

# DISASTER MEDICINE and PUBLIC HEALTH PREPAREDNESS

An Official Publication of the Society for Disaster Medicine and Public Health, Inc



## IN THIS ISSUE:

An Overview of the Current State of Disaster Health Apps

Developing Disaster Response Metrics

Report on Long-term Disaster Mental Health Services Following the Great East Japan Earthquake

The West Africa Preparedness Initiative

Utilizing a Pediatric Disaster Model

Translating Battlefield Practices to Disaster Health

CAMBRIDGE  
UNIVERSITY PRESS



 NCDMPH  
National Center for Disaster Medicine & Public Health

SDMPH  
SOCIETY FOR DISASTER MEDICINE & PUBLIC HEALTH

# SOCIETY FOR DISASTER MEDICINE AND PUBLIC HEALTH

Achieving Global Health Security

## SAVE THE DATE!

### 3rd Annual Meeting September 26 – 29, 2017 Norfolk, Virginia



**Presentations by staff of USNS Comfort and opportunity to tour hospital ship on September 28**

**Call for Abstracts now open**

**Registration and hotel information at [sdmph.org](http://sdmph.org)  
[info@sdmph.org](mailto:info@sdmph.org)**

The mission of the SDMPH is to advance and promote excellence in education, training and research in disaster medicine and public health for all potential health system responders based on sound educational principles, scientific evidence and best clinical and public health practices.

The SDMPH is dedicated to the promotion and advancement of excellence in disaster medicine and public health across a broad global, multiprofessional membership. The SDMPH will provide members with resources, organizational structure, and the means to sustain interprofessional interaction and discourse related to the discipline of disaster medicine and public health.

**[www.sdmph.org](http://www.sdmph.org)**

#### **Who should attend?**

Join over 200 attendees from ALL health professions as well as non-health individuals and organizations who play a major role in preparing for and responding to major events (natural disasters, conflict, technological). Emphasis will be on Disaster Global Health and individuals and nations coming together for more effective support of all elements of the disaster cycle.

# Disaster Medicine and Public Health Preparedness

## Editor-in-Chief

**James J. James, MD, DrPH, MHA**

*Chief Executive Officer,  
Society for Disaster Medicine and  
Public Health, Inc., USA*

## Deputy Editor

**David Markenson, MD, MBA**

*Vice President,  
Graduate Medical Education,  
Sky Ridge Medical Center,  
Denver, Colorado*

## Associate Editors

### Elizabeth Ablah, PhD, MPH

*Associate Professor, University of  
Kansas-Wichita, School of Medicine*

### Daniel J. Barnett, MD, MPH

*Associate Professor,  
Department of Environmental  
Health Sciences, Johns Hopkins  
Bloomberg School of Public Health*

### Charles W. Beadling, MD, FAAFP, IDHA, DMCC

*Associate Professor, Military and Emergency  
Medicine, Uniformed Services University of the  
Health Sciences, Bethesda, MD*

### Sandra C. Bibb, DNSc, RN, FAAN

*Dean and Professor, College of Health  
Professions, Wichita State University,  
Wichita, Kansas*

### Rita V. Burke, PhD, MPH

*Assistant Professor of Research Surgery  
and Preventive Medicine Pediatric Surgery,  
Children's Hospital Los Angeles*

### Laura J. Cavanaugh, MD, FAAP

*Pediatrician, Private Practice, USA*

### Jennifer L. Chan, MD, MPH

*Assistant Professor, Department  
of Emergency Medicine, Northwestern  
Feinberg School of Medicine*

### Mike Clarke, PhD

*Professor, Queens University,  
All Ireland Methodology Hub, Belfast, UK*

### Linda C. Degutis, DrPH, MSN

*Executive Director, Defense Health Horizons  
Chief Science Officer, The Avielle Foundation,  
Atlanta, GA*

### Betty Duggan

*Director, NYC Medical Reserve Corps, Office of  
Emergency Preparedness and Response, NYC  
Department of Health and Mental Hygiene*

### Anat Gesser-Edelsburg, PhD

*Head of Health Promotion Program, School of  
Public Health, Faculty of Social Welfare and  
Health Science, University of Haifa*

### Shinichi Egawa, MD, PhD

*Division of International Cooperation for  
Disaster Medicine, IRIDeS, Tohoku University,  
Sendai, Japan*

### Brian W. Flynn, EdD

*Department of Psychiatry, Center for the Study of  
Traumatic Stress, Uniformed Services University  
of the Health Sciences, Bethesda, MD*

### Dan Hanfling, MD

*Inova Health System, Falls Church, VA*

### Ebert B. Hsu, MD, MPH

*Director of Training,  
Johns Hopkins Office of Critical Event  
Preparedness and Response*

### Stephanie Kayden, MD, MPH

*Director, International Emergency Medicine  
Fellowship, Brigham and Women's Hospital*

### Joshua C. Morganstein, MD

*Commander, U.S. Public Health Service  
Department of Psychiatry, Center for the Study of  
Traumatic Stress, Uniformed Services University  
School of Medicine, Bethesda, MD*

### Stephen S. Morse, PhD

*Professor of Epidemiology & Director,  
Infectious Disease Epidemiology Certificate,  
Mailman School of Public Health,  
Columbia University, New York, NY*

### Frederick C. Nucifora Jr., DO, PhD, MHS

*Department of Psychiatry and  
Behavioral Science, Johns Hopkins  
University School of Medicine*

### Michael J. Reilly, DrPH, MPH, NREMT-P, CEM

*Director, Center for Disaster Medicine  
Associate Professor of Environmental Health  
Science and Emergency Medicine New York  
Medical College*

## Managing Editor

### Alice O'Donnell

*HJF, National Center for Disaster Medicine and  
Public Health  
Editorial support provided by the National Center  
for Disaster Medicine and Public Health*

## Copyeditor

### Jennifer Holmes

## Editorial Board

### John Armstrong, MD, FACS

*Associate Professor of Surgery,  
USF Health, University of South Florida*

### Frederick M. Burkle Jr., MD, MPH, DTM, FAAP, FACEP

*Senior Fellow, Harvard Humanitarian  
Initiative, Harvard School of Public Health*

### Cham E. Dallas, PhD

*Director, Institute for Health Management  
in Mass Destruction Defense, University of  
Georgia & Medical College of Georgia*

### Lewis R. Goldfrank, MD

*Herbert W. Adams Professor and Chair,  
Department of Emergency Medicine,  
New York University  
Medical Director, New York City Poison Center*

### John L. Hick, MD

*Associate Professor of Emergency  
Medicine, Hennepin County Medical  
Center, University of Minnesota*

### James G. Hodge, Jr., JD, LLM

*Lincoln Professor of Health Law and Ethics  
Director, Public Health Law and Policy Pro-  
gram, Sandra Day O'Connor College of Law,  
Arizona State University*

### Gabor Kelen, MD, FRCP(C), FACEP

*Professor and Chair, Department of  
Emergency Medicine, Johns Hopkins  
University*

### Thomas D. Kirsch, MD, MPH, FACEP

*Executive Director, National Center for  
Disaster Medicine and Public Health,  
Rockville, MD*

### William Lanier, MD

*Professor of Anesthesiology,  
Mayo Clinic*

### Yasuhiro Otomo, MD, PhD

*Director, Trauma and Acute Critical  
Care Medical Center  
Professor and Chairman,  
Tokyo Medical and Dental University  
Hospital of Medicine, Japan*

### Betty Pfefferbaum, MD, JD

*Chairman, Department of Psychiatry  
and Behavioral Sciences, University of  
Oklahoma Health Sciences Center*

### Irwin Redlener, MD

*Director, National Center for Disaster  
Preparedness, Columbia University*

### Hou Shi-ke, MD

*Institute for Disaster & Emergency  
Medicine of PAPF  
Affiliated Hospital of Logistic University,  
Tianjin City, China*

### W. Craig Vanderwagen, MD

*RADM, US Public Health Service, retired  
Senior Partner, Martin, Blanck, and Associates*

## Statistical Editors

### Guohua Li, MD, DrPH

*M. Finster Chair in Anesthesiology  
and Epidemiology, Columbia  
University College of Physicians and Surgeons*

### Michael A. Stoto, PhD

*Professor, Health Services Administration  
and Population Health, Georgetown University  
School of Nursing and Health Studies*

## Chair of Global Committee

### Raymond E. Swienton, MD, FACEP

*Co-director of EMS, Disaster Medicine and  
Homeland Security Section, University of Texas  
Southwestern*

## Associate Board

### Erik Auf der Heide, MD, MPH, FACEP

Agency for Toxic Substances  
and Disease Registry,  
US Department of Health and  
Human Services

### Joseph A. Barbera, MD

Co-director, Institute for Crisis,  
Disaster, and Risk Management,  
The George Washington  
University

### Donna F. Barbisch, DrHA, MPH

Director, Institute for Global and Regional  
Readiness

### Steven M. Becker, PhD

Professor, College of Health Sciences  
Old Dominion University

### Georges Benjamin, MD, FACP

Executive Director, American Public Health  
Association

### John Brownstein, PhD

Associate Professor, Clinical and Public Health  
Informatics, Boston Children's Hospital

### Arthur Cooper, MD, MS, FACS, FAAP, FCCM

Director of Trauma & Pediatric Surgical  
Services, Harlem Hospital Center

### Asha Devereaux, MD, MPH

Chair, American College of Chest  
Physicians Disaster Response  
Network

### Edward Eitzen, MD, MPH

Senior Partner, Biodefense and Public  
Health Programs, Martin, Blanck and  
Associates

### Mikael Eliasson, MD, PhD

Strategic Marketing Leader,  
General Medicine, GE Healthcare

### Joshua Epstein, PhD

Director, Center on Social and  
Economic Dynamics, The Brookings Institution

### J. Christopher Farmer, MD, FCCM

Associate Dean, Critical Care Medicine,  
Mayo Clinic College of Medicine

### Richard Garfield, RN, DrPH

Henrik H. Bendixen Professor of Clinical  
International Nursing, Columbia University

### Jeffrey Hammond, MD, MPH

Clinical Professor of Surgery, Robert Wood  
Johnson Medical School

### D.A. Henderson, MD, MPH

Center for Biosecurity, University of  
Pittsburgh Medical Center

### David Joyner, MD

Vice Chairman/CMO, Salus Healthcare  
International

### David Lakey, MD

Commissioner, Texas Department of State  
Health Services

### E. Brooke Lerner, PhD

Department of Emergency Medicine,  
Medical College of Wisconsin

### Jonathan Links, PhD

Director, Center for Public Health  
Preparedness, Johns Hopkins Bloomberg  
School of Public Health

### Craig H. Llewellyn, MD, MPH, MSTMH, FACPM

Emeritus Professor of Military Medicine,  
Emergency Medicine, Preventative  
Medicine & Surgery, Uniformed Services Uni-  
versity School of Medicine

### Darrell E. Lovins, DO, MPH, FACOFF

Associate Dean, Clinical Sciences,  
William Carey University

### Anthony Macintyre, MD

Visiting Associate Professor,  
Institute for Crisis, Disaster, and  
Risk Management, The George  
Washington University

### John Mutter, PhD

Professor of International and  
Public Affairs, The Earth Institute  
at Columbia University

### Kobi Peleg, PhD, MPH

Director, Israel National Center for Trauma and  
Emergency Medicine

### Cheryl Peterson, RN, MSN

Senior Policy Fellow, American Nurses  
Association

### Steven J. Phillips, MD

Director, Specialized Information Services,  
Associate Director, National Library of  
Medicine, US Department of Health  
and Human Services

### Louis Rowitz, PhD

Professor, Community Health Sciences,  
School of Public Health, University of Illinois at  
Chicago

### Joseph Scanlon

Professor Emeritus and Director,  
Emergency Communications and  
Research Unit, Carleton University

### R. Tom Sizemore III, MD

Principal Deputy Director, Office of  
Preparedness and Emergency Operations,  
US Department of Health and Human Services

### Robert Ursano, MD

Professor/Chair, Department of Psychiatry,  
Uniformed Services University of the Health  
Sciences

### Jeb Weisman, PhD

Director of Strategic Technologies,  
National Center for Disaster Preparedness,  
Columbia University

### Kevin Yeskey, MD

Senior Advisor for Emergency Public Health,  
MDB, Inc.

---

## Global Committee

### Michael Christian, MD, FRCP(C)

Department of Medicine, University of  
Toronto, Canada

### Herman Delooz, MD, PhD, FCCM, FCEM (dist)

Research Group on Disaster Medicine,  
Free University of Brussels

### Natalia Gudzenko, MD

Laboratory for Cancer Epidemiology, Research  
Center for Radiation Medicine, Ukraine

### Keqin Rao, MD, MPH

Director, National Center for Health Statistics and  
Information, Ministry of Health, China

### Alessandra Rossodivita, MD EMDM

San Raffaele Hospital Scientific Foundation,  
Milan, Italy

### Nobhojit Roy, MD, MPH

Bhabha Atomic Research Center Hospital,  
Mumbai, India

---

# Disaster Medicine and Public Health Preparedness

AUGUST 2017

Vol 11/No 4

## On the Cover

---

- 399** Regions Respond to Catastrophes  
Thomas D. Kirsch, Jeff Schlegelmilch, Kandra Strauss-Riggs, Thomas Chandler and Irwin Redlener

## Letter to the Editor

---

- 402** Successful Post-disaster Recovery Requires Adequate Pre-disaster Preparedness: The Case of Gulf Countries  
Yassar Alamri

## Brief Reports

---

- 403** Experience With a Novel, Global, Open-Access Template for Major Incidents: Qualitative Feasibility Study  
Sabina Fattah, Kari Milch Agledahl, Marius Rehn and Torben Wisborg
- 407** Impact of Hurricane Exposure on Reproductive Health Outcomes, Florida, 2004  
Shannon C. Grabich, Whitney R. Robinson, Charles E. Konrad and Jennifer A. Horney
- 412** Paramilitary Provision of Adequate Disaster Response and Advancement of Public Health: The Case of the Texas State Guard and Operation Lone Star  
Lieutenant Colonel Ralph Jay Johnson III
- 417** Public Perception of Extreme Cold Weather-Related Health Risk in a Cold Area of Northeast China  
Jie Ban, Li Lan, Chao Yang, Jian Wang, Chen Chen, Ganlin Huang and Tianian Li

## Original Research

---

- 422** Challenges of Hospital Response to the Twin Earthquakes of August 21, 2012, in East Azerbaijan, Iran  
Mahboub Pouraghaei, Ali Jannati, Peyman Moharamzadeh, Amir Ghaffarzad, Moharram Heshmati Far and Javad Babaie
- 431** The West Africa Disaster Preparedness Initiative: Strengthening National Capacities for All-Hazards Disaster Preparedness  
Melinda J. Morton Hamer, Paul L. Reed, Jane D. Greulich, Gabor D. Kelen, Nicole A. Bradstreet and Charles W. Beadling
- 439** Practical Report on Long-term Disaster Mental Health Services Following the Great East Japan Earthquake: Psychological and Social Background of Evacuees in Sendai City in the Mid- to Long-term Post-disaster Period  
Masatsugu Orui, Shuichiro Harada and Mizuho Hayashi, for the Disaster Mental Health Team of the Sendai City Mental Health and Welfare Center
- 451** Psychological Correlates of Civilian Preparedness for Conflicts  
Moran Bodas, Maya Siman-Tov, Shulamith Kreitler and Kobi Peleg
- 460** Evaluation of Real-Time Mortality Surveillance Based on Media Reports  
Olaniyi O. Olayinka, Tesfaye M. Bayleyegn, Rebecca S. Noe, Lauren S. Lewis, Vincent Arrisi and Amy F. Wolkin
- 467** How to Choose? Using the Delphi Method to Develop Consensus Triggers and Indicators for Disaster Response  
Rebecca Lis, Vicki Sakata and Onora Lien

TABLE OF CONTENTS

## Concepts in Disaster Medicine

- 473** Utilizing a Pediatric Disaster Coalition Model to Increase Pediatric Critical Care Surge Capacity in New York City  
Michael Frogel, Avram Flamm, Mayer Sagy, Katharine Uraneck, Edward Conway, Michael Ushay, Bruce M. Greenwald, Louisdon Pierre, Vikas Shah, Mohamed Gaffoor, Arthur Cooper and George Foltin
- 479** Development of an Evacuation Tool to Facilitate Disaster Preparedness: Use in a Planned Evacuation to Support a Hospital Move  
Ranna A. Rozenfeld, Sally L. Reynolds, Sherri Ewing, Mary Margaret Crulcich and Michelle Stephenson
- 487** Proposing a Framework for Mobile Applications in Disaster Health Learning  
Alexander G. Liu, Brian A. Altman, Kenneth Schor, Kandra Strauss-Riggs, Tracy N. Thomas, Catherine Sager, Michelle Leander-Griffith and Victoria Harp
- 496** Defining Roles for Pharmacy Personnel in Disaster Response and Emergency Preparedness  
Mohammad Alkhalili, Janice Ma and Sylvain Grenier
- 505** Setting Foundations for Developing Disaster Response Metrics  
Mahshid Abir, Sue Anne Bell, Neha Puppala, Osama Awad and Melinda Moore
- 510** Translating Battlefield Practices to Disaster Health  
Kandra Strauss-Riggs, Kevin Yeskey, Aubrey Miller, Stacey Arnesen and Craig Goolsby

## CONTACT INFORMATION

**Editorial Office**

NCDMPH  
11300 Rockville Pike, Suite 1000  
Rockville, MD 20852  
P: 240-833-4429  
E: dmpjournal@gmail.com

Edited from the Offices of the National Center for Disaster Medicine and Public Health (NCDMPH) located at the Uniformed Services University of the Health Sciences (USUHS) under a cooperative enterprise agreement between USUHS and The Society for Disaster Medicine and Public Health. The views expressed in each article are those of the author and do not necessarily reflect the official policy or position of NCDMPH, USUHS, the Department of Defense, or the United States Government.

**Manuscript Submission and Instructions for Authors**

May be found online at <http://mc.manuscriptcentral.com/dmp>

**DMPHP Reprints & Permissions****Article Reprints/E-prints Inquiry**

For use by commercial entities or educational institutions:  
[special\\_sales@cambridge.org](mailto:special_sales@cambridge.org)

**Permissions Inquiry**

For rights and permissions inquiries, please visit [www.cambridge.org/about-us/rights-permissions](http://www.cambridge.org/about-us/rights-permissions)

**Advertising**

For details about advertising rates and opportunities in *Disaster Medicine and Public Health Preparedness*, or to request a media pack, please contact M. J. Mrvica Associates, 2 West Taunton Avenue, Berlin, NJ 08009; Phone: 856-768-9360; Fax: 856-753-0064; Email: [mjmrvica@mrvica.com](mailto:mjmrvica@mrvica.com).

**Subscription Rates and Service****Subscription Information**

*Disaster Medicine and Public Health Preparedness* (ISSN: 1935-7893; EISSN: 1938-744X) is published bi-monthly by Cambridge University Press, One Liberty

Plaza, New York, NY 10006. Copyright © 2017 by the Society for Disaster Medicine and Public Health, Inc.

**Annual Subscription Rates**

Annual institutional print and electronic subscription rates: US \$662.00 in the USA, Canada and Mexico; UK £414.00 + VAT elsewhere. Institutional electronic rates only: US \$507.00 in the USA, Canada and Mexico; UK £316.00 + VAT elsewhere. Prices include surface postage and insurance. The electronic version of the journal is a free benefit to members of the Society.

Information on *Disaster Medicine and Public Health Preparedness* and all other Cambridge journals is available at <http://www.cambridge.org/>. Full text for this journal may be found at <http://cambridge.org/dmp>.

When citing this journal, please abbreviate as *Disaster Med Public Health Preparedness*.

Indexed in MEDLINE.

*Disaster Medicine and Public Health Preparedness* participates in the Health InterNetwork Access to Research Initiative (HINARI), which provides free or very-low-cost online access to major journals in biomedical and related social sciences to local, nonprofit institutions in developing countries. Please visit [www.who.int/hinari](http://www.who.int/hinari) for more information.

**Copyright ©2017 Society for Disaster Medicine and Public Health, Inc.**

All rights reserved. No part of this publication may be reproduced, in any form or by any means, electronic, photocopying or otherwise, without permission in writing from Cambridge University Press, except when permission is obtained through a bona fide copyright clearinghouse, such as the Copyright Clearance Center (USA) or the Copyright Licensing Agency (UK). For further information please visit <http://us.cambridge.org/information/rights/> or <http://www.cambridge.org/uk/information/rights/>.

Periodicals postage paid at New York, NY, and additional mailing offices. Return Postage Guaranteed. **Postmaster:** Send address changes in the USA and Canada to: *Disaster Medicine and Public Health Preparedness*, Cambridge University Press, Journals Fulfillment Dept., One Liberty Plaza, New York, NY 10006.