



## Antidote Stocking Guidelines and Practical Tips

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  - Cumberland Pharmaceutical
  - EMD
  - Fougera
  - Heyltx
  - Protherics
  - Rare Disease Therapeutics

## What is an Antidote?

- Antidote ≠ Anecdote
- An antidote is a substance that when injected into a patient...
- Produces a publication

## Why Stock Antidotes?

- The Joint Commission
  - MM 2.10: Medications for dispensing or administration be selected, listed, and procured according to criteria.
  - MM 2.30: Emergency medications or supplies, if any, be consistently available, controlled, and secured.
- State government
  - California hospital sanctioned for violating regulation requiring "availability of prescribed medications 24 hours a day"
  - Digoxin Fab was not available immediately for patient with cardiac glycoside toxicity

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## Inadequate Pyridoxine Stock and Its Effect on Patient Outcome

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- Status epilepticus after 9 g INH - Hospital had only 1 g pyridoxine
- 4 g obtained from another facility, but refractory seizures continued. Treated with large doses of benzodiazepines and emergent hemodialysis
- Eventually, 5 g of pyridoxine tablets via nasogastric tube

## Insufficient Antidote Stocking is Widespread

### North America

- Arizona, 1991
- New York, 1994
- Tennessee, 1994
- Colorado, Montana, Idaho, 1996
- Massachusetts, 1997
- Ontario, Canada 2001
- Philadelphia, 2001
- Illinois, 2007
- Others

### International

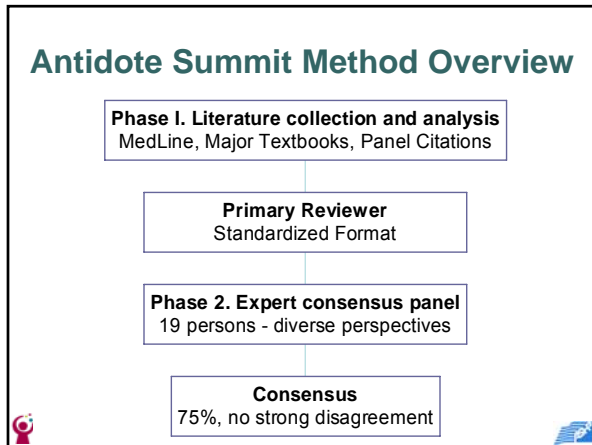
- Taiwan 2000
- France (SAMU) 2001
- Norway 2002
- Spain 2002
- Quebec, Canada 2003
- British Columbia 2003
- Czech Republic 2003
- British Columbia 2005
- North Palestine 2006
- Spain 2006

**Antidote Summit**

**EXPERT CONSENSUS GUIDELINES FOR HOSPITAL STOCKING OF EMERGENCY ANTIDOTES IN THE UNITED STATES**

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**EXPERT CONSENSUS GUIDELINES FOR HOSPITAL STOCKING OF EMERGENCY ANTIDOTES IN THE UNITED STATES**



- Expert Consensus Panel**
- Stephen Borron, MD, MS
  - E. Martin Caravati, MD, MPH
  - Dan Cobaugh, PharmD
  - Steven Curry, MD
  - Jay L. Falk, MD
  - Lewis Goldfrank, MD
  - Susan Gorman, PharmD, MS
  - Stephen Groft, PharmD
  - Kennon Heard, MD
  - Ken Miller, MD, PhD
  - Kent R. Olson, MD
  - Gerald O'Malley, DO
  - Donna Seger, MD
  - Steven Seifert, MD
  - Marco Sivilotti, MSc, MD
  - Tammi Schaeffer, DO
  - Anthony J. Tomassoni, MD, MS
  - Robert Wise, MD
- Orange County Fire & NAEMSP
  - ASHP Foundation
  - CDC Strategic National Stockpile
  - Director, NIH Rare Diseases
  - VP - The Joint Commission

Discipline/Specialty	Participants
Clinical Pharmacology	3
Critical Care	3
Clinical Pharmacy	2
Disaster Prep/Response	6
Emergency Medicine	11
EMS	4
Hospital Pharmacy	1
Internal Medicine	2
Clinical Toxicology	15
Pediatrics	2
Poison Center Admin	9
Public Health	1
Regulatory Medicine	4

Antidote	Indication	Recommendation			Class of Evidence
		Should Be Stocked	Available within 60 Minutes	Immediately Available	
<b>Total of 28 Medications</b>					
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### Antidotes: Immediately Available

1. Atropine
2. Crotaline snake antivenom
3. Coral snake antivenom
4. Cyanide antidote
5. Digoxin immune Fab
6. Flumazenil
7. Glucagon
8. Methylene blue
9. Naloxone
10. Physostigmine
11. Pyridoxine
12. Sodium bicarbonate

### Antidotes: Available within 1 hour

1. Acetylcysteine
2. Calcium chloride
3. Calcium gluconate
4. Cyanide antidote
5. Deferoxamine
6. Dimercaprol
7. Ethanol/fomepizole
8. Octreotide
9. Potassium iodide
10. Pralidoxime
11. "Immediately available list"

### Antidotes: Stocked, but no time limit

1. Black widow spider antivenom
2. EDTA
3. DTPA
4. Prussian blue

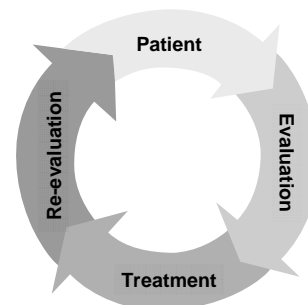
### Antidotes: Need not be stocked

1. Botulism Equine Trivalent Antitoxin
2. Botulism immune globulin (BabyBIG)

### How Much Antidote Should Be Stocked By Hospital

- Amount needed for 1 patient
  - 8 hours, 24 hours (AWP: \$70,000, \$90,000)
  - Some synthesis by the panel was needed
    - Acetylcysteine
      - 8 hours – 28 grams
      - 24 hours – 56 grams
- Hazard Vulnerability Assessment
  - The Joint Commission
  - Some hospitals have uneven stocking

### It's more than just the antidote



### Hazard Vulnerability Analysis

- Hospitals not all the same
- Hazard vulnerability assessment required by TJC
- “Identification of potential emergencies and the direct and indirect effects these emergencies may have on the hospital’s operations and the demand for its services.”

[http://www.jointcommission.org/NR/rdonlyres/F42AF828-7248-48C0-B4E6-BA18E719A87C/0/06\\_hap\\_accred\\_stds.pdf](http://www.jointcommission.org/NR/rdonlyres/F42AF828-7248-48C0-B4E6-BA18E719A87C/0/06_hap_accred_stds.pdf)

Factor	Principle	Example
History or experience of use	Some modes of suicide or abuse become locally prevalent	<ul style="list-style-type: none"> <li>• Popularity of cyanide or other specific agents as a suicide agent</li> <li>• Amateur snakekeepers (e.g. cobras) in area</li> <li>• Residential/commercial fires</li> </ul>
Anticipated volume of use	More than 1 victim of a poisoning may occur	<ul style="list-style-type: none"> <li>• Multiple casualty incidents (smoke inhalation)</li> <li>• Indigenous snakebite in areas with frequent occurrences</li> </ul>
Anticipated time to re-stock of antidote	Time to re-stock varies among hospitals	<ul style="list-style-type: none"> <li>• Hospitals that stabilize and refer</li> <li>• Hospitals that provide tertiary care</li> </ul>

### Why?

- Cost
- Medical ignorance
- Antidotes used infrequently
- Everyone responsible = no one responsible
- Lack of guidance

### Conclusions

- Antidote non-stocking is common
- Recommendations can help reduce insufficient treatment of poisoned patients
- Analysis – What antidotes and when are they needed?
- Ann Emerg Med 2009;54:386-394