Protocol
R-10

SECTION: R-10

PROTOCOL TITLE: Carbon Monoxide Toxicity

REVISED: June 15, 2021

GENERAL COMMENTS: This protocol is for suspected and confirmed Carbon Monoxide Toxicity from a variety of Endogenous and exogenous sources.

BLS SPECIFIC CARE: *See Protocol M-1, PM-1, PM-9*

- Ensure provider safety. Remove patient from potentially toxic environment prior to initiating therapy
- Attempt to ascertain CO content of environment from which patient was removed
    - NIOSH CO Immediately dangerous to life or health (IDLH) level: ≥ 1200 ppm
- Supplemental high flow oxygen via tight fitting non-rebreather mask or CPAP for moderate (≥ 10%) and severe (≥ 15%) exposures.
    - Dry oxygen may not be tolerated in cases of inhalation injury. In these instances, nebulized NS may make oxygen therapy more tolerable
- Pulse oximetry (SpO_2) readings will be falsely elevated.
    - Low SpO_2 readings, (i.e. ≤ 90%) however, may be indicative of other concomitant respiratory pathology (e.g. pulmonary edema)
- Obtain 12 lead for moderate (≥ 10%) and severe (≥ 15%) exposures.

AEMT/O.M. SPECIFIC CARE: *See Protocol M-1, PM-1, PM-9*

ALS SPECIFIC CARE: *See Protocol M-1, PM-1, PM-9*

- For moderate (SPCO ≥ 10%) and severe (SPCO ≥ 15%) exposures: Initiate cardiac monitoring. Apply multi-function electrode (MFE) Defib pads prophylactically.

Symptomatic patients in the setting of suspected CO toxicity, regardless of SpCO/ HbCO, should be transported for further evaluation.

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Physician Pearls:

SpCO/ Carboxy-Hemoglobin Levels (HbCO)

- When in doubt, confirm SpCO by two separate readings in two separate digits, preferably in separate extremities.
- **SpCO is approximately +/- 3% of HbCO**
- **SpCO** / HbCO ≥ 10% = moderate carbon monoxide toxicity.
- **SpCO** / HbCO ≥ 15% = severe carbon monoxide toxicity.

Indications for SPCO monitoring: SpCO/ HbCO monitoring should be initiated in the following cases:

- **Fire Rehab**
- **Suspected** Smoke inhalation
- Burn injuries
- Methylene Chloride Exposure:
  - Paint Strippers
  - Degreasers
  - Floor Strippers
- Medical conditions without clearly identifiable etiologies such as:
  - Altered level of consciousness.
  - Chest pain*/pressure*
  - Headache
  - Nausea and vomiting
  - Dizziness and lightheadedness
- Multiple patients with similar non-traumatic symptoms

Concomitant Injuries

- Trauma and burn care take priority over CO toxicity in transport decisions. Priority 2 and 1 Trauma patients should be transported in accordance with trauma destination guidelines.

Pregnant Patients

- Fetal hemoglobin has a significantly stronger affinity for CO than adult hemoglobin.
- Pregnant patients with confirmed or suspected CO exposure, or with SpCO > 10% should be transported for further evaluation, even if asymptomatic.

Obtaining an accurate SpCO reading: The CO Oximeter ***may*** return a false-positive reading based on patient and/or environmental conditions. Considerations regarding false-positive readings

- **Center the nail** directly over the red light preferably by turning the finger upside down (Nail side down) as well as inverting probe so light is flashing facing you. Once the light is flashing facing up simply place the MIDDLE of the nail bed directly over the red light and close sensor. Jamming the finger in too far or not realizing a patient has a **short fingernail bed** utilizing the traditional method of pulse oximetry will cause an elevated reading. Demonstrate this if possible, in training
- Always confirm high readings with 2 additional finger measurements (Use different fingers or hand)
- Be aware of **ambient light** such as strobes, direct sun, extra bright lights that will affect both pulse and CO oximetry. Cover the SpCO sensor and shield from light.
- Fingers should be **clean** especially if full of soot from a fire
- Finger should be **wide enough** to fit the width of sensor. If fingers are too slim (Even with some adults) then there is a chance of a false positive since the light will pass around the finger versus through the middle of the nail. This is the same rule for Pulse Oximetry
- **Perfusion** index on the left side of the RAD 57 should be at least 2 bars. If very low perfusion exists it may not read CO and provide inaccurate pulse Oximetry as well