Antidote administration may dramatically reduce morbidity and mortality in certain intoxications. The use of antidotes in appropriate situations can result in a more rapid recovery with potentially fewer long-term complications. Antidotes are a critical component in the care of poisoned patients. Antidotes reduce or reverse poison effects by a variety of means. They may 1), 4) antagonize end-organ effects, 5) inhibit conversion to more toxic metabolites or 6) enhance conversion to less or nontoxic metabolites. Their usage is appropriate when: 1) There is a poisoning for which an antidote exists; 2) The actual or predicted severity of poisoning warrants its use; 3) Expected benefits of therapy outweigh its associated risk; and 4) There are NO contraindications. Consequently, they are used in only about 1 % of cases. Although a response to empirically administered antidotes can be used to confirm a suspected diagnosis, their indiscriminate use can potentially increase patient morbidity or mortality (potential for ADR-I’s). Some antidotes are toxic themselves and therefore should be used cautiously only when indicated.

Antidote availability is crucial for the poisoned patient. It is important that hospitals keep antidotes readily available and in stock to have on hand to treat these patients. Generally, it is well known that hospital stocks of many antidotes are inadequate or not satisfactory (either not available or insufficient). Hence, a genuine effort must be made to stock every Emergency Medicine Department appropriately and even consider developing and maintaining a National Antidote Program within the Puerto Rico Health Department and/or between regional interfacilities.
The following are the recommended antidotes to maintain in stock and be familiarize with (keep in mind the required pediatric dosages). Also, included in the list are frequently used agents (most of which are already stocked in the ED cardiac arrest cart) that maybe required in the overall acute management of poisoned patients. It will be prudent to be prepared for at least one patient weighing 100-kg during the first 24 hours-of-treatment with the following agents (not listed in any particular preference):

- Activated Charcoal (without cathartics)*
- N-acetylcysteine (Mucomyst 20%)
- Acetadote
- Physostigmine*
- Flumazenil* (mainly for iatrogenic oversedation)
- Glucagon*
- Calcium Chloride 10%*
- Calcium Gluconate (2.5% Gel, and 10% IV)*
- Regular Insulin: High-Dose Insulin (1-10 U/kg/hour) Therapy
- IV Dextrose (5%, 10%, and 50%)
- Potassium Chloride
- Potassium Iodide
- Ondansetron IV (Zofran)
- Fatty Acid Emulsion: 20% Lipid Emulsion (Intralipid) – advised ED stocking
- Prussian Blue Insoluble Capsules (Radiogardase)
- High Flow oxygen (NRB mask)
- Cyanide Kit: Amyl nitrite pearls, Sodium nitrites 3%, Sodium thiosulfate 25%*
- Hydroxycobalamin*
- Digoxin immune Fab (DigiFab(R))*
- Ethanol 5-10%
- Thiamine (parenteral)
- Fomepizole (preferred to IV ethanol)
- Protamine sulfate
- Deferoxamine
- Pyridoxine (parenteral formulation)*
- DMSA (Succimer)
- British antilewisite (BAL) or Dimercaprol
- Methylene blue 1%*
- Naloxone (Narcan)* and nalmefene
- Atropine*
- Pralidoxime (Protopam) - advised ED stocking
- Octreotide (Sandostatin)
- Sodium bicarbonate*
- Calcium disodium edilate (EDTA)
- Calcium - DTPA
- Folic acid/tetrahydrofolic acid (leucovorin)
- D-Penicillamine
- Vitamin K1 (phytonadione)
- Cyproheptadine
- Crotalidae antivenin (CroFab)
- Latrodectus antivenin
- Coral snake or Elapidae antivenin
- Heptavalent Botulinum Antitoxin (contact the PR Health Department & CDC)
- Botulism Immune Globulin: Infant Botulism (contact the PR Health Department & CDC)
- Polyethylene Glycerol (Golytely) for WBI
- Cholestyramine
- Sodium Polystyrene (kayexalate)
- Dopamine
- Dobutamine
- Inamrinone
- Adenosine
- Norepinephrine
- Epinephrine
- Benzodiazepines (parenteral formulation): valium, lorazepam, and midazolam
- Magnesium sulfate
- Esmolol
❖ Labetalol
❖ Phentolamine
❖ Hydralazine
❖ Nitroprusside
❖ Etomidate
❖ Succinylcholine
❖ Thiopental
❖ Vecuronium
❖ Diphenhydramine
❖ Benztropine
❖ Methylprednisolone or Dexamethasone
❖ Dantrolene
❖ Diazoxide
❖ Mannitol
❖ Metoclopramide
❖ Cimetidine and ranitidine (parenteral formulation)
❖ Acetic Acid 4-6%
❖ Albuterol 0.5%
❖ Starch
❖ Icatibant (Firazyr)
❖ Glucarpidase (Voraxaze)
❖ Dexrazoxane (Totect)
❖ Silibinin
❖ Benzylpenicillin
❖ IV analgesics (morphine or fentanyl)
❖ Hyperbaric Medicine (HBO) Consultation Agreement
❖ Hemodialysis Center Consultation Agreement (charcoal hemoperfusion availability)
❖ Extracorporeal Membrane Oxygenation (ECMO) Consultation Agreement
❖ Therapeutic Hypothermia Therapy

*Expert Consensus recommended stocking at the main ED for immediate availability (1)
Concerning quantity stocking, the first step for your respective Emergency Department is to actually “Plan For One & Train For Many” until recognizing the actual needs of your specific hospital and your community. Certainly, acquaintance with all these agents and treatment modalities are required to provide state-of-the-art medical care to poisoned patients. Education and preparedness on this topic will ultimately reduce wasteful overstocking and inappropriate use.

Each hospital or its respective Emergency Department will face unique social, political, and geographic challenges that will alter the right amount of antidotes to stock. All hospitals and their stakeholders should perform a frequent and formal “Antidote Hazard Vulnerability Analysis”. Besides this analysis-of-need, each institution should create their own individual system (i.e. ED and Pharmacy Poisoning Cart) to regularly inventory their antidote listing to be able to guarantee that the stock is: not expired; it is available in the right amount; and stored at the right location. In addition, anticipation of the time needed to restocking of antidotes should be well thought-out. A timely delivery from the in-house pharmacy stocking of 60 minutes or less from the time of the medical order is strongly encouraged. Further, it is important to make certain that the antidote stockpile information is disseminated properly to ALL medical providers.

Do not hesitate to contact the PR Health Department or the Puerto Rico – Poison Control Center as you deemed needed (800-222-1222).

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REFERENCES