Just-In-Time Learning Series:

MANAGEMEMNT OF CHEMICAL AGENT INJURIES - **ASPHYXIANTS**

Region 8 MOUNTAIN PLAINS Regional Disaster Health Response System

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PPE IS CRUCIAL TO ENSURING PREHOSPITAL PROVIDER SAFETY WHEN TREATING PATIENTS EXPOSED TO ASPHYXIANTS

- Must wear gas-rated PPE such as SCBA, PAPR, etc
- Many gaseous asphyxiants are denser than air. As a result, be wary of confined spaces where these gases may collect.
- On scene reporting/information is vital to patient management because specific medical tests are not readily/easily available for many gaseous compound exposures. Consider what was found at the scene and reported concentrations to inform patient care.
- Reference OSHA color coding for "Gas Masks" to ensure the proper cartridge/canister is used for a given contaminant.

Asphyxiation:

The inability to get oxygen from the air into the bloodstream. Can be mechanical, chemical/metabolic, or hypoxic.

Simple Asphyxiants:

Any gas that displaces sufficient oxygen from the environment but does not necessarily cause any metabolic interaction.

- *Carbon dioxide*
- *Methane (flammable)*
- *Argon*
- *Helium*
- *Propane (flammable)*
- *Carbon monoxide*
- *Halon (and other fire suppressants)*

CYANOGENIC COMPOUNDS

- Many compounds both natural and artificially made can liberate cyanide under the correct conditions.
- **Indications of acute cyanide poisoning**: Patients typically present with sudden onset of tachycardia, tachypnea, and progress to hypotension with convulsions possible. Extremely elevated lactate concentration (>8 mmol/L) and a high PaO_2 on a VBG are laboratory indicators of cyanide poisoning. Rapid collapse is followed by death.

CYANIDE ANTIDOTES

- First intervention to treat those exposed is immediate evacuation to fresh air
- Hydroxocobalamin (cyanokit) is effective and easy to use.
  - Side effects include: hypertension, dark red discoloration of body fluids

Adult Dosing of Hydroxocobalamin	Pediatric Dosing of Hydroxocobalamin
5g IV reconstituted in 250 mL NS push/run over 15 minutes, may repeat after 15 min. No renal/hep adjustment.	**70mg/kg** IV reconstituted in 250mL NS push/run over 15 min, may repeat after 15 min. No renal/hep dose adjustment. If close to adult size, give adult dose.

- B_{12} is not a therapeutic option

HYDROGEN SULFIDE (H_2S)

- Colorless, flammable, smells distinctively of rotten eggs at lower air concentrations but humans cannot smell it anymore at concentrations >200ppm
- Workers in gas, sewer works, mining, oil drilling, fracking, and farming are at risk for exposure.
- Flammable, colorless gas, denser than air.
- H_2S binds to oxygen sensitive areas and causes rapid cellular hypoxia leading to knockdown. Recovery is fairly rapid once removed from the exposure. H_2S can also lead to irritation of mucous membranes, and in high concentrations result in caustic injury and lung injury (ARDS).

TREATMENT FOR HYDROGEN SULFIDE (H_2S) EXPOSURE

- First intervention to treat those exposed is immediate evacuation to fresh air
- Knockdown patients, protect yourself then extricate to fresh air
- Lung: Ventilation PRN and watch for ARDS
- Could consider hydroxocobalamin however evidence to support this is weak unless there is concern for a mixed gas environment where cyanide may also be present.

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