Ethylene Glycol (EG)

EG is present in some antifreeze, coolant, brake fluid, and solvent products. Ingestion is potentially lethal. CONSULT A CLINICAL TOXICOLOGIST EARLY

Toxicity / Risk Assessment

Ingestion of >1 mL / kg 100% EG is potentially lethal

Manage all deliberate ingestions as potentially lethal

Accidental "less than a mouthful" exposures are usually benign

Dermal and inhalation exposure does not cause toxicity

Clinical features:

- Rapidly absorbed: peak concentration 1-4 hours post ingestion
- Metabolized to acids responsible for clinical toxicity
- During the 1-2 hours post EG exposure, the osmol gap (OG) may be high (a normal OG does not exclude exposure), and the anion-gap (AG) and pH will be normal
- As EG is metabolized, the OG↓, pH↓ and the AG↑
- Co-ingestion of ethanol delays onset of toxicity

STAGE 1 (1-12 hours): ataxia, slurred speech, drowsiness (similar to ethanol intoxication)

STAGE 2 (6-24 hours): AG↑/acidosis, ↑RR ↑HR ↑BP ↓GCS

STAGE 3 (24-72 hours): progressive acidosis, ARF, ↓Ca^{2+}, seizures, coma, death

Calcium oxalate crystalluria is diagnostic, but present in <50% of cases

Management

More acidosis = worse outcome. Early treatment = good prognosis

Any delay in commencing treatment with an antidote results in more severe toxicity.

Decontamination: Activated charcoal does not adsorb EG and is not indicated.

Laboratory: Obtain U&E/VBG/ethanol/glucose/AG/measured osmolality **at the same time**.

Calculated osmolarity = 2[Na^+] + urea + glucose + 1.25[ethanol] (concentrations in mmol/L)

Osmol Gap (OG) = Measured osmolality - Calculated osmolarity

EG concentrations are generally not readily available; use surrogate markers (pH/AG/OG)

Antidote: Alcohol dehydrogenase blocker such as ***Ethanol*** or ***Fomepizole (4-MP)***

See separate ***Ethanol*** or ***Fomepizole*** guideline

Indications for discussion with clinical toxicologist for consideration of Rx with an antidote: documented history of ingestion & OG>10 **OR** suspicion of ingestion AND at least 2 of the following: pH <7.30, HCO3 <20, OG >10, urinary oxalate crystals OR EG concentration of > 20 mg/dL

8.4% Sodium Bicarbonate: correct acidaemia if pH <7.30 (bolus of 1-2 mL/kg 8.4% solution)

Enhanced elimination

Intermittent haemodialysis is the preferred modality. (Discuss with clinical toxicologist)

Indications: acidosis / ARF / haemodynamic instability (continue until acidosis resolves)

- Increase ethanol / 4-MP infusion rate during haemodialysis

Cofactors: IV pyridoxine 50 mg q6h & thiamine may help in metabolism to non-toxic metabolites.

Disposition - Discharge pending mental health assessment if well + normal pH + HCO3 >20 + OG <10 + ethanol is undetectable at least 4-hours post ingestion