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In this era of rapidly advancing information technology in healthcare, America has witnessed a transformation –in fact, evolution—of prehospital care. Health care leaders have recognized that EMS offers the most favorable ratio of healthcare providers to patients, albeit only for a relatively short time. Within this condensed time frame, EMTs are expected to assess the scene, assess the patient, extract a history, identify immediate life threats, stabilize, perform a physical examination, formulate a differential diagnosis, immobilize, transmit information to the emergency department (including 12-lead EKGs), and transport the patient while providing pharmacological and interventional therapeutic modalities while en route to the receiving facility. Indeed, with the overburdened emergency departments and hospitals, more responsibility for diagnosis and immediate treatment has been placed upon the broad shoulders of our American EMS systems.

EMTs for example, are expected to recognize, diagnose and *initiate treatment* for acute myocardial infarction. High quality Pre-hospital EKGs are the standard of care in many communities, and cardiac cath teams are called to action even before the patient arrives. EMTs are trained in the diagnosis and treatment of Stroke. To this end, the Advanced Medical Life Support Course has recently been introduced in an effort to train the EMTs to think in terms of diagnosis, rather than symptom-based paradigms. If a patient presents with subtle or non-obvious symptoms and signs, the differential diagnosis method can prove invaluable in ruling out – and ruling in—various clinical possibilities.

Carbon Monoxide poisoning is an often elusive condition which must be included in the differential diagnosis of mental status change, seizures, or severe headache with nausea. Roughly 15,000 patients annually seek ED treatment for CO –related symptoms. Sometimes the diagnosis will be obvious, as in the case of a lethargic victim pulled from a burning building, or in the case of 5 family members who are found comatose in their home which had been heated via emergency gasoline generator during a snowstorm power-outage. At other times, the diagnosis is not quite so obvious. Utilizing the differential diagnostic method will help the EMT make the diagnosis.

Carbon Monoxide (CO) is produced during the combustion process of many carbon-containing compounds. Faulty furnaces, gasoline engines, propane heaters / faulty stoves, boats with engines, and structure fires are all dangerous sources of CO production. The carbon monoxide molecule has a strong affinity for hemoglobin, which prevents oxygen from binding to the red blood cell. CO also affects the ability of normal hemoglobin to unleash oxygen to the tissues, and poisons the normal function of the mitochondria which leads to cell death.

Symptoms of carbon monoxide poisoning are far ranging, and dependent on several factors including length of exposure, concentration of poison and health status of the individual exposed. The central nervous system and heart are the most susceptible organs to CO damage. Early symptoms such as nausea, headache and fatigue may be mistaken for flu-like illness. With more prolonged CO exposure, the patient may experience confusion, lethargy, chest pain, arrhythmias, seizures, coma and death. Patients who survive serious CO poisoning may experience permanent neurological damage.

Treatment of CO poisoning consists of adherence to the ABC's, as with any emergency situation. Depending on the situation, the victim may be comatose and/or have coexistent injuries, burns, smoke inhalation, or concomitant cyanide poisoning. If the patient's clinical circumstance allows, the EMT should provide 100% oxygen by nonrebreathing mask with reservoir. Oxygen hastens the release of CO from hemoglobin. The half life of carbon monoxide decreases from 320 minutes while breathing normal air to about 80 minutes while breathing 100% oxygen. Some cases, including those listed below, may require hyperbaric medicine (hyperbaric chamber).

Indications for hyperbaric oxygen (HBO) could include:

- Acute Coronary Ischemia
- Loss of consciousness
- Focal neurologic deficits
- Pregnant mother with carbon monoxide level of > 15%

HBO treatment uses 100% oxygen at 2.8 atmospheres pressure for 90 minutes. This treatment has both short and long-term benefits for neurological recovery.

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