Carbon Monoxide Myths and Management

Siamak Moayedi MD and Anand Swaminathan MD

Take Home Points

- ❏ **Symptoms of carbon monoxide poisoning are due to toxicity of the gas and not secondary to a functional anemia.**
- ❏ **Hyperbaric treatment prevents delayed neuropsychiatric illness not mortality.**
- ❏ **The carboxyhemoglobin level may be determined on venous blood gas.**
- ❏ **Carbon monoxide is a small molecule that may diffuse through drywall and affect multiple connected residences.**

- **Carbon monoxide is odorless, colorless and the leading cause of accidental poisonings and deaths worldwide and in the US.**

Myth #1.

- ***Carboxyhemoglobin causes a functional anemia.*** **This is wrong.** Carbon monoxide can be considered as a gas neurotransmitter. It activates sodium channels and increases nitric oxide levels. It triggers a cascade of events in the brain that can result in brain damage. Anemia doesn't cause nausea or headaches. It is the gas that causes problems. The carboxyhemoglobin is just the tool to make the diagnosis.

Myth #2.

- ***We save lives in the hyperbaric chamber.*** **We don't.** If you make it out of the carbon monoxide exposure alive, there is only a 3% mortality rate. We save brains, not lives, with hyperbaric chambers. Delayed neuropsychiatric illness is a concern. The patient may be initially asymptomatic despite exposure to high levels of carbon monoxide. However, they may later develop personality changes, Parkinsonism or inability to perform basic math.

Myth #3.

- ***You need an arterial blood gas*****. This is untrue; you just need a venous sample.** You can send a venous blood gas or carboxyhemoglobin level. You don't need to repeat the level. If you are removed from the environment containing carbon monoxide, your levels will decrease. On room air, the carbon monoxide will drop by a half –life every six hours. If you put the patient on a non-rebreather, it will drop by a half-life in one hour.

Pearl #1.

- **EMS providers may give you data using different devices.**
  - They may use a handheld carbon monoxide detector that provides readings of parts per million. This is different from a machine that gives actual carboxyhemoglobin levels.
  - The pulse oximetry is completely useless. The levels will be falsely elevated as the machine is unable to differentiate between carboxyhemoglobin and oxygenated hemoglobin.

Pearl #2.

- **Carbon monoxide is such a small molecule that it can diffuse through painted drywall and expose other rooms and households.** If a patient with carbon monoxide exposure denies combustion sources in the house, you may be fooled into sending them back home to a death trap. For example, a neighbor may have been running a generator in the basement of the next door row house. Everyone within multiple drywalls will be exposed.

Pearl #3.

- **Consider cyanide toxicity in patients who were exposed to smoke, especially from burning plastics.** Consider cyanide toxicity when the lactate level is greater than 8. Smoke inhalation + altered mental status + lactate of 8 = cyanide kit administration.

The cyanide kit is now hydroxycobalamin. It will bind to the cyanide and it converts it to B12.