

## KOENIG AND SCHULTZ'S DISASTER MEDICINE

### *Second Edition*

As societies become more complex and interconnected, the global risk for catastrophic disasters is increasing. Demand for expertise to mitigate the human suffering and damage these events cause is also high. A new field of disaster medicine is emerging, offering innovative approaches intended to optimize disaster management. However, much of the information needed to create the foundation for this growing specialty is not objectively described or is scattered among multiple different sources.

This definitive work brings together a coherent and comprehensive collection of scientific observations and evidence-based recommendations with expert contributors from around the globe. This book identifies essential subject matter, clarifies nomenclature, and outlines necessary areas of proficiency for healthcare professionals handling mass casualty crises. It also describes in-depth strategies for the rapid diagnosis and treatment of victims suffering from blast injuries or exposure to chemical, biological, and radiological agents.

Dr. Kristi L. Koenig, Professor of Emergency Medicine and Public Health, Director of Public Health Preparedness, and Director of the Center for Disaster Medical Sciences at the University of California, Irvine, is an internationally recognized expert in the fields of homeland security, disaster and emergency medicine, emergency management, and emergency medical services. During the U.S. terrorist attacks of 9/11, she served as National Director of the Emergency Management Office for the Federal Department of Veterans Affairs. Professor Koenig is a Fulbright Scholar and fellow of the International Federation for Emergency Medicine. She holds multiple appointments including Visiting Professor at universities in Australia, Italy, and Belgium. With a strong health policy and academic background, including more than 100 peer-reviewed publications and nearly 500 invited lectures in about 35 countries, she is widely sought for presentations at regional, national, and international forums.

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*In loving memory of my mother, whose unwavering love, guidance, and support allowed me enormous life opportunities, including the ability to create this book  
And with appreciation and admiration for my students, residents, EMS and Disaster Medical Sciences Fellows, International Fellows, and the European Master of Disaster Medicine family who will continue to move the science of disaster medicine forward into the future to mitigate loss of life and human suffering from disasters*

*Kristi L. Koenig, MD, FACEP, FIFEM*

*To all the organizations worldwide that support the emerging specialty of disaster medicine  
To Noriaki Aoki, MD, PhD, whose premature death robbed our specialty of a truly gifted and visionary talent, and me of a great friend  
To my father, Irwin M. Schultz, MD, and in memory of my mother, Ruth L. Schultz, BSN, whose love and encouragement have sustained me throughout my career*

*Carl H. Schultz, MD, FACEP*

**KOENIG AND SCHULTZ'S**  
**DISASTER MEDICINE**  
**COMPREHENSIVE PRINCIPLES**  
**AND PRACTICE**

*Second Edition*

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**CAMBRIDGE**  
UNIVERSITY PRESS

University Printing House, Cambridge CB2 8BS, United Kingdom  
One Liberty Plaza, 20th Floor, New York, NY 10006, USA  
477 Williamstown Road, Port Melbourne, VIC 3207, Australia  
4843/24, 2nd Floor, Ansari Road, Daryaganj, Delhi - 110002, India  
79 Anson Road, #06-04/06, Singapore 079906

Cambridge University Press is part of the University of Cambridge.

It furthers the University's mission by disseminating knowledge in the pursuit of education, learning, and research at the highest international levels of excellence.

[www.cambridge.org](http://www.cambridge.org)

Information on this title: [www.cambridge.org/9781107040755](http://www.cambridge.org/9781107040755)

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First published 2016

*A catalog record for this publication is available from the British Library.*

*Library of Congress Cataloging in Publication Data*

Names: Koenig, Kristi L., editor. | Schultz, Carl H. (Carl Herman), editor.

Title: Koenig and Schultz's disaster medicine : comprehensive principles and practice / edited by Kristi L. Koenig, Carl H. Schultz.

Other titles: Disaster medicine : comprehensive principles and practice

Description: Second edition. | Cambridge ; New York : Cambridge University Press, 2015. | Includes bibliographical references and index.

Identifiers: LCCN 2015041206 | ISBN 9781107040755

Subjects: | MESH: Disaster Medicine. | Disaster Planning. | Disasters.

Classification: LCC RA645.9 | NLM WA 295 | DDC 616 – dc23

LC record available at <http://lcn.loc.gov/2015041206>

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## CONTENTS

Contributors	page vii		
Foreword	xv		
Perspective	xvii		
<i>Carl H. Schultz</i>			
Preface	xix		
<b>PART I. CONCEPTUAL FRAMEWORK AND STRATEGIC OVERVIEW</b>			
1. Disaster Research and Epidemiology	3		
<i>Megumi Kano, Michele M. Wood, Judith M. Siegel, and Linda B. Bourque</i>			
2. Disaster Health Education and Training: Linking Individual and Organizational Learning and Performance	23		
<i>Peter W. Brewster</i>			
3. Surge Capacity and Scarce Resource Allocation	38		
<i>Donna F. Barbisch</i>			
4. Climate Change	52		
<i>Richard A. Matthew and Jamie L. Agius</i>			
5. International Perspectives on Disaster Management	59		
<i>Jean Luc Poncelet</i>			
6. Community Resilience	71		
<i>Rose L. Pfefferbaum, Richard Reed, and Betty Pfefferbaum</i>			
7. Ethical Issues in Disaster Medicine	81		
<i>George J. Annas</i>			
8. Emerging Infectious Diseases: Concepts in Preparing for and Responding to the Next Microbial Threat	93		
<i>Shantini D. Gamage, Stephen M. Kralovic, and Gary A. Roselle</i>			
9. Disaster Behavioral Health	124		
<i>James C. West, Merritt D. Schreiber, David Benedek, and Dori B. Reissman</i>			
10. Populations with Functional or Access Needs	137		
<i>Brenda D. Phillips and Laura M. Stough</i>			
<b>PART II. OPERATIONAL ISSUES</b>			
11. Public Health and Emergency Management Systems	165		
<i>Connie J. Boatright-Royster and Peter W. Brewster</i>			
12. Legislative Authorities and Regulatory Issues	183		
<i>Ernest B. Abbott and Jeffrey H. Luk</i>			
13. Syndromic Surveillance	199		
<i>Gary A. Roselle</i>			
14. Triage	208		
<i>Christopher A. Kahn, E. Brooke Lerner, and David C. Cone</i>			
15. Personal Protective Equipment	219		
<i>Howard W. Levitin</i>			
16. Decontamination	232		
<i>Howard W. Levitin and Christopher A. Kahn</i>			
17. Quarantine	241		
<i>James G. Hodge, Jr. and Lawrence O. Gostin</i>			
18. Mass Dispensing of Medical Countermeasures	250		
<i>Susan E. Gorman</i>			
19. Management of Mass Gatherings	265		
<i>Michael S. Molloy</i>			
20. Transportation Disasters	294		
<i>Ulf Björnstig and Rebecca Forsberg</i>			
21. Emergency Medical Services Scene Management	321		
<i>Kenneth T. Miller</i>			
22. Healthcare Facility Disaster Management	330		
<i>John D. Hoyle, Sr.</i>			
23. Mass Fatality Management	361		
<i>Paul S. Sledzik and Sharon W. Bryson</i>			

## vi ■ CONTENTS

24. Rehabilitation of Disaster Casualties <i>James E. Gosney, Jr. and Colleen O'Connell</i>	376	34. Hazardous Material, Toxic, and Industrial Events <i>Hoon Chin Lim and Hock Heng Tan</i>	579
25. Crisis and Emergency Risk Communication <i>Barbara J. Reynolds and Gilead Shenhar</i>	390	SECTION IIIB: ENVIRONMENTAL EVENTS	
26. Telemedicine and Telehealth: Role in Disaster and Public Health Emergencies <i>Adam W. Darkins</i>	415	35. Floods <i>Mark E. Keim</i>	603
27. Complex Public Health Emergencies <i>Frederick M. Burkle, Jr.</i>	433	36. Cyclones, Hurricanes, and Typhoons <i>Kelly R. Klein and Frank Fuh-Yuan Shih</i>	624
28. Patient Identification and Tracking <i>Andreas Ziegler</i>	450	37. Tornadoes <i>Arthur G. Wallace, Jr.</i>	635
PART III. CLINICAL MANAGEMENT		38. Earthquakes <i>Carl H. Schultz and Shira A. Schlesinger</i>	642
SECTION IIIA: CBRNE AND HAZMAT		39. Tsunamis <i>Samuel J. Stratton</i>	661
29. Explosive Events <i>Glenn D. Burns and John M. Wightman</i>	467	40. Winter Storms and Hazards <i>John M. Wightman and William H. Dice</i>	670
30. Burn Disaster Management: Planning and Resource Needs <i>Tina L. Palmieri, Ariel Tessone, and Joseph Haik</i>	490	41. Extreme Heat Events <i>Carl Adrianopoli and Irving Jacoby</i>	692
31. Clinical Aspects of Large-Scale Chemical Events <i>Jonathan Newmark</i>	499	42. Landslides <i>Iain T. R. Kennedy, David N. Petley, and Virginia Murray</i>	716
32. Biological Events <i>Zygmunt F. Dembek and Theodore J. Cieslak</i>	522	43. Volcanoes <i>Peter J. Baxter</i>	724
33. Radiation Accidents and the Medical Management of Acute Radiation Injury <i>Richard J. Hatchett, David M. Weinstock, and Ronald E. Goans</i>	544	Index	737

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xii ■ CONTRIBUTORS

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## FOREWORD

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Medical care and public health textbooks are published to document what we know about a particular subject and what to expect when an event occurs, and to define current evidence-based best practices. Textbooks are based on the latest evidence as distilled by the authors and synthesized with their experience and knowledge. This is particularly relevant given the current state of the science in the relatively new discipline of disaster medicine. The textbook, *Disaster Medicine: Comprehensive Principles and Practices*, Second Edition, edited by Koenig and Schultz, successfully identifies this body of knowledge and presents it in an objective and accurate manner.

Assembling textbooks addressing evolving disciplines can be difficult. While there are an abundance of epidemiological descriptions of the health aspects of disasters in the peer-reviewed disaster literature, for the most part, such reports have no standardized format. Without structure, it is difficult, at best, to compare findings with those of studies conducted in other similar or dissimilar settings. Failure to identify similarities and differences between descriptions makes it difficult to establish what to expect epidemiologically or evidence as to the impacts of interventions; these difficulties threaten the external validity of the findings. External validity for such evidence is based on the same or similar findings obtained in other studies and is essential for the design of interventions aimed at reducing the risks for future disasters.

Additional challenges faced in the development of disaster medicine textbooks involve capturing all the available evidence. This can be inspiring particularly when studying disaster-related interventions. These investigations are conducted to identify the *changes* in levels of function that resulted from the implementation of an intervention. The findings are used to determine best practices for management of the needs during an emergency or disaster or for reduction of the disaster risks in a given setting. To date, interventional studies of the health aspects of disasters (relief, recovery, and risk-reduction) rarely have been published in the peer-reviewed literature. The information that does exist has been published primarily in the grey literature, and is not only unstructured, but lacks information of what changes resulted from the intervention (such as outcomes and impacts). Much

of the information provided is limited to achievement indices (how many of something was accomplished). Such information does not provide evidence as to what worked and what did not. Unstructured information is difficult to compare. Without an ability to conduct randomized, controlled trials, comparisons with other studies have remained elusive, are replete with opinions, and often do not contribute to the establishment of both external and internal validity (cause-effect). Therefore, currently, there is little evidence available to define best practices to be used in a given setting.

These factors complicate the development of a textbook on disaster medicine. The assembly of accurate and valid information is a very difficult task. Building on the worldwide success of the first edition (including translations into Arabic and Mandarin Chinese), Koenig and Schultz have assembled a cadre of seventy-six noted authorities who have been at the forefront of disaster medicine and public health responses and risk-reduction for decades. For this second edition, additional chapters have been added: Climate Change; Community Resilience; Rehabilitation of Disaster Casualties; and Landslides. The text expands its international authors and global perspectives to include content discussions from academic, military, civilian, and intergovernmental perspectives. This integrated approach coupled with scientific rigor delivers both a conceptual framework for strategic decision making as well as practical information for use in disaster management.

The task for the assembled global team of national and international experts was to sift and winnow through the available information and synthesize their findings with their own knowledge and experience. Each chapter provides a systematic review of the existing peer-reviewed and grey literature related to the assigned topic, much as is done by the systematic reviews conducted by Evidence Aid and the Cochrane Collaboration. This very difficult and lengthy process synthesizes the best information currently available. The resultant second edition of *Koenig and Schultz's Disaster Medicine: Comprehensive Principles and Practices* captures the essence of disaster medicine as we know it today. As a definitive reference, it reflects the state of the science, codifies current practices in all aspects of the field of

xvi ■ FOREWORD

disaster medicine, and lays the foundation for the development of a research agenda for the study of the health aspects of future disasters.

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## PERSPECTIVE

Carl H. Schultz

The specialty of disaster medicine has witnessed significant progress in the last 20 years. New organizations and publications have arisen as governments and societies have become more determined to address the impact of disasters. However, a brief review of just one of history's previous catastrophes illustrates how much significant work remains ahead. Although the event in question occurred in the United States, its root cause and consequences apply to all countries.

This event is a disaster that many anticipated but were unable to prevent. Multiple clues and warnings existed but were ignored. Had even one entity or person of influence attended to these alarms and responded, the tragedy would have been averted. In the end, over 2,200 people died preventable deaths. In any real sense, this event represents the quintessential challenges faced by the disaster community.

Most reading this text will probably assume the event was the attack on the World Trade Center in New York on September 11, 2001. However, this disaster occurred 125 years ago in the city of Johnstown, in the state of Pennsylvania. An earthen dam, poorly managed and maintained by disinterested parties, collapsed in a rainstorm, flooding the town downriver. The text entitled *The Johnstown Flood* by David McCullough chronicles the missteps and arrogance leading up to the disaster. This work should be mandatory reading for anyone who commits to the study of and response to disasters.

The errors committed by those responsible in the Johnstown tragedy have been repeated multiple times in the ensuing years during different disasters throughout the world, resulting in similar outcomes. A reluctance persists to invest significant resources that bolster community resilience. Governments continue to assign low priority to rigorous disaster preparedness and mitigation. In the United States, the National Disaster Medical System, which is responsible for coordinating the acute medical response after a disaster from the national level, remains largely a volunteer organization without permanent funding from the federal government. The commitment is lacking to provide this entity with appropriate resources so it can properly protect the public's safety.

Such observations support the contention that we continuously learn the same lessons without making real progress.

Unfortunately, this has been true until fairly recently. The term "lessons learned" has become part of the disaster medicine lexicon and disaster responders still refer to acquired knowledge using this phrase.

In truth, knowledge is not a lesson, learned or otherwise. It is an established fact that is identified and recorded for all to acquire. It represents scientific advancement and information that should be incorporated into a growing body of knowledge. One does not find physicists or biologists referring to newly identified discoveries as "lessons learned." The perpetuation of the term "lessons learned" has its origins in the creation and development of our specialty. When disaster medicine was in its infancy, no formal educational curriculum or scientific journal dedicated to the field existed. As individuals accepted appointments to disaster-related positions, they discovered a dearth of legitimate training opportunities. Given these limitations, they had no choice but to acquire knowledge by personal experience. Hence the term "lessons learned" crept into the disaster medicine taxonomy.

The problem with lessons, however, is that they are personal and cannot be generalized or systematically disseminated. A good example is the small child who learns not to touch a hot stove by experiencing a burn. The child has learned the lesson, but as an adult, will find it difficult to pass on that knowledge to his or her own child. Each child must learn the lesson as a personal unique event.

In a field where knowledge is acquired by personal experience, an individual may gain wisdom and understanding but will have difficulty distributing such information to others. When the knowledgeable person leaves the job, retires, or dies, the knowledge goes with that individual and others must begin all over again. As such, the system perpetuates itself with the new employee needing to "learn the lesson" anew. The bottom line is that no progress is made and the field of disaster medicine remains a cottage industry, devoid of new developments and science. At best, the term "lessons learned" provides tacit support for this suboptimal method of knowledge acquisition. At worst, it is disrespectful of those who pursue disaster medicine as a career and the field as a whole. The phrase incorrectly implies the specialty lacks a systematic body of



xviii ■ PERSPECTIVE

literature that can be used to advance the field and better prepare for catastrophes.

Fortunately, this is beginning to change. There is an early but clear movement away from learning the field of disaster medicine through personal experience and an evolving emphasis on developing knowledge through formalized education and training. Although every disaster has unique and unanticipated features, underlying patterns exist. Employing a formal education and training approach can impart this growing body of information in the classroom by systematizing knowledge gained through objective investigation and observation. Many universities in the United States and Europe now offer master's degrees in disaster-related studies and several sponsor doctorate degree programs. Some medical schools offer fellowships in disaster medicine, emphasizing both clinical and research skills. Professional organizations are creating clinical competencies for those who would respond to disasters. There is an international movement to professionalize response teams and train them to essential skill levels prior to permitting deploy-

ment. The specialty is finally beginning the evolution to a science.

Publishing the second edition of *Koenig and Schultz's Disaster Medicine: Comprehensive Principles and Practice* marks a milestone of sorts. It attests to the establishment of an authoritative text with international input and support. While insufficient by itself, this definitive reference is a necessary achievement in a long process that will ultimately result in creation of a scientific specialty and cadre of true experts. This will significantly improve the care of populations impacted by disasters. Besides the emphasis on science, the text also focuses on the functional impact of disasters and strategies for effective management regardless of etiology. Less emphasis is placed on such issues as who is "in charge" of the response or whether the event is "natural or man-made." Such classifications do little to improve understanding or outcome. If successful, our journey toward science will render the term "lessons learned" obsolete. Someday, one will only find the term listed in Wikipedia under the disaster medicine heading as, "an archaic term of historical interest only."

## PREFACE

Welcome to the second edition of *Koenig and Schultz's Disaster Medicine: Comprehensive Principles and Practices*. We are pleased to offer the next evolution of the book with timely updates by world-renowned contributors. This definitive reference on disaster medical sciences also contains new chapters that reflect the progression of the science of disaster medicine.

With more than 1,000 copies of the first edition sold, translation into Arabic completed, and translation into Mandarin

Chinese ongoing, disaster medical sciences is moving forward. We include a new “Perspective” in the front matter to provide a solid framework as you digest this new knowledge.

Please enjoy this new edition. Use the knowledge for teaching and practical applications to improve all-hazard emergency management and provide the best possible outcomes for populations affected by disasters.