



Medical Direction and Practices Board

White Paper

Carbon Monoxide Monitors

Background

Carbon Monoxide [CO] is a tasteless, odorless gas that can cause sudden illness and death. CO is found in combustion fumes and can be produced by motor vehicles, lanterns, stoves, and heating systems and will build up in poorly ventilated areas. Symptoms of CO poisoning include headache, dizziness, weakness, nausea, vomiting, diarrhea, abdominal pain, flu-like illness, urinary incontinence, chest pain, confusion, dyspnea, agitation, hallucinations, syncope, seizure, gait and memory disturbances, bizarre neurologic symptoms, and coma. Individuals who are sleeping or intoxicated can die from CO poisoning because they do not wake up because of symptoms or do not recognize the symptoms. There are approximately 50,000 emergency department visits and 1,000 – 2,000 deaths per year due to CO poisoning.

Patients presenting with inhalation or burn injuries should raise suspicion for CO poisoning. Vital signs may include tachycardia, hypertension or hypotension, and tachypnea. “Cherry red” skin is seldom seen and patients more frequently present with pallor.

Diagnosis

The clinical diagnosis of CO poisoning should be confirmed with an *arterial* or *venous* carboxyhemoglobin (HbCO) level. CO-oximetry monitors are available, however, the accuracy of these monitors in diagnosing CO toxicity is not well established, and they are not recommended for making clinical decisions. One study indicated that moderate hypoxemia interfered with the accuracy of CO-oximetry readings⁴ therefore, these monitors cannot be relied upon in the setting of hypoxia. Even more concerning, false-negative results have occurred with the Rad-57 CO-oximetry monitor even furthering the argument not to rely on its results for treatment/transport decisions. In 2017, the American College of Emergency Physicians (ACEP) issued a statement **against** using pulse CO-oximetry to diagnose CO toxicity in emergency department patients with suspected acute CO poisoning (level B recommendation).

As a result of the lack of data supporting the accuracy of CO-oximetry monitors and to avoid under- or over-treating CO poisoning patients, the MDPB has **removed** the recommendation of checking a finger CO level from the 2019 protocols. The protocols continue to emphasize that pulse oximetry may be inaccurate in the setting of CO poisoning. Please recall, that the administration of high-flow oxygen remains the treatment for hypoxia as well as for CO poisoning.

The MDPB recognizes that for many years, many services have employed the use of devices such as the RAD-57 as a tool for triaging the need to transport patients involved in large scale fires and carbon monoxide incidents or in day to day firefighter rehab. However, the MDPB encourages services and providers to revisit their response policies and their usage of these devices. Using a good primary assessment far out ways the risk of misdiagnosis from one of these monitoring devices. Services are also encouraged to talk with local on-line medical control for management of the potentially large number of patients that may be present at these incidents.

References

1. Medline Plus: CO Poisoning. December 31, 2018
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4. Accuracy of Carboxyhemoglobin Detection by Pulse CO-Oximetry During Hypoxemia. *Anesth. Analg.* 2013 Oct: 117(4) 847-858.
5. Weaver L, Churchill S, Deru K, et al. False positive rate of carbon monoxide saturation by finger probe oximetry of emergency department patients. *Respir Care*. 2012 Jul 10.