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

Edited by

Kristi L. Koenig
University of California, Irvine, Center for Disaster Medical Sciences

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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 for decades. For this second edition, additional chapters have been added: Climate Change; Community Resilience; Rehabilitation of Disaster Casualties; and Landslides. The text expands
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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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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 valuable information to which to turn.

This eventually led to the development of our specialty. When disaster medicine was in its infancy, no formal educational curriculum or scientific journal existed. As individuals accepted appointments to disaster-related positions, they discovered a dearth of valuable information to which to turn. 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 valuable information to which to turn.

One does not find physicists or biologists referring to newly identified discoveries as “lessons learned.” The perpetuation of 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 trial and error. An individual child learns 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 experience.

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
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 deployment. 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.”
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.