoglobin and enhance tissue oxygenation. HBO is utilized to eliminate COHb more quickly than normobaric oxygen and to help prevent neurologic sequelae, although there is controversy as to its effectiveness. The indications (e.g. signs/symptoms, COHb level, acute/chronic CO exposure, pregnancy) for HBO, as well as treatment regimens (e.g. number of "dives"), vary widely among treatment centers in the U.S. In the absence of specific protocols, all CO-poisoned patients with altered mental status or other effects suggestive of severe toxicity should be considered for rapid transfer to a HBO facility.



@MPCToxTidbits