

Management of Hazardous Material Emergencies, An Issue of Emergency Medicine Clinics of North America, E-Book (The Clinics: Internal Medicine)

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Clinics Review Articles

EMERGENCY MEDICINE CLINICS OF NORTH AMERICA Management of Hazardous Material
Emergencies

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Anthony J. Tomassoni, Robert N.E. French, and Frank G. Walter

Toxidromes aid emergency care providers in the context of the patient presenting with suspected poisoning, unexplained altered mental status, unknown hazardous materials or chemical weapons exposure, or the unknown overdose. The ability to capture an adequate chemical exposure history and to recognize toxidromes may reduce dependence on laboratory tests, speed time to delivery of specific antidote therapy, and improve selection of supportive care practices tailored to the etiologic agent. This article highlights elements of the exposure history and presents selected toxidromes that may be caused by toxic industrial chemicals and chemical weapons. Specific antidotes for toxidromes and points regarding their use, and special supportive measures, are presented.

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Brooks L. Moore, Robert J. Geller, and Charlotte Clark

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Michael G. Holland and David Cawthon

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Stephen W. Borron and Vikhyat S. Bebarta

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Andrew M. King and Cynthia K. Aaron

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Some OP and carbamates have therapeutic indications such as physostigmine. Certain organophosphorus compounds, known as nerve agents, have been employed in chemical warfare and terrorism incidents. Both classes inhibit acetylcholinesterase (AChE) enzymes, leading to excess acetylcholine accumulation at nerve terminals. In the setting of toxicity from either agent class, clinical syndromes result from excessive nicotinic and muscarinic neurostimulation. The toxic effects from OPs and carbamates differ with respect to reversibility, subacute, and chronic effects. Decontamination, meticulous supportive care, aggressive antimuscarinic therapy, seizure control, and administration of oximes are cornerstones of management. Intentional and Inadvertent Chemical Contamination of Food, Water, and Medication 153

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Ziad Kazzi, Jennifer Buzzell, Luiz Bertelli, and Doran Christensen

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Preparation for, and response to, hazardous materials emergencies requires both preplanning and just-in-time information management. The development of an emergency operations plan and a hazardous materials incident response plan involves many steps and implicates numerous resources: institutional, governmental, and private. This article provides checklists for

development of plans and guidelines, with numerous references to information and material resources. An important component of readiness is revision. The availability of resources, human and informatics, as well as the means for accessing them, inevitably changes over time. The reader is advised to update all links and telephone numbers on a regularly scheduled basis.

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Program Objective

The goal of *Emergency Medicine Clinics of North America* is to keep practicing emergency medicine physicians and emergency medicine residents up to date with current clinical practice in emergency medicine by providing timely articles reviewing the state of the art in patient care.

Learning Objectives

Upon completion of this activity, participants will be able to:

1. Review hospital preparedness for hazardous material emergencies including chemical and radiological emergencies.
2. Recognize resources for toxicological information and assistance.
3. Discuss psychological aspects of chemical and radiological disasters.

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Foreword

Management of Hazardous Materials Emergencies

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Amal Mattu, MD, *Consulting Editor*

As I pondered how to write the foreword for this issue of *Emergency Medicine Clinics of North America*, I came to a simple realization—I really don't know much about hazardous materials (HAZMAT) at all. I don't even think I could clearly define what they are, though I think I could eventually recognize them if I saw them. The problem is that by the time I recognized what I was dealing with, it might very well be too late for the patient...and for me!

In emergency medicine, we spend most of our time dwelling on the management of common complaints, such as chest pain, abdominal pain, and back pain, among many other complaints. We read about and teach our trainees about high-risk entities, such as myocardial infarction, stroke, aortic dissection, and pulmonary embolism. We spend a great deal of our time managing lower-risk but high-frequency complaints, such as viral syndromes, bumps, bruises, and lacerations. But where do HAZMAT exposures fall into this mix? The complications of these exposures span the gamut of low risk all the way up to high risk and deadly. Fortunately for all of us, they are very uncommon, but when they do occur, they may pose significant public health risks and dangers to entire families or towns. Given that the first site of arrival for these patients would be the emergency department, it certainly seems sensible, even mandatory, for all of us to be well-educated in recognizing and managing HAZMAT exposures. With this bit of newfound respect for HAZMAT emergencies, I went to the textbooks to see what I could quickly learn before writing this foreword.

First, I reviewed three popular texts that focus on core curriculum review for those that are studying for the Written Certification Examination in emergency medicine. I found in each of the texts a page or two regarding hydrocarbons, organophosphates, and an occasional mention of

phosgene. Perhaps there was enough content there to answer a couple of questions on the exam, but the texts were severely lacking in terms of providing real recommendations about how to manage patients. When I reviewed our own residency's curriculum, I found at best only an occasional mention of exposures to some of the relevant agents in assorted toxicology lectures, but nothing truly of any substance over the past several years. Next, I reviewed three of the "classic," comprehensive textbooks in emergency medicine. Surely, I thought, these would provide a practical approach to managing minor and major HAZMAT exposures. I was pleased to find that each did provide some information regarding site control and decontamination, but nevertheless, they were still somewhat lacking in depth. Given that we in the emergency department are the first line of defense for major public health emergencies, it seems that we need to know far more than the basics that are provided in the current popular emergency medicine textbooks that are available to us.

Fortunately for our sake and for the public's sake, Dr Stephen Borron, Dr Ziad Kazzi, and an outstanding group of authors have stepped forward to provide us a much needed resource that discusses in necessary depth how to provide immediate care to the victims of HAZMAT exposures and also how to protect the public from spread of these exposures. In the following pages, all of us that are poorly educated and (therefore) poorly prepared for HAZMAT emergencies will learn exactly what we *should have* been learning in our training programs and when studying for the Certification Exams. After an excellent introductory article, which really hammers home the importance for all of us to be experts in HAZMAT emergencies, the contributors continue to discuss a potpourri of key topics. They discuss some individual toxins, such as industrial agents, irritants, corrosives, asphyxiants, and cholinergic agents. They also discuss some key issues pertaining to personal and public health, including how to use protective equipment, hospital preparedness, food/water/medication contamination, and mental health consequences of chemical and radioactive agents. Finally, they provide a critically important checklist for HAZMAT preparedness in the Appendix.

This issue of *Emergency Medicine Clinics of North America* represents an important addition to the emergency medicine literature. Experienced emergency physicians, emergency medicine trainees, and the public will benefit tremendously from the expertise provided in the pages that follow. The guest editors and authors are commended for providing a single resource that covers a broad spectrum of HAZMAT exposures in a succinct, clinically relevant, and cutting-edge manner.

This issue of *Emergency Medicine Clinics*, edited by Drs. Stephen Borron and Ziad Kazzi focuses on emergencies arising from contact with Hazardous Materials. Article topics include: Selected classes and examples of dangerous industrial chemicals, weapons of mass destruction, and their syndromic identification; Hospital preparedness for chemical and radiological disasters; Personnel protection and decontamination of adults and children; Resources for toxicological information and assistance; Asphyxiants; Corrosives and irritants; Organophosphates and carbamates; Intentional and unintentional food, drug, and water contamination, and more!

OHA Emergency Management Toolkit - Ontario Hospital - The book is organized around issues that humanitarian aid workers from... emergency preparedness and

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