

TREATMENT OF ETHYLENE GLYCOL (ANTIFREEZE) AND METHANOL (WINDSHIELD WIPER FLUID) POISONING

GUIDELINE FOR TREATMENT

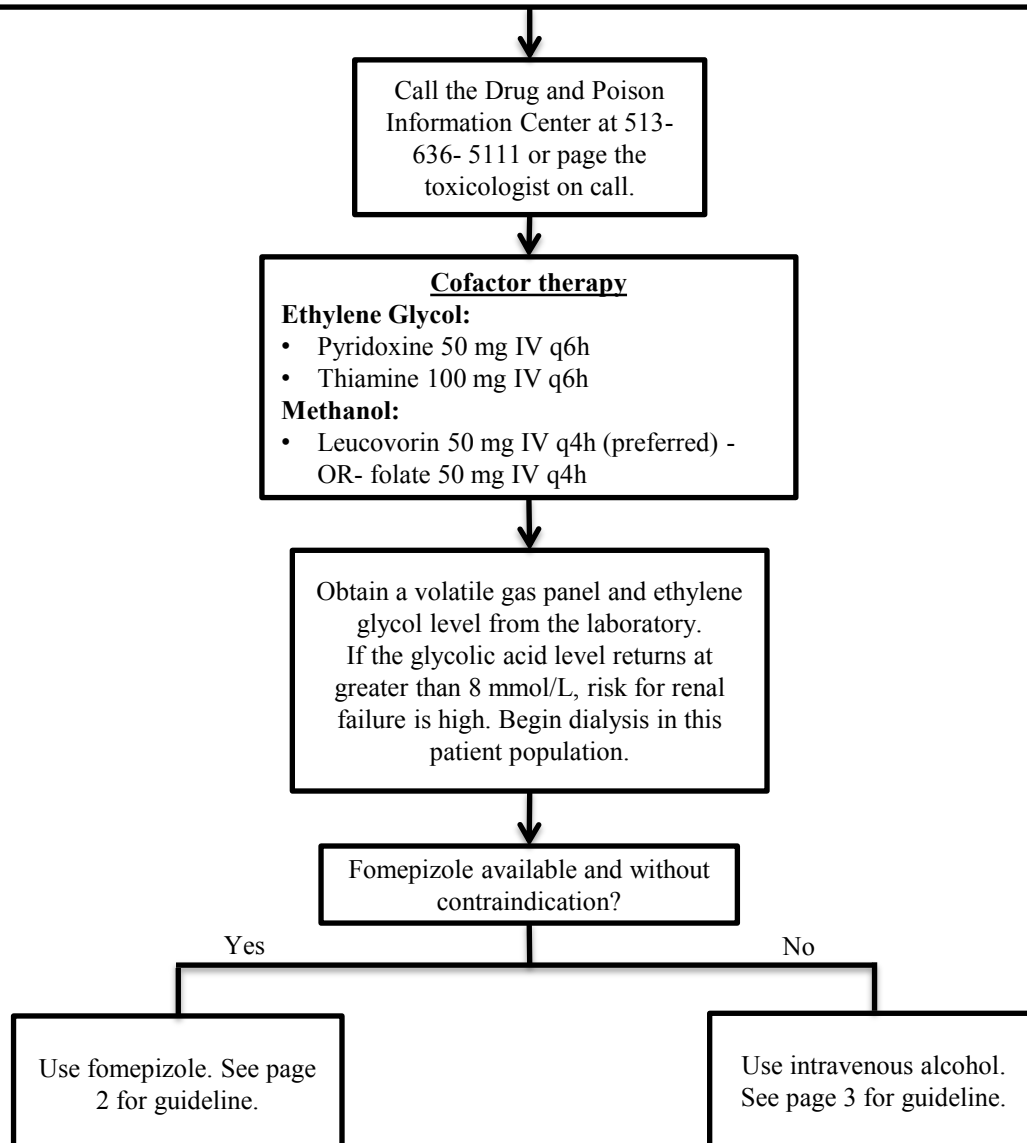
Criteria for Initiation of Therapy in Patients with Known or Suspected Toxic Alcohol Poisoning (one of the following)

Ethylene Glycol

- Documented plasma concentration of ethylene glycol of ≥ 20 mg per deciliter (3.2 mmol per liter)
- Documented recent history of ingestion of toxic amounts of ethylene glycol and an osmolal gap of >10 mOsm per liter,
- Suspected ethylene glycol ingestion and at least three of the following criteria: Arterial pH level of <7.3 , Serum carbon dioxide level of <20 mmol per liter, Osmolal gap of >10 mOsm per liter, Oxalate crystalluria

Methanol

- Documented plasma methanol concentration of 20 mg per deciliter (6.2 mmol per liter)
- Documented recent history of ingestion of toxic amounts of methanol and an osmolal gap of >10 mOsm per liter
- Suspected methanol ingestion and at least two of the following criteria: Arterial pH level of <7.3 , Serum carbon dioxide level of <20 mmol per liter, Osmolal gap of >10 mOsm per liter



**TREATMENT OF ETHYLENE GLYCOL (ANTIFREEZE) AND
METHANOL (WINDSHIELD WIPER FLUID) POISONING****GUIDELINE FOR FOMEPIZOLE USE**

Administer a loading dose of 15 mg/kg fomepizole.
Give all doses as slow IV infusion over 30 minutes.

Not on Dialysis

Administer dose of 10 mg/kg every 12 hours for 4 doses. Administer as slow IV infusion over 30 minutes.

Dosing in Hemodialysis

10mg/kg every 4 hours x 4 doses during hemodialysis.
Administer as slow IV infusion over 30 minutes

Check ethylene glycol or methanol levels. If they are >20mg/dL, continue fomepizole at 15mg/kg every 12 hours (or every 4 hours with dialysis) thereafter until ethylene glycol or methanol levels have been reduced to <20mg/dL. Administer as slow IV infusion over 30 minutes.

DIALYSIS

The use of fomepizole does not affect the indication for dialysis.

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GUIDELINE FOR USE OF INTRAVENOUS ALCOHOL

Initial: 600-700 mg/kg IV infusion
(equivalent to 7.6-8.9 mL/kg using a 10% solution)
*Administer through central line

Goal of therapy to maintain serum ethanol levels of ≥ 100 mg/dL
-Titrations must be ordered by a physician

Hemodialysis?

Yes

No

Drinker?

Drinker?

Chronic Drinker:
257 mg/kg/hour
(equivalent to 3.26 mL/kg/hour using a 10% solution)
*Administer through central line

Non-drinker/Moderate:
169 mg/kg/hour (equivalent to 2.13 mL/kg/hour using a 10% solution)
*Administer through central line

Chronic Drinker:
154 mg/kg/hour
(equivalent to 1.96 mL/kg/hour using a 10% solution)
*Administer through central line

Non-drinker/Moderate:
66 mg/kg/hour (equivalent to 0.83 mL/kg/hour using a 10% solution)
*Administer through central line

Goal of therapy to maintain serum ethanol levels of ≥ 100 mg/dL. Titrations must be ordered by a physician. Monitor blood ethanol levels every 1-2 hours until steady state is reached, then every 2-4 hours. Continue therapy until levels are ≤ 20 mg/dL **and** patient is asymptomatic **and** metabolic acidosis is corrected.

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APPENDIX- FOMEPIZOLE

Monitoring

- Monitor for for: metabolic acidosis, acute renal failure, adult respiratory distress syndrome and hypocalcemia
- Supportive therapy: Consider the following as supportive therapy: fluids, sodium bicarbonate, potassium and calcium supplementation, and supplemental oxygen. Hemodialysis is necessary in the anuric patient or in patients with severe metabolic acidosis or azotemia.
- Treatment Assessment: Blood gases, pH, electrolytes, BUN, creatinine and urinalysis.
- Monitor ethylene glycol or methanol plasma concentrations and for the presence of urinary oxalate crystals frequently throughout treatment to assess for clearance of ethylene glycol or methanol and metabolites.
- Perform electrocardiography.
- In comatose patient: electroencephalography.
- Monitor hepatic enzymes and WBC counts during treatment, as transient increases in serum transaminase levels and eosinophilia have been noted with repeated fomepizole dosing.

Preparation

Draw the appropriate dose of fomepizole from the vial with a syringe inject into at least 100 ml of sterile 0.9% Sodium Chloride Injection or Dextrose 5% Injection. Mix well. Infuse the entire contents of resulting solution over 30 minutes. Fomepizole solidifies at temperatures <25C(77F). If the fomepizole solution has become solid in the vial, liquefy by running the vial under warm water or by holding in the hand. Solidification does not affect the efficacy, safety or stability of fomepizole.

Fomepizole Dosing 15 mg/kg			Fomepizole Dosing 10 mg/kg		
Weight(kg)	mL	mg	Weight(kg)	mL	mg
20	0.3	300	20	0.2	200
40	0.6	600	30	0.3	300
60	0.9	900	40	0.4	400
70	1.0	1050	50	0.5	500
80	1.2	1200	60	0.6	600
90	1.3	1350	70	0.7	700
100	1.5	1500	80	0.8	800
110	1.6	1650	90	0.9	900
115	1.7	1725	100	1.0	1000
120	1.8	1800	110	1.1	1100
130	1.9	1950	120	1.2	1200

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APPENDIX- INTRAVENOUS ALCOHOL

Use of ethanol for ethylene glycol poisoning has largely been replaced by the use of fomepizole. Ethanol has not been prospectively studied for this indication and has not been approved by the FDA for this purpose.

Ethanol dose will depend on the amount of ethylene glycol present. Higher doses may be needed for very large ingestions.

Monitoring

Monitor blood ethanol levels ever 1-2 hours until steady state is reached, then every 2-4 hours. Monitor blood glucose, electrolytes (including magnesium), serum pH, blood gas, and methanol or ethylene glycol levels. Continue therapy until levels are ≤ 20 mg/dL **and** patient is asymptomatic **and** metabolic acidosis is corrected.

Preparation

- Dilute with D5W, dispense in glass bottle.
- **Initial dose:** Calculate 10% dilution for 600-700 mg/kg dose based on $C_1V_1 = C_2V_2$:
 $C_1 = 0.7742$ g/mL (98% ethyl alcohol)
 $V_1 =$ Patient weight (kg) * dose (mg/kg) * 1g/1000mg * 1 mL/0.774g ethanol
 $C_2 = 0.079$ g/mL (10% ethanol)
 $V_2 =$ Unknown volume of final preparation (V1 + mL of D5W for dilution)
- **Continuous Infusion:** diluted from 98% stock, 102 mL of 98% ethanol diluted with 898 mL D5W to make a 1000 mL 10% solution.
- Beyond use date of 24 hours at room temperature

Administration

A 10% solution of ethanol is hyperosmolar (1713 mosM/L). Administer intravenously through central line only. Initial dose should be administered over 1 hour.

Adverse Effects

- The doses required will produce clinical signs and symptoms of ethanol intoxication (e.g., inebriation, depression of cortical function, emotional lability, poor coordination, loss of judgment, visual impairment, slurred speech). Patients should be assisted with any action that requires judgment or coordination.
- Severe depression of mental status may necessitate endotracheal intubation in order to protect the patient's airway and protect against respiratory depression.