The Poison Control Center
The Children's Hospital of Philadelphia
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Lipid Emulsion Therapy for Oral Cardiovascular Toxicant Overdose: Quick Treatment Tips

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Lipid emulsion therapy is a relatively new "rescue" treatment for cardiovascular collapse from lipophilic drug poisoning.
It is not FDA-approved for this indication and optimal dosing and practice has not been defined by clinical trials.

Lipid Emulsion Administration

- Contraindicated with egg, soy or safflower allergy.
- Relative contraindications: neonates, fat metabolism disorder, pancreatitis, immediate availability of ECMO support.
- Best to have dedicated IV line. Don't give calcium salts or glucagon simultaneously in the same line.
- 20% Lipid Emulsion: 100 mL (children: 1.5 mL/kg) IV push, then 50 mL (0.75 mL/kg) slow push over 3-5 minutes; if prolonged therapy desired then 100 mL/hr infusion (0.025 mL/kg/min) for up to 6 hours. (FDA limits total dose, for other indications, to < 12.5 mL/kg/day)
- Infusion may be titrated to clinical effect.
- If infusion > 6 hours required, try to target serum triglyceride concentration of ~1000 mg/dL (1%).

Known Adverse Effects of Lipid Emulsion

- Phlebitis
- Pancreatitis
- Pulmonary infiltrates / ARDS
- Sequestration of other pharmaceuticals
- Laboratory difficulty with lipemic samples
- Clogging of renal replacement therapy filters / ECMO circuitry
- Fat overload syndrome

Proposed Mechanisms of Action

- Acts as a "lipid sponge" and keeps lipophilic drugs from binding to sodium or calcium channels of heart.
- Increases fatty acid fuel delivery to cardiac mitochondria.
- Increases efficiency of calcium use by cardiac muscle.
- Inhibits the mitochondrial permeability transition pore.
- Stimulates insulin release.

Support for Use of Lipid Emulsion Therapy

- Recommended by the *Australian and New Zealand College of* Anesthetists and the *Resuscitation Council of the United Kingdom* for cardiac arrest due to local anesthetic toxicity.
- Recommended by the *American Heart Association's ACLS* guidelines for cardiac arrest due to lipophilic beta- and calcium channel-blockers.

The specialists, and consulting toxicologists, at The Poison Control Center may be able to provide more nuanced information to assist clinicians trying to make patient care decisions.

24-hour hotline
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Selected References for More In-Depth Information:

- Fettiplace MR, et al. Confusion about infusion: Rational volume limits for intravenous lipid emulsion during treatment of oral overdoses. Ann Emerg Med 2015; 66: 185-188.
- Jang DH, et al. Toxin-induced cardiovascular failure. Emerg Med Clin NA 2014; 32: 79-102.
- Kostic MA, et al. Review of the use of lipid emulsion in nonlocal anesthestic poisoning. Pediatr Emerg Care 2014; 30: 427-436.
- Levine M, et al. Complications following antidotal use of intravenous lipid emulsion therapy. J Med Toxicol 2014; 10: 10-14.
- Ozcan MS, et al. Intravenous lipid emulsion for the treatment of drug toxicity. J Intens Care Med 2014; 29: 59-70.
- Sirianni AJ, Osterhoudt KC, et al. Use of lipid emulsion in the resuscitation of a patient with prolonged cardiovascular collapse after overdose of bupropion and lamotrigine. Ann Emerg Med 2008; 51: 412-415.

A Simple System for Emergency Department or Intensive Care Unit Stocking:

- Stock a 250 mL bag of 20% lipid emulsion in ED or ICU.
- An unopened bag may be stored at room temperature for up to 24 months.
- For a patient > 60 kg: Give 100 mL push, then 50 mL over 3-5 minutes, then remaining 100 mL over one hour.
- Get 500 mL bag from pharmacy – may give at rate 100 mL/hr as needed for next 5 hours.