

PREHOSPITAL and DISASTER MEDICINE

Volume 31, Number 6

December 2016



WADDEM

CAMBRIDGE
UNIVERSITY PRESS

The Official Journal of the
World Association for Disaster and Emergency Medicine

AS FUNDING FOR HOSPITAL EMERGENCY PREPAREDNESS FALLS, THREATS REMAIN.



You need an efficient training solution. Discover **DQE-On-Demand® eLearning...**

Dynamic Hospital Emergency Preparedness Training



Engaging animation and professionally produced audio clearly teaches procedures and effectively demonstrates skills.

Comprehensive Curriculum



Programs with the latest best practices for Decontamination, Hospital Incident Command (HICS) and Evacuation.

Train at Your Own Pace



View programs any time, with 24-hour online access on your desktop or on mobile devices.



Visit www.DQEOnDemand.com to watch the new demo video!

Ready to Get Started?

Contact us at info@dqeready.com or 800-355-4628.

DQE On-Demand®
eLearning for Healthcare Preparedness

www.DQEOnDemand.com | 800-355-4628

Table of Contents

EDITORIAL

- Access to Essential Medications During Disaster Events** 579
Samuel J. Stratton, MD, MPH

GUEST EDITORIAL

- A Survey of Disaster Medical Education in Osteopathic Medical School Curricula** 581
Steven J. Parrillo, DO, FACOEP-D, FACEP; Doran Christensen, DO; Howard S. Teitelbaum, DO, PhD, MPH, FAOCOPM (dist); Erik S. Glassman, MS, NRP, EMT-T

ORIGINAL RESEARCH

DISASTER HEALTH AND MEDICINE

- Disaster Impact on Impoverished Area of US: An Inter-Professional Mixed Method Study** 583
Linda H. Banks, MSN, MS, RN; Lisa A. Davenport, PhD, RN, CEN; Meghan H. Hayes, MPH, RN; Moriah A. McArthur, MSc; Stacey N. Toro, MSN, MBA, RN; Cameron E. King, BSN, RN; Hazel M. Vazirani

EMERGENCY MEDICAL SERVICES

- Intubation of Profoundly Agitated Patients Treated with Prehospital Ketamine** 593
Travis D. Olives, MD; Paul C. Nystrom, MD; Jon B. Cole, MD; Kenneth W. Dodd, MD; Jeffrey D. Ho, MD

- The HOME Team: Evaluating the Effect of an EMS-based Outreach Team to Decrease the Frequency of 911 Use Among High Utilizers of EMS** 603
Niels Tangherlini, EMTP, BA; Julian Villar, MD; John Brown, MD; Robert M. Rodriguez, MD; Clement Yeh, MD; Benjamin T. Friedman, MD, NREMT-P; Paul Wada, EMT

- Prehospital Emergency Medical Services Departure Interval: Does Patient Age Matter?** 608
Bruno Schnegg, MD; Mathieu Pasquier, MD; Pierre-Nicolas Carron, MD; Bertrand Yersin, MD; Fabrice Dami, MD

GLOBAL HEALTH EMERGENCIES

- Rwanda's Model Prehospital Emergency Care Service: A Two-year Review of Patient Demographics and Injury Patterns in Kigali** 614
Samuel Enumah, BA; John W. Scott, MD, MPH; Rebecca Maine, MD, MPH; Eric Uwitonze, AR, BSc; Jeanne D'Arc Nyinawankusi, RN, BSc, MBA; Robert Riviello, MD, MPH; Jean Claude Byiringiro, MD, MMED, MCS; Ignace Kabagema, AR, BSc; Sudha Jayaraman, MD, MSc

- Emergency Medical Services Utilization in EMS Priority Conditions in Beirut, Lebanon** 621
Mazen El Sayed, MD, MPH; Hani Tamim, PhD, MPH; Abel Al-Hajj Chebadeh, MD; Amin A. Kazzi, MD

MASS GATHERING HEALTH AND MEDICINE

- An Observational Study Using English Syndromic Surveillance Data Collected During the 2012 London Olympics – What did Syndromic Surveillance Show and What Can We Learn for Future Mass-gathering Events?** 628
Dan Todkill, MFPH; Helen E. Hughes, MSc; Alex J. Elliot, PhD; Roger A. Morbey, CStat; Obaghe Edeghere, FFPH; Sally Harcourt, MPH; Tom Hughes, FRCS; Tina Endericks, MBA; Brian McCloskey, FFPH; Mike Catchpole, FRCP; Sue Ibbotson, FFPH; Gillian Smith, FFPH

- A Systematic Review of Health Outcomes Among Disaster and Humanitarian Responders** 635
Stephanie C. Garbern, MD, MPH; Laura G. Ebbeling, MD; Susan A. Bartels, MD, MPH

COMPREHENSIVE REVIEWS

- Preparing Emergency Physicians for Acute Disaster Response: A Review of Current Training Opportunities in the US** 643
Bhakti Hansoti, MBChB, MPH; Dylan S. Kellogg, MD; Sara J. Aberle, MD; Morgan C. Broccoli, MSc; Jeffrey Feden, MD; Arthur French, MD; Charles M. Little, MD; Brooks Moore, MD; Joseph Sabato Jr., MD; Tara Sheets, MD; R. Weinberg, MD; Pat Elmes, MD; Christopher Kang, MD
- Women's Mental Health and Intimate Partner Violence Following Natural Disaster: A Scoping Review** 648
Sue Anne Bell, PhD, FNP-BC; Lisa A. Folkert, BSc

SPECIAL REPORTS

- A 3-year Health Care Coalition Experience in Advancing Hospital Evacuation Preparedness** 658
John J. Lowe, PhD; Keith F. Hansen, MBA; Kristine K. Sanger, BS; Jannah M. Obaid, BA
- Development and Implementation of a Novel Prehospital Care System in the State of Kerala, India** 663
Heather A. Brown, MD, MPH; Katherine A. Douglass, MD, MPH; Shafi Ejas, MBBS; Venugopalan Poovathumparambil, MBBS
- Can Paramedics Safely Refuse Transport of Non-Urgent Patients?** 667
Alex J. Fraess-Phillips, MSc

BRIEF REPORTS

- Epidemiology of Emergency Medical Services (EMS) Utilization in Four Indian Emergency Departments** 675
Olindi Wijesekera, MS, MD(c); Amanda Reed, MPH; Parker S. Chastain, MPH; Shauna Biggs, MPH; Elizabeth G. Clark, MA, MPH; Tamorish Kole, MBBS, FEM-RCGP (UK), MRCS (EDIN), FRSM (London); Anoop T. Chakrapani, MD, MCEM, FCCM; Nandy Ashish, FAEM, MEM, FDP; Prasad Rajhans, MBBS, MD, FICCM; Alan H. Breaud, MPH; Gabrielle A. Jacquet, MD, MPH
- Review of the International Council of Nurses (ICN) Framework of Disaster Nursing Competencies** 680
Alison Hutton, RN, BN, MN, PhD, FACN; Tener Goodwin Veenema, PhD, MPH, RN, FAAN; Kristine Gebbie, RN, DrPH

CASE REPORT

- Thoracic Spine Fracture in a Survivor of Out-of-Hospital Cardiac Arrest with Mechanical CPR** 684
Robert Trevor Marshall, MD; Hemang Kotecha, DO; Takuyo Chiba, MD; Joseph Tennyson, MD

LETTER TO THE EDITOR

- Mass-gathering Medicine: Risks and Patient Presentations at a 2-day Electronic Dance Music Event - Year Two** 687
Sheila A. Turriss, RN, PhD; Michael Camporese, PC; Samuel J. Gutman, MD; Adam Lund, MD, FRCPC

Editorial Office
World Association for Disaster and Emergency
Medicine (WADEM), Madison,
Wisconsin USA

Editor-in-Chief
Samuel J. Stratton, MD, MPH

Managing Editor
Ellen Johnson, MS

Editorial Assistant
Deidra A. Daugherty

Publisher
Cambridge University Press
One Liberty Plaza
New York, NY 10006

Prehospital and Disaster Medicine (ISSN 1049-023X) is published bimonthly in the months of February, April, June, August, October, December, by Cambridge University Press for the World Association for Disaster and Emergency Medicine. Prehospital and Disaster Medicine incorporates the Journal of the World Association for Emergency and Disaster Medicine and the Journal of Prehospital Medicine.

Editorial Information: All manuscripts must be submitted through the Journal's online submission platform, ScholarOne Manuscripts: <http://mc.manuscriptcentral.com/pdm>.

2016 Subscription Information: Institutions print and electronic: US\$692.00 in the USA, Canada, and Mexico; UK£422.00+VAT elsewhere. Institutions electronic only: US\$512.00 in the USA, Canada, and Mexico; UK£312.00+VAT elsewhere. Individuals print and electronic: US\$201.00 in the USA, Canada, and Mexico; UK£123.00+VAT elsewhere. Individuals electronic only: US\$146.00 in the USA, Canada, and Mexico; UK£83.00+VAT elsewhere. Single Part: US\$133.00 in the USA, Canada, and Mexico; UK£81.00+VAT elsewhere. Prices include postage and insurance. Airmail or registered mail is extra. Back volume prices are available upon request. Claims of non-receipt or damaged issues must be filed within three months of cover date.

Comprehensively indexed by the National Library of Medicine (MEDLINE), Cumulative Index to Nursing and Allied Health (CINAHL) and Health Star Cumulative Index. The database is available online via BRS, Data-Star, and DIA-LOG, and on CD-ROM through CD Plus, Compact Cambridge and Silver Platter. Abstracts and search capability available on the Internet at <http://journals.cambridge.org/PDM>.

Copyright © 2016 by the World Association for Disaster and Emergency Medicine.

Cover Artwork

TSUNAMI, Watercolor by Colette Girard

For the majority of her professional career, Colette Girard worked as a psychotherapist in a psychiatric facility. When she retired several years ago, her lifelong interest in photography evolved into a deeper appreciation of all things artful. Girard's photographs owe inspiration to a brief study of Miksang, a form of contemplative photography. This is her first watercolor, which she photographed and then printed on metal.

Girard is a member of the following organizations in Wisconsin (USA): The Madison Art Guild, Wisconsin Visual Artists, and Wisconsin Regional Artists Association.

Girard's work can be viewed at: <http://colettegirardphotography.com/index.html>.

EDITOR-IN-CHIEF

Samuel J. Stratton, MD, MPH
University of California-Los Angeles
Los Angeles, California, USA

EMERITUS**EDITOR-IN-CHIEF**

Marvin L. Birnbaum, MD, PhD
University of Wisconsin-Madison
Madison, Wisconsin, USA

MANAGING EDITOR

Ellen Johnson, MS

SECTION EDITORS*Emergency Medical Services*

**Darren Walter, FRCS(Ed)
FCEM, FIMC**
University Hospital South
Manchester
Manchester, UK

Humanitarian Affairs

**Frederick M. Burkle, MD,
MPH, DTM**
Harvard Humanitarian Initiative
Harvard University
Cambridge, Massachusetts, USA

Mass Gathering Medicine

Paul Arbon, PhD
School of Nursing and Midwifery
Flinders University
Adelaide, South Australia

Nursing

**Elaine Daily, RN, BSN,
FCCM, FAHA**
Madison, Wisconsin, USA

Oceania

Graeme McColl
Christchurch, New Zealand

Psychosocial

Gloria Leon, PhD
University of Minnesota
Minneapolis, Minnesota USA

ASSOCIATE EDITORS

David A. Bradt, MD, MPH
Royal Melbourne Hospital
Melbourne, Australia

Wolfgang F. Dick, MD, PhD
Mainz, Germany

Kimball Maull, MD, FACS

Department of Surgery
Hamad General Hospital
Doha, Qatar

Steven Rottman, MD

University of California-Los Angeles
Los Angeles, California, USA

Geert Synaeve, MD

Brussels, Belgium

EDITORIAL BOARD

Carol Amaratunga, PhD

School of Child and Youth
Development
University of Victoria Research
Association of the Justice
Institute of British Columbia
Victoria BC, Canada

Frank Archer, MD

Department of Community
Emergency Health &
Paramedic Practice
Monash University
Melbourne, Australia

Jeffrey Arnold, MD

Department of Emergency
Medicine
Santa Clara Valley Medical
Center
San Jose, California, USA

Yaron Bar-Dayam, MD, MHA

Israeli Defense Forces Home
Front Command
Or-Yehuda, Israel

Joost Bierens, MD, PhD

Amsterdam, The Netherlands

Tareg Bey, MD

Saudi Arabia

Richard A. Bissell, PhD

Center for Emergency Education
and Disaster Research
University of
Maryland-Baltimore
Baltimore, Maryland, USA

Felipe Cruz-Vega, MD

Office of Social Security
Mexico City, Mexico

**Robert A. DeLorenzo, MD,
MSM, FACEP**

Medical Corps
United States Army
San Antonio, Texas, USA

Claude de Ville de Goyet, MD

Brussels, Belgium

Judith Fisher, MD

Washington, DC, USA

Erik S. Gaull

George Washington University
Washington, DC, USA

Michael Gunderson

Integral Performance Solutions
Lakeland, Florida, USA

Pinchas Halpern, MD

Critical Care and Emergency
Medicine
Tel Aviv University
Tel Aviv, Israel

Keith Holtermann, MD

George Washington University
Washington, DC, USA

Mark Johnson, MPA

Juneau, Alaska, USA

Mark Keim, MD

Centers for Disease Control and
Prevention
Atlanta, Georgia, USA

Todd J. LeDuc, EMT-P

Broward Sheriff Fire Rescue
Ft. Lauderdale, Florida, USA

Lidia Mayner, PhD

School of Nursing and Midwifery
Flinders University
Adelaide, South Australia

**Andrew Milsten, MD, MS,
FACEP**

University of Massachusetts
Emergency Medicine
Worcester, Massachusetts, USA

Jerry Overton

IAED Emergency Clinical
Advice System & Standards
Board
Salt Lake City, Utah, USA

Paul Paris, MD

Center for Emergency Medicine
University of Pittsburgh
Pittsburgh, Pennsylvania, USA

**Lynda Redwood-Campbell,
MD, MPH**

Department of Family Medicine
McMaster University
Hamilton, Ontario, Canada

Edward Ricci, PhD

Behavioral and Community
Health Sciences
University of Pittsburgh
Pittsburgh, Pennsylvania, USA

Leonid Roshal, MD

Institute of Pediatrics
Academy of Medical Sciences
Moscow, Russia

Don Schramm

Disaster Management Center
University of Wisconsin-Madison
Madison, Wisconsin, USA

James M. Shultz, PhD

Center for Disaster & Extreme
Event Preparedness
University of Miami
Miami, Florida, USA

**Wayne Smith, BSC, MChB,
EMDM, FCEM(SA)**

Division of Emergency Medicine
University of Cape Town
Cape Town, South Africa

Knut Ole Sundnes, MD

Baerum Hospital
Solo, Norway

Takashi Ukai, MD

Hyogo Emergency Medical
Center
Hyogo, Japan

Michael Van Rooyen, MD

Harvard Humanitarian Initiative
and Department of Emergency
Medicine, Brigham and
Women's Hospital
Boston, Massachusetts, USA

Richard Zoraster, MD, MPH

Kaneohe, Hawaii, USA

Aims and Scope: The mission of *Prehospital and Disaster Medicine* (PDM) is the distribution of information relevant to the practice of out-of-hospital and in-hospital emergency medical care, disaster health, and public health and safety. PDM provides an international forum for the reporting and discussion of scientific studies, both quantitative and qualitative, that have relevance to the above practices. The major objectives are: (1) the improvement of the types and quality of the care delivered to patients with perceived medical emergencies and to victims of multi-casualty accidents or disasters, including the public health and safety aspects of such events; and (2) the prevention and/or mitigation of the occurrence of such events and of the effects of these events upon the human population and environment.

Editorial Office: Prehospital and Disaster Medicine, 3330 University Avenue, Suite 130, Madison, Wisconsin 53705, USA. Telephone: (+1) (608) 819-6604; Facsimile (+1) (608) 819-6055; E-mail: pdm@wadem.org

Publishing, Production, and Advertising Office: Cambridge University Press, One Liberty Plaza New York, NY 10006, United States; USAdSales@cambridge.org.

Subscription Offices: (for USA, Canada, and Mexico) Cambridge University Press, One Liberty Plaza New York, NY 10006, United States; (for UK and elsewhere) Cambridge University Press, University Printing House, Shaftesbury Road, Cambridge CB2 8BS, UK.

2016 Subscription Information: *Prehospital and Disaster Medicine* (Print ISSN 1049-023X; Electronic ISSN 1945-1938) is published bimonthly in the months of February, April, June, August, October, and December by Cambridge University Press, One Liberty Plaza New York, NY 10006, United States/Cambridge University Press, University Printing House, Shaftesbury Road, Cambridge CB2 8BS, UK for the World Association for Disaster and Emergency Medicine. 2014 Annual subscription rates: Institutions print and electronic: US\$659.00 in the USA, Canada, and Mexico; UK£402.00+VAT elsewhere. Institutions electronic only: US\$486.00 in the USA, Canada, and Mexico; UK£297.00+VAT elsewhere. Individuals print and electronic: US\$191.00 in the USA, Canada, and Mexico; UK£117.00+VAT elsewhere. Individuals electronic only: US\$139.00 in the USA, Canada, and Mexico; UK£79+VAT elsewhere. Single Part: US\$121.00 in the USA, Canada, and Mexico; UK£74.00+VAT elsewhere. Prices include postage and insurance. Airmail or registered mail is extra. Back volume prices are available upon request.

Submissions: All manuscripts must be submitted through the Journal's online submission platform, ScholarOne Manuscripts, at <http://mc.manuscriptcentral.com/pdm>. Please review the Author Instructions and Author Checklist available online before finalizing a submission.

Indexing: National Library of Medicine (MEDLINE), Cumulative Index to Nursing and Allied Health (CINAHL), and Health Star Cumulative Index.

© **World Association for Disaster and Emergency Medicine 2016.** 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. Policies, request forms, and contacts are available at: <http://www.cambridge.org/rights/permissions/permission.htm>. Permission to copy (for users in the United States) is available from Copyright Clearance Center Transactional Reporting Service, 222 Rosewood Drive, Danvers, MA 01923, USA. <http://www.copyright.com>, email: info@copyright.com.

Printed in United States of America on acid-free paper.

Postmaster: Send address changes in the USA and Canada to *Prehospital and Disaster Medicine*, Subscription Department, Cambridge University Press, One Liberty Plaza New York, NY 10006, USA.

Periodical postage rate paid at New York, NY and additional mailing offices.

Call for Artwork

The cover design of *Prehospital and Disaster Medicine* calls for a photograph of relevant artwork.

If you have access to artwork that you think may be appropriate, please submit a high-resolution .TIF or .EPS file to:

Ellen Johnson, Managing Editor
E-mail: eswenson@wadem.org

All submissions will be evaluated by a panel of judges.
Items not selected will be returned to the sender.