Pharmacologic Strategies for Treatment of Poisonings

Eric Roberts, DNP, FNP-BC, ENP-BC[a,*],
Michael D. Gooch, MSN, ACNP-BC, FNP-BC, ENP-BC[b,c,d,e]

KEYWORDS

• Toxicology • Toxidromes • Drug abuse • Street drugs • Overdoses

KEY POINTS

- Poisoning is the leading cause of injury-related mortality in the United States, with more than 40,000 deaths annually.
- Toxicologic emergencies range from intentional to accidental overdoses and include substances both legal and illegal.
- Toxidromes assist the clinician in narrowing the differential diagnosis through an understanding of global symptoms common to categorical poisonings.
- Pharmacologic management may be determined by understanding the toxidrome categories.

INTRODUCTION

Poisoning is the leading cause of injury-related mortality in the United States, with more than 40,000 deaths annually.[1] To ensure optimal patient outcomes in poisoning situations, nurses must have foundational knowledge of overdoses and how to effectively intervene. Prescribed drugs, over-the-counter drugs, and illegal drugs can all contribute to intentional or unintentional overdoses to various extent and mandate thorough consideration. From 2008 to 2011, an estimated 1.1 million patients annually went to emergency departments for drug poisonings at a rate of 35.4 per 10,000 persons.[2] Nearly one-quarter (24.5%) of these visits resulted in hospital admission.

Trends suggest the need for a heightened knowledge and ability to manage toxicologic emergencies. Between 2004 and 2009 there was a 98.4% increase in

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[a] Loyola University Chicago, 2160 South First Avenue, Marcella Niehoff School of Nursing Building, Room 4500, Maywood, IL 60153, USA; [b] Vanderbilt University School of Nursing, Nashville, TN, USA; [c] Middle Tennessee School of Anesthesia, Madison, TN, USA; [d] Vanderbilt University Medical Center - LifeFlight, Nashville, TN, USA; [e] TeamHealth at Maury Regional Medical Center, Columbia, TN, USA
* Corresponding author.
E-mail address: robertsdnp@gmail.com

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nonmedical use of pharmaceuticals. During this same period, there was an 82.9% increase in emergency department visits involving adverse reactions to drugs.[3] Opioids were the most frequent class of drugs that prompted emergency department visits. Use of nonmedical opioids accounted for about 50% of these visits. Illicit drug use is also on the rise with an 8.3% increase in overall illicit drug use from 2002 to 2013.[3] Although cocaine use has declined, there has been an increased use of methamphetamines. Another recent trend in the United States is the increase of drug use seen in persons in their fifties and sixties. This is an important consideration because the pharmacokinetics and pharmacodynamics are quite different in this age group as opposed to younger adult populations.

The complexity of the issue is enhanced when one considers the increasing number and types of drugs along with the diversity of populations using these drugs. To provide optimal care in cases of toxic ingestions, it is essential that health care providers develop knowledge and skills in not only recognizing common presentations, but also to intervene with effective treatment modalities. Although there are numerous agents that can cause toxicities, the scope of this article focuses on more commonly encountered substances and their appropriate antidotes. Toxidromes, describing classical findings of physical examination from a given overdose, are discussed to guide the health care provider in recognizing common diagnoses and treatments of toxicologic emergencies.[4]

TOXIDROMES

Toxidromes are classifications of ingestions based on common presentations and can assist the health care provider in identification of unknown ingestions and focus initial treatment regimens. Caution must be taken when considering toxidromes, however, because comorbidities, ingestion of multiple drugs, and concurrent drug therapies may alter an individual presentation.[4] **Table 1** outlines common toxidromes including anticholinergic, cholinergic, opioid, and sympathomimetic presentations. In general,

Table 1
Common toxidromes

Toxidrome	Evaluation Finding	Drug Example	Treatment
Sympathomimetic	Tachycardia, hypertension, tachypnea, agitation, diaphoresis	Amphetamines, cocaine, PCP, ecstasy, methamphetamine, Ritalin	Intravenous fluids, benzodiazepines, airway support, cardiac monitoring
Anticholinergic	Anhidrosis, mydriasis, flushing, hyperthermia, delirium, seizure, urinary retention, thirst	Antihistamines, antispasmotics, antiparkinson, antipsychotic, antidepressant, phenothiazines	Intravenous fluids, benzodiazepines, antipyretics, physostigmine
Cholinergic	DUMBBELSS	Organophosphates, carbamates, mushrooms, nicotine, pilocarpine	Atropine, pralidoxime
Opioid	Hypoventilation, central nervous system depression, meiosis, hypotension	Hydrocodone, hydromorphone, oxycodone, methadone, fentanyl	Naloxone