

# INFECTION CONTROL & HOSPITAL EPIDEMIOLOGY

VOLUME 33, NUMBER 2

FEBRUARY 2012

## ORIGINAL ARTICLES

- 105 Evaluation of Healthcare-Associated Infection Surveillance in Pennsylvania Hospitals •**  
Aimee J. Palumbo, MPH; P. Ann Loveless, MD, MS; Mária E. Moll, MD; Stephen Ostroff, MD
- 112 Commentary: Use of Electronic Surveillance to Drive Improvement in Hospital Infection Rates •**  
Rosa R. Baier, MPH; Stefan Gravenstein, MD, MPH
- 114 Inclusion of 30-Day Postdischarge Detection Triples the Incidence of Hospital-Onset Methicillin-Resistant *Staphylococcus aureus* •** Taliser R. Avery, MS; Ken P. Kleinman, ScD; Michael Klompas, MD, MPH; Ann Aschengrau, ScD, MS; Susan S. Huang, MD, MPH
- 122 Commentary: The Art of Oversimplification: The Challenge of Measuring Hospital-Acquired MRSA •**  
Marin L. Schweizer, PhD; Michael A. Rubin, MD, PhD
- 124 Performance, Revision, and Extension of the National Nosocomial Infections Surveillance System's Risk Index in Brazilian Hospitals •** Fernando Martín Biscione, MD, PhD; Renato Camargos Couto, MD, PhD; Tânia M. G. Pedrosa, MD, PhD
- 135 Evaluation of Organizational Culture among Different Levels of Healthcare Staff Participating in the Institute for Healthcare Improvement's 100,000 Lives Campaign •** Ronda L. Sinkowitz-Cochran, MPH; Amanda Garcia-Williams, MPH; Andrew D. Hackbarth, MPhil; Bonnie Zell, MD, MPH; G. Ross Baker, PhD; C. Joseph McCannon, AB; Elise M. Beltrami, MD, MPH; John A. Jernigan, MD, MS; L. Clifford McDonald, MD, FACP; Donald A. Goldmann, MD
- 144 Infection Prevention Promotion Program Based on the PRECEDE Model: Improving Hand Hygiene Behaviors among Healthcare Personnel •** Hanan Aboumatar, MD, MPH; Polly Ristaino, MS, CIC; Richard O. Davis, PhD; Carol B. Thompson, MS, MBA; Lisa Maragakis, MD, MPH; Sara Cosgrove, MD, MS; Beryl Rosenstein, MD; Trish M. Perl, MD, MSc
- 152 Cost-Effectiveness of Preoperative Nasal Mupirocin Treatment in Preventing Surgical Site Infection in Patients Undergoing Total Hip and Knee Arthroplasty: A Cost-Effectiveness Analysis •**  
Xan F. Courville, MD, MS; Ivan M. Tomek, MD, FRCS(C); Kathryn B. Kirkland, MD; Marian Bihle, MPH; Stephen R. Kantor, MD; Samuel R. G. Finlayson, MD, MPH
- 160 Prior Vancomycin Use Is a Risk Factor for Reduced Vancomycin Susceptibility in Methicillin-Susceptible but Not Methicillin-Resistant *Staphylococcus aureus* Bacteremia •** Kara B. Mascitti, MD; Paul H. Edelstein, MD; Neil O. Fishman, MD; Knashawn H. Morales, ScD; Andrew J. Baltus, BS; Ebbing Lautenbach, MD, MPH, MSCE
- 167 An Outbreak of Heterogeneous Glycopeptide-Intermediate *Staphylococcus aureus* Related to a Device Source in an Intensive Care Unit •** Sylvie Parer, MD; Anne Lotthé, MD; Patrick Chardon, MD; Rosie Poncet, MD; Hélène Jean-Pierre, MD; Estelle Jumas-Bilak, PhD, PharmD
- 175 High Proportion of False-Positive *Clostridium difficile* Enzyme Immunoassays for Toxin A and B in Pediatric Patients •** Philip Toltzis, MD; Michelle M. Nerandzic, BS; Elie Saade, MD; Mary Ann O'Riordan, MS; Sarah Smathers, MS; Theoklis Zaoutis, MD; Jason Kim, MD; Curtis J. Donskey, MD



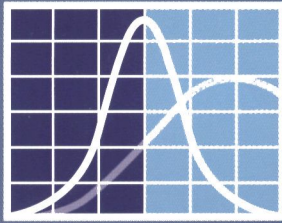
THE OFFICIAL JOURNAL OF THE SOCIETY FOR HEALTHCARE EPIDEMIOLOGY OF AMERICA

CONTENTS CONTINUED INSIDE

THE UNIVERSITY OF CHICAGO PRESS

<https://doi.org/10.1017/S0195947700030496> Published online by Cambridge University Press





# Advancing Healthcare Epidemiology and Antimicrobial Stewardship

Spring 2012 Conference | April 13 – 16 | Jacksonville, FL | [www.shea2012.org](http://www.shea2012.org)

Spring 2012 Conference | April 13 – 16 | Jacksonville, FL | [www.shea2012.org](http://www.shea2012.org)

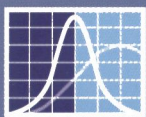


## Register Today!

Join experts and colleagues in the field for the must-attend event of the Spring.

- SHEA/CDC Training Course (Basic Track)
- Advanced Epidemiological Methods (New!)
- Antimicrobial Stewardship (New!)
- Troubleshooting Sessions (New!)

**Register today at** [www.shea2012.org](http://www.shea2012.org)



**SHEA**  
The Society for Healthcare  
Epidemiology of America

1300 Wilson Boulevard, Suite 300, Arlington, VA | Phone: 703.684.1006 | Fax: 703.684.1009 | Email: [info@shea-online.org](mailto:info@shea-online.org)



# INFECTION CONTROL & HOSPITAL EPIDEMIOLOGY

VOLUME 33, NUMBER 2

FEBRUARY 2012

CONTENTS CONTINUED FROM COVER

- 180 **Investigation and Control of an Outbreak of *Achromobacter xylosoxidans* Bacteremia •**  
Brie Behrens-Muller, MD; Judith Conway, RN, CIC; Jonathan Yoder, MPH; Craig S. Conover, MD, MPH
- 185 **An Outbreak of Legionnaires Disease Associated with a Decorative Water Wall Fountain in a Hospital •**  
Thomas E. Haupt, MS; Richard T. Heffernan, MPH; James J. Kazmierczak, DVM; Henry Nehls-Lowe, MPH;  
Bruce Rheineck, MS; Christine Powell, BS; Kathryn K. Leonhardt, MD; Amit S. Chitnis, MD; Jeffrey P. Davis, MD

## CONCISE COMMUNICATIONS

- 192 **Ultraviolet Powder versus Ultraviolet Gel for Assessing Environmental Cleaning •**  
L. Silvia Munoz-Price, MD; Yovanit Fajardo-Aquino, MD; Kristopher L. Arheart, EdD
- 196 **Pandemic Influenza A(H1N1)2009 in Hospital Healthcare Workers in New Zealand •**  
Nigel J. Raymond, MBChB, FRACP; Neville Berry, MBChB, BSc(Hons), FAFOEM;  
Tim K. Blackmore, MBChB, FRACP, FRCPA, PhD; Sarah Jefferies, MBChB; Katherine Norton, MBChB;  
Kyle Perrin, MBChB, FRACP, PhD; Richard Beasley, MD, FRACP, FRCP, DSc

## RESEARCH BRIEFS

- 200 **Evaluation of the Antimicrobial Properties of Copper Surfaces in an Outpatient Infectious Disease Practice •** Seema Rai, MD; Bruce E. Hirsch, MD; Hubert H. Attaway, MS, MBA; Richard Nadan, RN; S. Fairey, BS; J. Hardy, BS; G. Miller, MS; Donna Armellino, RN; Wilton R. Moran, BS; Peter Sharpe, PhD; Adam Estelle, BS; J. H. Michel, MS; Harold T. Michels, PhD; Michael G. Schmidt, PhD
- 202 **Beyond 30 Days: Does Limiting the Duration of Surgical Site Infection Follow-up Limit Detection? •**  
Julie D. Lankiewicz, MPH; Deborah S. Yokoe, MD, MPH; Margaret A. Olsen, PhD, MPH; Fallon Onufrak, BS; Victoria J. Fraser, MD, FACP; Kurt Stevenson, MD, MPH; Yosef Khan, MD, MPH; David Hooper, MD; Richard Platt, MD, MS; Susan S. Huang, MD, MPH
- 204 **Latent Tuberculosis Infection in Nurses Exposed to Tuberculous Patients Cared for in Rooms without Negative Pressure after the 2011 Great East Japan Earthquake •** Hajime Kanamori, MD, PhD; Noboru Aso, MD, PhD; David J. Weber, MD, MPH; Mari Koide, RN; Yuri Sasaki, RN; Koichi Tokuda, MD, PhD, MPH; Mitsuo Kaku, MD, PhD

## LETTERS TO THE EDITOR

- 207 **The Role of Intention-to-Treat Analyses in Randomized Trials •** Joshua C. Herigon, MPH; Jason G. Newland, MD
- 208 **Reply to Herigon and Newland •** Stephanie A. Fritz, MD, MSCI; Bernard C. Camins, MD, MSCR; Jonathan Dukes, MPH; Gregory A. Storch, MD

## ERRATUM

- 211 **Wilmer et al (2011;32[12]:1227-1229)**

*An Official Publication of the Society for Healthcare Epidemiology of America*

## EDITOR

Suzanne F. Bradley, MD • Ann Arbor, MI

## DEPUTY EDITOR

Carol A. Kauffman, MD • Ann Arbor, MI

## SENIOR ASSOCIATE EDITORS

C. Glen Mayhall, MD • Galveston, TX  
Gina Pugliese, RN, MS • Chicago, IL  
William Schaffner, MD • Nashville, TN

## ASSOCIATE EDITORS

Ebbing Lautenbach, MD, MPH • Philadelphia, PA  
Preeti N. Malani, MD, MSJ • Ann Arbor, MI  
David Weber, MD, MPH • Chapel Hill, NC

## STATISTICS CONSULTANT

Rodney L. Dunn, MS • Ann Arbor, MI

## SECTION EDITOR FOR GUIDELINES, POSITION PAPERS, AND INVITED REVIEWS

Carol Chenoweth, MD • Ann Arbor, MI

## MANAGING EDITOR

Rob Blixt • Chicago, IL

## PAST EDITORS

### *Infection Control*

Richard P. Wenzel, MD, 1980–1990 (vols. 1–11)

### *Infection Control and Hospital Epidemiology*

Richard P. Wenzel, MD, 1991–1992 (vols. 12 and 13)  
Michael D. Decker, MD, 1993–2001 (vols. 14–22)  
Barry M. Farr, MD, 2002–2004 (vols. 23–25)  
William R. Jarvis, MD, 2005–2006 (vols. 26 and 27)

## EDITORIAL ADVISORY BOARD

Miriam Alter, PhD, MD • Galveston, TX  
Deverick Anderson, MD, MPH • Durham, NC  
Anucha Apisarntharak, MD • Pratumthani, Thailand  
Lennox Archibald, MD, FRCP • Alachua, FL  
Hilary Babcock, MD • St. Louis, MO  
Shailen Banerjee, PhD • Atlanta, GA  
Elise M. Beltrami, MD, MPH • Atlanta, GA  
Jo Anne Bennett, RN, PhD • New York, NY  
David Birnbaum, PhD, MPH • Sidney, BC  
Marc Bonten, MD • Utrecht, Netherlands  
Christian Brun-Buisson, MD • Creteil, France  
John P. Burke, MD • Salt Lake City, UT  
David P. Calfee, MD, MS • New York, NY  
Yehuda Carmeli, MD, MPH • Tel Aviv, Israel  
Donald E. Craven, MD • Burlington, MA  
Christopher Crnich, MD, MS • Madison, WI  
Erika D'Agata, MD, MPH • Boston, MA  
Daniel Diekema, MD • Iowa City, IA  
Erik Dubberke, MD, MSPH • St. Louis, MO  
Charles E. Edmiston, Jr., PhD • Milwaukee, WI  
Theodore C. Eickhoff, MD • Denver, CO  
Mohamad Fakih, MD, MPH • Grosse Pointe Woods, MI  
Jon P. Furuno, PhD • Portland, OR  
Petra Gastmeier, MD • Berlin, Germany  
Jeffrey Gerber, MD, PhD • Philadelphia, PA  
Dale N. Gerding, MD • Hines, IL  
Donald A. Goldmann, MD • Boston, MA  
Nicholas Graves, PhD • Brisbane, Australia  
Donna Haiduvan, RN, PhD, CIC • Tampa, FL  
Anthony D. Harris, MD, MPH • Baltimore, MD  
Elizabeth Henderson, PhD • Calgary, AB

David K. Henderson, MD • Bethesda, MD  
Loreen A. Herwaldt, MD • Iowa City, IA  
Peter N. R. Heseltine, MD • Brea, CA  
John A. Jernigan, MD, MS • Atlanta, GA  
James T. Lee, MD, PhD • St. Paul, MN  
L. Clifford McDonald, MD • Atlanta, GA  
Allison McGeer, MD • Toronto, ON  
Leonard A. Mermel, DO, ScM • Providence, RI  
Robert R. Muder, MD • Pittsburgh, PA  
Linda Mundy, MD • St. Louis, MO  
Joseph M. Mylotte, MD, CIC • Buffalo, NY  
Jan Evans Patterson, MD • San Antonio, TX  
David A. Pegues, MD • Los Angeles, CA  
Eli Perencevich, MD, MS • Iowa City, IA  
Didier Pittet, MD, MS • Geneva, Switzerland  
Issam Raad, MD • Houston, TX  
Manfred L. Rotter, MD, DipBact • Vienna, Austria  
William A. Rutala, PhD, MPH • Chapel Hill, NC  
Lisa Saiman, MD, MPH • New York, NY  
Sanjay Saint, MD, MPH • Ann Arbor, MI  
Sorana Segal-Maurer, MD • Flushing, NY  
Lynne M. Sehulster, PhD • Atlanta, GA  
John A. Sellick, DO • Amherst, NY  
Kent Sepkowitz, MD • New York, NY  
Andrew E. Simor, MD • Toronto, ON  
Philip W. Smith, MD • Omaha, NE  
Kurt Stevenson, MD, MPH • Columbus, OH  
Nimalie Stone, MD • Atlanta, GA  
Thomas Talbot, MD, MPH • Nashville, TN  
Paul Tambyah, MBBS • Singapore  
William Trick, MD • Chicago, IL  
Antoni Trilla, MD, PhD • Barcelona, Spain  
Robert A. Weinstein, MD • Chicago, IL  
Andreas Widmer, MD, MS • Basel, Switzerland  
Marcus Zervos, MD • Detroit, MI

*Infection Control and Hospital Epidemiology* (ISSN 0899-823X) is published monthly by the University of Chicago Press, 1427 E. 60th St., Chicago, IL 60637-2954 (<http://www.journals.uchicago.edu/ICHE/>). The editorial office is in Chicago, Illinois.

## Editorial Office

Communications should be addressed to the Editor, *Infection Control and Hospital Epidemiology*, 1427 E. 60th St., Chicago, IL 60637-2954; (e-mail: [iche@press.uchicago.edu](mailto:iche@press.uchicago.edu); telephone: 773-702-2538, fax: 773-753-4247). Contributors should consult the Information for Authors, which is available at the journal's Web site.

## Advertising

Please direct advertising inquiries to Paul Tucker, Breuning Nagle Associates, 59 Grove Street, New Canaan, CT 06840 (e-mail: [paul@bna1.com](mailto:paul@bna1.com); telephone: 847-669-1096, fax: 203-801-0011). Publication of an advertisement in *Infection Control and Hospital Epidemiology* does not imply endorsement of its claims by the Society for Healthcare Epidemiology of America, by the Editor, or by the University of Chicago. Correspondence regarding advertising should be addressed to the advertising office in Chicago.

## Permissions

Articles may be copied or otherwise reused without permission only to the extent permitted by Sections 107 and 108 of the US Copyright Law. Permission to copy articles for personal, internal, classroom, or library use may be obtained from the Copyright Clearance Center (<http://www.copyright.com>). For all other uses, such as copying for general distribution, for advertising or promotional purposes, for creating new collective works, or for resale, please contact the Permissions Coordinator, Journals Division, University of Chicago Press, 1427 E. 60th St., Chicago, IL 60637 (e-mail: [journalpermissions@press.uchicago.edu](mailto:journalpermissions@press.uchicago.edu); fax:

773-834-3489). Articles in the public domain may be used without permission, but it is customary to contact the author.

## Subscriptions

Individual subscription rates for 2012 are \$191. Lower rates for fellows, residents, and students are available at <http://www.journals.uchicago.edu/ICHE>. Individuals have the option to order directly from the University of Chicago Press. Institutional print + electronic and e-only subscriptions are available through JSTOR's Current Scholarship Program and include unlimited online access; rates are tiered according to an institution's type and research output: \$425 to \$1,063 (print + electronic), \$340 to \$884 (e-only). Institutional print-only is \$425. Additional taxes and/or postage for non-U.S. subscriptions may apply. Subscription agent for Japan: Kinokuniya Company, Ltd. Free or deeply discounted access is available in most developing nations through the Chicago Emerging Nations Initiative (<http://www.journals.uchicago.edu/ceni/>).

Please direct subscription inquiries, requests for back issues, and address changes to Journals Division, University of Chicago Press, P.O. Box 37005, Chicago, IL 60637 (e-mail: [subscriptions@press.uchicago.edu](mailto:subscriptions@press.uchicago.edu); telephone: 773-753-3347 or toll-free in the United States and Canada 877-705-1878; fax: 773-753-0811 or toll-free 877-705-1879).

**Postmaster:** Send address changes to *Infection Control and Hospital Epidemiology*, University of Chicago Press, P.O. Box 37005, Chicago, IL 60637-2954.

Periodicals postage paid at Chicago, Illinois, and at an additional mailing office.

Published by the University of Chicago Press, Chicago, Illinois. © 2012 by the Society for Healthcare Epidemiology of America. All rights reserved. This publication is printed on acid-free paper.





## Emerald Journals

### Clinical Governance

*An International Journal*

*Clinical Governance: An International Journal* aims to address the doubts, queries, triumphs and practical applications of introducing quality assurance mechanisms into the delivery of care.

The journal takes an international stance and covers key developments worldwide which can inform best practice in health care. Efficiency, effectiveness and economics are the main factors in the assessment of best practice and all are addressed in the research- audit- and evidence-based papers published. All papers are peer reviewed to ensure their validity and value to current debates.

#### The journal publishes:

- Research articles which illustrate clear implications for practice
- Results-focused case studies which discuss problems and successes in clinical governance techniques
- Special issues on topical themes

For more information please visit the homepage:  
[www.emeraldinsight.com/cgij.htm](http://www.emeraldinsight.com/cgij.htm)

To submit a paper visit:  
<http://mc.manuscriptcentral.com/cgij>



Research you can use



# Find the latest in infection control research and practice information in **AJIC**



## American Journal of Infection Control

EDITOR: Elaine L. Larson, RN, PhD, FAAN, CIC

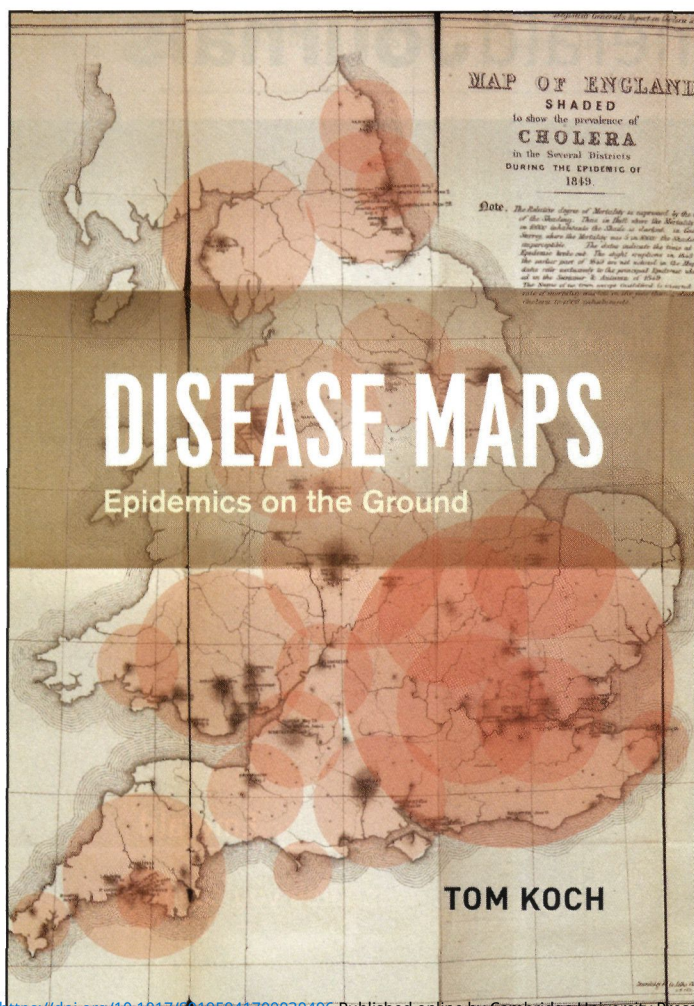
**AJIC** covers key topics and issues in infection control and epidemiology. Infection control professionals, including physicians, nurses, and epidemiologists, rely on **AJIC** for peer-reviewed articles covering clinical topics as well as original research. As the official publication of the *Association for Professionals in Infection Control and Epidemiology, Inc. (APIC)*, **AJIC** is the foremost resource on infection control, epidemiology, infectious diseases, quality management, occupational health, and disease prevention. **AJIC** also publishes relevant infection control guidelines. **AJIC** is included in Index Medicus and CINAHL.

**Official Publication  
of the Association for  
Professionals in  
Infection Control and  
Epidemiology, Inc.**

Register at [ajicjournal.org](http://ajicjournal.org) to receive free access to  
Tables of Contents and all article abstracts; free access to select  
full text articles; free e-alerts and search personalization, and more!



Submit your manuscript at: <http://ees.elsevier.com/ajic/>



## FORTHCOMING IN MAY

"*Disease Maps* is an extraordinary visual and narrative treat. I have come to look forward to Tom Koch's books for the wonderful and unique way that he can synthesize data and present it visually and in the process tell us magnificent stories."

Dr. Abraham Verghese,  
Stanford University School of Medicine

"This is a masterful book in conception and structure. It is also extremely well written. What we find on reading is an exquisite telling of the history of the medical science of disease. The collection of medical maps, diagrams, and other illustrations is impressive in scope—there are many disease maps shown that have not been publicly available before or collected in one place."

Michael Friendly,  
York University

CLOTH \$45.00

The University of Chicago Press  
[www.press.uchicago.edu](http://www.press.uchicago.edu)