

Toxic Alcohol Treatment

Recommended laboratory investigations required to calculate an anion gap and osmolar gap.

ideally these labs are all drawn at the same time

1. Venous blood gas (arterial acceptable)
2. Lactate
3. Chemistry: Na⁺, K⁺, Cl⁻, HCO₃⁻, creatinine, BUN, amylase, glucose
4. Serum osmolality
5. Serum ethanol
6. Toxic alcohol levels: methanol, ethylene glycol, isopropanol, acetone, propylene glycol
 - Note that ethylene glycol may need to be ordered separately in addition to a "Toxic alcohol" or "Volatile" screen – depending on the local laboratory

Calculations:

$$\text{Anion Gap} = \text{Na} - (\text{Cl} + \text{HCO}_3)$$

Abnormal >12

$$\text{Calculated Osmolality (using SI units)} = (\text{Na} \times 2) + \text{Urea} + \text{Glucose} + (\text{Ethanol (mmol/L)} \times 1.25)$$

$$\text{Osmolar Gap} = \text{Measured Osmolality} - \text{Calculated Osmolality}$$

Abnormal >10

Laboratory Investigations should be repeated as follows:

IF methanol/ethylene glycol levels are NOT available AND the patient has a possible exposure (eg. a child found in the vicinity of a container) AND an ADH blocker is NOT recommended: measure venous blood gases, electrolytes, creatinine, glucose, and osmolarity Q4H to determine need for intervention or discharge.

IF an ADH blocker has been recommended: measure venous blood gases, electrolytes, BUN, glucose, osmolarity and methanol / ethylene glycol levels (if available & as appropriate) (IF now known to be methanol OR now known to be ethylene glycol, only do the relevant level) q12h to determine need for further dosing.

IF dialysis has been recommended: measure venous blood gases, electrolytes, BUN, glucose, osmolarity and relevant toxic alcohol levels (if available), q4h to determine need for continued dialysis.

Interventions:

Alcohol Dehydrogenase (ADH) Blocker

Fomepizole (4-methylpyrazole, or 4-MP) is the preferred antidote for toxic alcohol poisoning. Indications for antidote treatment with fomepizole are evaluated on a case-by-case basis by the toxicologist on call. Ethanol (PO or IV) is an alternative antidote, but, is only considered if fomepizole is not available.

Fomepizole Administration: If fomepizole is advised by the consulting toxicologist, dose as follows:

LOADING DOSE (Time 0 hours): 15 mg/kg in 100 mL D5W OR NS intravenously infused over 30 minutes

Time 12 hours: 10 mg/kg in 100 mL D5W OR NS intravenously infused over 30 minutes

Time 24 hours: 10 mg/kg in 100 mL D5W OR NS intravenously infused over 30 minutes

Time 36 hours: 10 mg/kg in 100 mL D5W OR NS intravenously infused over 30 minutes

Time 48 hours: 15 mg/kg in 100 mL D5W OR NS intravenously infused over 30 minutes

Any further doses, given 12 hours apart, until stopping rules are met, are 15 mg/kg in 100 mL D5W OR NS infused intravenously over 30 minutes

IF the patient is being dialyzed, the dosing interval changes to every 4 hours (instead of every 12 hours) until dialysis has ended.

IF the patient has co-ingested ethyl alcohol, fomepizole can be delayed until the serum ethanol level falls to < 23 mmol/L.

Fomepizole Stopping Rules:

- IF fomepizole was started AND the level of methanol OR ethylene glycol are available to the treating hospital, STOP fomepizole when [methanol] < 6 mmol/L OR [ethylene glycol] < 3 mmol/L respectively AND the acidosis is corrected.
- IF fomepizole was started for high suspicion of methanol OR ethylene glycol exposure, AND the osmolar gap was elevated >10 mOsm/L, STOP fomepizole when the osmolar gap is zero AND the acidosis is corrected.

Cofactors

Folinic acid (Leucovorin®) OR Folic Acid 1-2 mg/kg IV infusion (adult or peds) over 30 minutes q4-6h (assume maximum body weight of 100 kg)

- For any potential toxic alcohol ingestion, OR
- Until Methanol level is negligible

Thiamine 100 mg IV by slow push (adult) (peds: 50 mg IV) q8h

- Consider if patient is a chronic alcoholic or the toxic alcohol could be Ethylene Glycol & no level yet available, OR
- Until Ethylene Glycol level is negligible

Pyridoxine 50 mg IV by slow push (adult & peds) q6h

- If the toxic alcohol could be Ethylene Glycol & no level yet available OR
- Until Ethylene Glycol level is negligible

Correct acidosis with a bicarbonate infusion to target serum pH > 7.2.

Dialysis: Recommendations to be made in consultation with the on-call toxicologist.