

INFECTION CONTROL & HOSPITAL EPIDEMIOLOGY

VOLUME 29, NUMBER 7

JULY 2008

ORIGINAL ARTICLES

- 583** **Detection of Methicillin-Resistant *Staphylococcus aureus* and Vancomycin-Resistant Enterococci on the Gowns and Gloves of Healthcare Workers** • Graham M. Snyder, MD; Kerri A. Thom, MD; Jon P. Furuno, PhD; Eli N. Perencevich, MD, MS; Mary-Claire Roghmann, MD, MS; Sandra M. Strauss, BS MT(ASCP); Giora Netzer, MD, MSCE; Anthony D. Harris, MD, MPH
- 590** **Commentary: Contamination, Acquisition, and Transmission of Pathogens: Implications for Research and Practice of Infection Control** • Linda M. Mundy, MD
- 593** **Impact of an Environmental Cleaning Intervention on the Presence of Methicillin-Resistant *Staphylococcus aureus* and Vancomycin-Resistant Enterococci on Surfaces in Intensive Care Unit Rooms** • Eric R. Goodman, BS; Richard Platt, MD, MS; Richard Bass, BS, CHESP; Andrew B. Onderdonk, PhD; Deborah S. Yokoe, MD, MPH; Susan S. Huang, MD MPH
- 600** **Risk Factors for Methicillin-Resistant *Staphylococcus aureus* (MRSA) Acquisition in Roommate Contacts of Patients Colonized or Infected With MRSA in an Acute-Care Hospital** • Christine Moore, ART, Jastej Dhaliwal, MSc, Agnes Tong, MSc, Sarah Eden, BScN, Cindi Wigston, BSc, and Barbara Willey, ART, for the Mount Sinai Hospital Infection Control Team; Allison McGeer, MSc, MD
- 607** **Validation Study of Artificial Neural Network Models for Prediction of Methicillin-Resistant *Staphylococcus aureus* Carriage** • Cheng-Chuan Hsu, MS; Yusen E. Lin, PhD, MBA; Yao-Shen Chen, MD; Yung-Ching Liu, MD; Robert R. Muder, MD
- 615** **Differential Correlation Between Rates of Antimicrobial Drug Consumption and Prevalence of Antimicrobial Resistance in a Tertiary Care Hospital in Greece** • Elias Iosifidis, MD; Charalampos Antachopoulos, MD, PhD; Maria Tsivitanidou, MD; Aspasia Katragkou, MD; Evagelia Farmaki, MD, PhD; Maria Tsiakou, MD; Theano Kyriazi, MSc; Danai Sofianou, MD, PhD; Emmanuel Roilides, MD, PhD
- 623** **Economic Burden of Surgical Site Infections at a European University Hospital** • Walter P. Weber, MD; Marcel Zwahlen, PhD; Stefan Reck, MD; Chantal Feder-Mengus, PhD; Heidi Misteli, MD; Rachel Rosenthal, MD; Daniel Brandenberger, MD; Daniel Oertli, MD, FACS; Andreas F. Widmer, MD; Walter R. Marti, MD, FACS
- 630** **Epidemiology of Sepsis in the Valencian Community (Spain), 1995–2004.** • Juan Carlos Andreu Ballester, MD; Ferran Ballester, MD, PhD; Antonio González Sánchez, MD; Amadeo Almela Quilis, MD; Enrique Colomer Rubio, MD; Carlos Peñarroja Otero, MD, PhD
- 635** **Local Hospital Perspective on a Nationwide Outbreak of *Pseudomonas aeruginosa* Infection in Norway** • Mette Walberg, PhD; Kathrine Frey Frøslie, MSc; Jo Røislien, PhD
- 642** **Prevention of Nosocomial Infection and Standard Precautions: Knowledge and Source of Information Among Healthcare Students** • Marie-Pierre Tivolacci, MD, MPH; Joël Ladner, MD, PhD; Laurent Bailly, MD, MPH; Véronique Merle, MD, PhD; Isabelle Pitrou, MD, MPH; Pierre Czernichow, MD

CONTENTS CONTINUED INSIDE



THE OFFICIAL JOURNAL OF THE SOCIETY FOR HEALTHCARE EPIDEMIOLOGY OF AMERICA

THE UNIVERSITY OF CHICAGO PRESS

SPECIAL ANNOUNCEMENT

ICAAC

IDSA

2008

IMPORTANT DATES

Abstract Submission Deadline May 19, 2008
Discounted Registration Deadline July 31, 2008
Pre-Meeting Workshops Deadline August 29, 2008
Advance Registration and Housing Deadline..... September 15, 2008

48th Annual ICAAC® / IDSA 46th Annual Meeting
Washington, DC ~ October 25-28, 2008
A Joint Meeting of ASM and IDSA

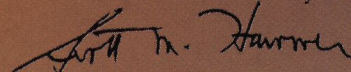
Dear Colleagues:

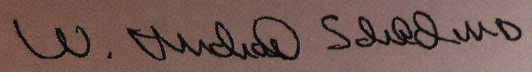
On behalf of the American Society for Microbiology (ASM) and the Infectious Diseases Society of America (IDSA) we invite you to participate in the 48th Annual ICAAC/IDSA 46th Annual Meeting, which will be held in Washington, DC, October 25-28, 2008.

Responding to the interest of many of the society's members and attendees, we are pleased to announce this joint meeting of ICAAC and IDSA. The Joint Program Committee has determined the Scientific Categories of the 2008 program with representatives from both organizations appointed in every category. Grants and Awards are expected to be presented as usual by each organization.

The online version of the **Call for Abstracts**, designed to guide you through the abstract preparation and electronic submission process is available at www.icaacidsa2008.org.

Your presentation at the joint meeting of ICAAC and IDSA will be an excellent opportunity for you to share your work with the scientific community.


Scott M. Hammer, M.D.


W. Michael Scheld, M.D.



www.icaacidsa2008.org

INFECTION CONTROL & HOSPITAL EPIDEMIOLOGY

VOLUME 29, NUMBER 7

JULY 2008

CONTENTS CONTINUED FROM COVER

- 648 Factors Associated With Diagnostic Evaluation for Tuberculosis Among Adults Hospitalized for Clinical Pneumonia in Thailand** • Ann M. Weber, MPH; Peera Areerat, MD; Julie E. Fischer, PhD; Somsak Thamthitawat, MD, MPH; Sonja J. Olsen, PhD; Jay K. Varma, MD

CONCISE COMMUNICATIONS

- 658 Effect of Telephoned Notification of Positive *Clostridium difficile* Test Results on the Time to the Ordering of Antimicrobial Therapy** • Brandon P. Verdoorn, BS; Robert Orenstein, DO; John W. Wilson, MD; Lynn L. Estes, PharmD; Randy F. Wendt, AS; Cathy D. Schleck, BSc; William S. Harmsen, MS; Lisa M. Nyre, MS; Robin Patel, MD
- 661 Emergence of Multidrug Resistance in Bacteria and Impact on Antibiotic Expenditure at a Major Army Medical Center Caring for Soldiers Wounded in Iraq and Afghanistan** • Michael J. Zapor, MD, PhD, FACP; Daniel Erwin, MS; Goldina Erowele, PharmD; Glenn Wortmann, MD, FACP, FIDSA
- 664 Factors Associated with Recovery of *Acinetobacter baumannii* in a Combat Support Hospital** • Matthew E. Griffith, MD; Russell S. Gonzalez, MS, MT; John B. Holcomb, MD; Duane R. Hospenthal, MD, PhD; Glenn W. Wortmann, MD; Clinton K. Murray, MD
- 667 Variability in Vancomycin Use in Newborn Intensive Care Units Determined From Data in an Electronic Medical Record** • Cody Arnold, MD, MSc; Reese Clark, MD; Jaclyn Bosco, MPH; Craig Shoemaker, MD; Alan R. Spitzer, MD
- 671 Predictors of Mortality From Community-Onset Bloodstream Infections Due to Extended-Spectrum β -Lactamase–Producing *Escherichia coli* and *Klebsiella pneumoniae*** • Anucha Apisarntharak, MD; Pattarachai Kiratisin, MD, PhD; Linda M. Mundy, MD
- 675 Relationship of Influenza Vaccination Declination Statements and Influenza Vaccination Rates for Healthcare Workers in 22 US Hospitals** • Philip M. B... MD, MPH, PhD; H. C... MD

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

Gordon Rudy, PhD, ELS • 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 • Atlanta, GA
Anucha Apisarntharak, MD • Pratumthani, Thailand
Lennox Archibald, MD, FRCP • Alachua, FL
Hilary Babcock, MD • St. Louis, MO
Elise M. Beltrami, MD, MPH • Decatur, GA
David Birnbaum, PhD, MPH • Sidney, BC
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
Sara E. Cosgrove, MD, MS • Baltimore, MD
Donald E. Craven, MD • Burlington, MA
Burke A. Cunha, MD • Mineola, NY
Erika D'Agata, MD, MPH • Boston, MA
Patch Dellinger, MD • Seattle, WA
Daniel Diekema, MD • Iowa City, IA
Charles E. Edmiston, Jr., PhD • Milwaukee, WI
Theodore C. Eickhoff, MD • Denver, CO
Martin S. Favero, PhD • Irvine, CA
Jon P. Furuno, PhD • Baltimore, MD
Richard A. Garibaldi, MD • Farmington, CT
Petra Gastmeier, MD • Hanover, Germany
Dale N. Gerding, MD • Hines, IL
Donald A. Goldmann, MD • Boston, MA
Donna Haiduvan, RN, PhD, CIC • Tampa, FL
Anthony D. Harris, MD, MPH • Baltimore, MD
David K. Henderson, MD • Bethesda, MD
Loreen A. Herwaldt, MD • Iowa City, IA
Peter N. R. Heseltine, MD • San Juan, CA
Karen Hoffmann, RN, CIC, MS • Chapel Hill, NC
Janine Jagger, MPH, PhD • Charlottesville, VA
John A. Jernigan, MD, MS • Atlanta, GA
James T. Lee, MD, PhD • St. Paul, MN
L. Clifford McDonald, MD • Atlanta, Georgia

Allison McGeer, MD • Toronto, ON
Leonard A. Mermel, DO, ScM • Providence, RI
Robert R. Muder, MD • Pittsburgh, PA
Carlene A. Muto, MD, MS • Pittsburgh, PA
Joseph M. Mylotte, MD, CIC • Buffalo, NY
David L. Paterson, MBBS, FRACP • Pittsburgh, PA
Jan Evans Patterson, MD • San Antonio, TX
Sindy M. Paul, MD • Yardley, PA
David A. Pegues, MD • Los Angeles, CA
Eli Perencevich, MD, MS • Baltimore, MD
Didier Pittet, MD, MS • Geneva, Switzerland
Michael A. Pfaller, MD • Iowa City, IA
Gina Pugliese, RN, MS • Chicago, IL
Isaam Raad, MD • Houston, TX
Jordi Rello, MD, PhD • Tarragona, Spain
Manfred L. Rotter, MD, DipBact • Vienna, Austria
Henning Rüden, MD • Berlin, Germany
William A. Rutala, PhD, MPH • Chapel Hill, NC
Lisa Saiman, MD, MPH • New York, NY
Sanjay Saint, MD, MPH • Ann Arbor, MI
William E. Scheckler, MD • Madison, WI
Lynne M. Sehulster, PhD • Atlanta, GA
John A. Sellick, DO • Amherst, NY
Kent Sepkowitz, MD • New York, NY
Samir Shah, MD, MSCE • Philadelphia, PA
Andrew E. Simor, MD • Toronto, ON
Philip W. Smith, MD • Omaha, NE
Denis W. Spelman, MD • Prahan, Victoria, Australia
Jeffrey R. Starke, MD • Houston, TX
Janet E. Stout, PhD • Pittsburgh, PA
Clyde Thornberry, PhD • Franklin, TN
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 • Royal Oak, MI

Infection Control and Hospital Epidemiology (ISSN 0899-823X) is published monthly by the University of Chicago Press, 1427 East 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; telephone: 773-702-2448, 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 Journals Advertising, University of Chicago Press, 1427 E. 60th St., Chicago, IL 60637 (e-mail: cbarhany@press.uchicago.edu; telephone: 773-702-8187; fax: 773-702-0172). 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; fax: 773-834-3489). Articles in the public domain may be used without permission, but it is customary to contact the author.

Subscriptions

Subscription rates for 2008 are \$164 for individuals and \$386 for institutions. Additional rates for non-US subscribers and reduced rates for fellows, residents, and students are available at <http://www.journals.uchicago.edu/ICHE>. Subscription agent for Japan: Kinokuniya Company, Ltd. Individuals have the option to order directly from the University of Chicago Press. Single copy rates: individuals \$17; institutions \$38.

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; 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).

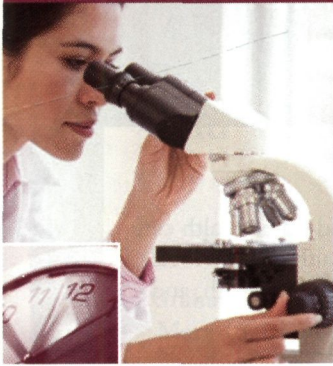
Postmaster: Send address changes to *Infection Control and Hospital Epidemiology*, University of Chicago Press, P.O. Box 37005, Chicago, IL 60637-2954.

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

Published by the University of Chicago Press, Chicago, Illinois. © 2008 by The Society for Healthcare Epidemiology of America. All rights reserved. This publication is printed on acid-free paper.

The Joint Commission and Joint Commission Resources present Annual Infection Prevention and Control Conference

September 18-19, 2008 • Hyatt Regency Chicago, IL



The battle against infections is relentless. And the threat is growing stronger every day.

Your team needs successful strategies and sustainable solutions from the **2008 Annual Infection Prevention and Control Conference**, presented by The Joint Commission and Joint Commission Resources.

Your team can:

- Learn from **leading infection control experts**, including Barbara Moore Soule, Kelly Podgorny, Elizabeth Coughlin, and Patricia M. Bray.
- Discover firsthand **how leading organizations have made significant improvements** to minimize health care-acquired infections.
- Receive a **Free Infection Control CD-ROM** for every attendee with practical tools and vital knowledge that will go back to work for you.

Register your team and save over \$100 per person.

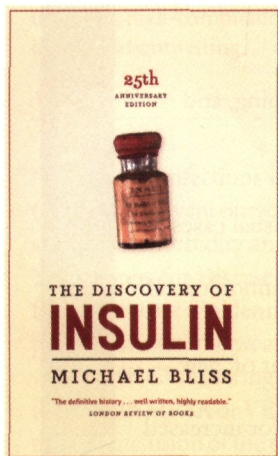
Call 877-223-6866 or visit www.jcrinc.com

BWW



www.jcrinc.com

The History of Medicine from Chicago



The Discovery of Insulin

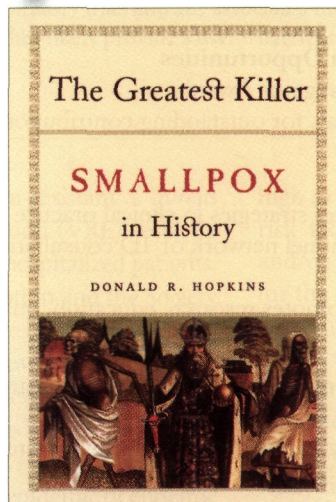
Twenty-fifth Anniversary Edition

Michael Bliss

"Scrupulously researched and compellingly readable. . . I wholeheartedly recommend it to anyone with an interest in diabetes, medical history, or medical scandal and gossip."—*British Medical Journal*

"The story of insulin's discovery ought to be a novel . . . but Michael Bliss's splendid account is just as absorbing as any fiction."—*Isis*

Paper \$22.50



The Greatest Killer

Smallpox in History

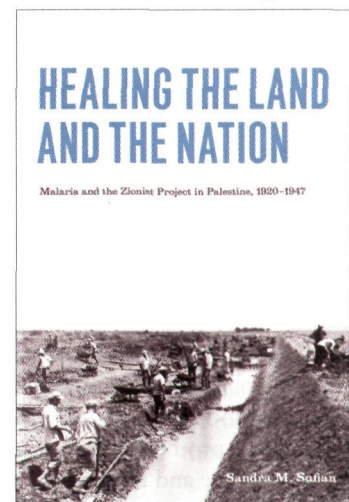
Donald R. Hopkins

"Nowhere else that I know is there to be found such a compact account of smallpox in all five continents and of its impact on the history of each. . . I found it a sobering and broadening experience to be exposed to Hopkins's story—there will be few people who would not benefit from reading it."

—Keith Dumbell, *Nature*

"A superb book."—former President Jimmy Carter

Paper \$18.00



Healing the Land and the Nation

Malaria and the Zionist Project in Palestine, 1920-1947

Sandra M. Sufian

"*Healing the Land and the Nation* is a truly innovative and exciting history of the coproduction of a healthy environment, healthy bodies, and the modern settler nation-state. Sufian studies this exceptionally fraught and controversial colonial site with exemplary balance and sensitivity."—Warwick Anderson, University of Wisconsin-Madison

Cloth \$40.00



The University of Chicago Press • www.press.uchicago.edu



There are many benefits
of IDSA membership.
Join today!

About IDSA

The Infectious Diseases Society of America (IDSA) represents physicians, scientists, and other health care professionals who specialize in infectious diseases. IDSA's purpose is to improve the health of individuals, communities, and society by promoting excellence in patient care, education, research, public health, and prevention relating to infectious diseases.

IDSA's Core Values

- Enhancing care of children and adults based on sound scientific evidence
- Advancing the discipline of infectious diseases as a foundation of medicine and public health
- Promoting and sharing knowledge to reduce the human and societal toll from infectious diseases
- Advocating for sound and humane public policy
- Promoting collaboration and cooperation among, and services for, members and other professional colleagues

Benefits of Membership

Education and Information

- Subscription to *The Journal of Infectious Diseases* and *Clinical Infectious Diseases*
- Discounts at IDSA's Annual Meeting
- Special conferences and CME activities on important issues such as rapid diagnostics, bioterrorism, and medical errors
- Practice guidelines and other ID resources
- A subscription to *IDSA News*

Professional Development and Research Opportunities

- Postdoctoral Fellowships and Young Investigator Awards
- Annual Society Awards honoring individuals for outstanding contributions to research, teaching, and patient care
- Online ID/HIV Career Center
- The annual Fellows Meeting, offering career strategies in clinical practice
- The Emerging Infections Network – a sentinel network of ID consultants reporting on unusual cases and phenomena encountered in their practices
- The HIV Medicine Association, which promotes research, education, quality care, and prevention of HIV

Advocacy and Representation

- Recognizing the urgency of antimicrobial resistance, IDSA fosters research and development of new antibiotics
- IDSA promotes ID consultative services to patients and health care systems and advocates for increased coverage and reimbursement for ID services
- IDSA supports federal funding for biomedical research and the adoption of science-based government policies on immunization, public health, pandemic influenza, infection control, and other areas related to infectious diseases
- IDSA's public policy agenda includes quality microbiology, bioterrorism defense, HIV care, and food safety
- IDSA is a founding organization in the National Network for Immunization Information (NNii), which provides the public, health professionals, policymakers, and the media with up-to-date, scientifically valid information about vaccines and immunizations
- Affiliated state and regional societies provide forums to address infectious diseases issues at the local level

Join IDSA today at www.idsociety.org