



**PHARMACEUTICAL UPDATE:
HYDROXOCOBALAMIN (CYANOKIT)**

1. PURPOSE

- 1.1 To describe the use of a new pharmaceutical agent within the FDNY EMS Command.

2. SCOPE

- 2.1 This procedure applies to all FDNY ALS providers.

3. BACKGROUND

- 3.1 The FDNY EMS Command will include Hydroxocobalamin (Cyanokit) in its pharmaceutical formulary beginning in July 2009, with use of the medication dictated by the July 2009 REMSCO protocol changes.
- 3.2 Cyanide exposures may occur accidentally (smoke inhalation, industrial accidents, jewelry manufacture and poisonings) or as a result of terrorism. Cyanide exposures may occur by inhalation or less commonly by ingestion or topical contact. The classic odor of bitter almonds is noticeable by less than 60% of those exposed. Toxicity occurs because cyanide prevents the cells ability to use oxygen. Initial effects include headache, shortness of breath, anxiety and agitation. With significant exposure there is rapid progression to acidosis, hypotension, shock, arrhythmias, seizures, coma and death.

4. PHARMACOLOGY REVIEW

4.1 Description

- 4.1.1 Hydroxocobalamin is a natural substance. When administered to a patient suffering from cyanide toxicity, it permanently binds with cyanide to form vitamin B12 which is then excreted in the urine.

4.2 Onset and Duration

- 4.2.1 Hydroxocobalamin has a rapid onset and a long duration of action (> 24 hours).

4.3 **Indications**

4.3.1 Hydroxocobalamin is indicated for use in the treatment for cyanide toxicity. Because serum cyanide levels cannot be tested for in the field, treatment for cyanide shall be initiated based on a clinical suspicion, suspected exposure and any of the following:

- Hypotension not attributable to other obvious causes
- Altered mental status
- Coma
- Seizures
- Respiratory Arrest
- Cardiac Arrest

4.4 **Contraindications**

4.4.1 None

4.5 **Adverse Reactions**

4.5.1 Red discoloration of skin, mucous membranes, and urine. This is the only common adverse effect and does not require any interventions.

4.5.2 Transient hypertension that peaks towards the end of the medication infusion. No intervention is required.

4.5.3 Infusion site reaction – redness and/or swelling. Requires immediate confirmation that the IV / IO line is properly placed, patent and with good return of blood flow. If the line is not patent, the infusion should be temporarily discontinued until a new line is placed.

4.6 **Incompatibility**

4.6.1 The following medications in FDNY's drug formulary are not compatible and should not be administered simultaneously through the same IV line as hydroxocobalamin:

- Diazepam
- Dopamine
- Sodium Thiosulfate

4.6.2 Unless specifically indicated, any new medication added to the formulary should be assumed to be incompatible with hydroxocobalamin and therefore should be administered through a separate line.

4.6.3 If only a single IV/IO line is available, the IV line **must** be flushed with a minimum of 20ml of normal saline following hydroxocobalamin administration before any medications may be administered.

4.7 **Precautions**

4.7.1 Hydroxocobalamin potentially interferes with clinical laboratory blood test performed at hospitals. Therefore, prior to administration of hydroxocobalamin obtain three blood samples using the tubes provided with the cyanide toxicity kit.

5. **POLICY**

5.1 Hydroxocobalamin shall be administered **under standing orders** for symptomatic patients with hypotension not attributable to other obvious causes, altered mental status, coma, seizures, respiratory arrest OR cardiac arrest at any of the following incidents:

5.1.1 Exposure to smoke in an enclosed space regardless of the number of patients

5.1.2 Exposure to cyanide with less than 5 patients.

5.1.3 If more than 5 patients exist at a cyanide incident, a class order issued by a FDNY-OMA Medical Director is required to administer hydroxocobalamin due to the likelihood of a Weapons of Mass Destruction attack.

5.2 If cyanide toxicity is suspected, both hydroxocobalamin and sodium thiosulfate should be administered.

5.3 Hydroxocobalamin should be the first medication administered for the treatment of cyanide toxicity. If a second intravenous line is available, sodium thiosulfate can be administered immediately after starting the hydroxocobalamin infusion. You need not wait for its completion. If only one line is able to be obtained then sodium thiosulfate should be administered only after the completion of the hydroxocobalamin infusion and a normal saline flush (minimum of 20ml) administered to clear the intravenous line.

5.4 Upon completion of an assignment where hydroxocobalamin was administered, members shall contact On-line Medical Control (OLMC) to complete a quality assurance survey.

5.5 The following must be documented in the ePCR regarding the use of hydroxocobalamin:

5.5.1 Dosage – this should be recorded in the Flowchart Section found on the first page of the ePCR (medication code = 63) and written in the comments associated with treatment.

5.5.2 Adverse effects – any adverse effects related to the use of hydroxocobalamin must be written in the narrative section found on the second page of the ePCR.

6. PROCEDURE

Two 250-mL glass bottles,
each containing 2.5 g
Hydroxocobalamin powder

Cyanokit®



One sterile IV
infusion set

One quick-use reference guide



Two 100mL D₅W

Two sterile
transfer spikes

6.1 Preparation of hydroxocobalamin for administration:

6.1.1 Reconstitute hydroxocobalamin with D₅W



Remove Cap



Using sharp transfer spike,
Insert into set port of D₅W



Fill-line



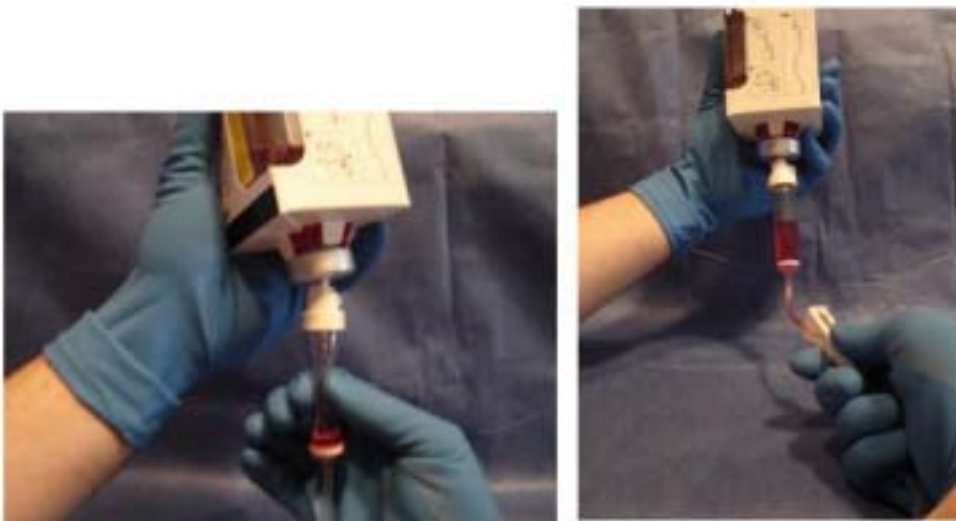
Connect to vial, then invert filling bottle with
100mL of D₅W (fill line on bottle)

6.1.2 After adding the fluid, repeatedly rotate or rock the bottle to insure the powder is dissolved. **DO NOT SHAKE.** If the reconstituted solution is not dark red or if particular matter is seen after the solution has been appropriately mixed, the solution should be discarded rather than administered to the patient.

6.1.2 Set-up IV infusion set



Using vented macro (20 ggt) drip set spike bottle



Fill the infusion set chamber, run the line to the patient and infuse wide-open

6.2 Dosing of Hydroxocobalamin

AGE GROUP	DOSAGE
Infant/Toddler (0-2 years)	1/4 bottle
Preschool (3-5 years)	1/2 bottle
Grade School (6-13 years)	1 bottle
Adult (≥14 years)	2 bottles (entire kit)

7. RELATED DOCUMENTS

- 7.1 New York City Regional Emergency Medical Advisory Council (REMAC) Advanced EMT Protocols

**BY ORDER OF THE FIRE COMMISSIONER AND THE OFFICE OF MEDICAL
AFFAIRS**