

Volume 46, No 1
Jan 2025

Infection Control & Hospital Epidemiology

ICHE



Preventing cross-contamination can save lives
Are your hands clean?
Let us show you



www.glogerm.com
800-842-6622

CONTENTS

Joint Statement

- 1** Elevating infection prevention programs
Thomas R. Talbot and Tania N. Bubb

SHEA White Paper

- 3** SHEA practice update: infection prevention and control (IPC) in residential facilities for pediatric patients and their families
Judith A. Guzman-Cottrill, Daniel B. Blatt, Kristina A. Bryant, Caitlin L. McGrath, Danielle M. Zerr, Ayelet Rosenthal, Larry K. Kociolek, Catherine Murphy and Karen A. Ravin

Original Articles

- 27** Which is the safer option for adult patients between peripherally inserted central catheters and midline catheters: a meta-analysis
Jianyun Wen, Shuping Xiong, Ziwei Tu, Ping Lin, Yeqin Yuan, Wenhong Fu and Juan Qiu
- 35** Transmission of MRSA, ESBL *E. coli*, and *C. difficile* within a tertiary care hospital and across surrounding facilities in Japan: a molecular epidemiological study with the PCR-based Open-reading frame typing
Hiroki Saito, Satoshi Miike, Tatsuya Ohno, Momoko Anzai, Fumimasa Kasai, Akiko Hosoyama, Tomomi Takakura, Yosuke Tanaka and Shigeki Fujitani
- 43** Long-term trends in the incidence of hospital-acquired carbapenem-resistant *Enterobacterales* and antimicrobial utilization in a network of community hospitals in the Southeastern United States from 2013 to 2023
Tark Kim, Rebekah W. Moehring, Nicholas A. Turner, Elizabeth Dodds Ashley, Linda Crane, Polly Padgett, Valerie C. Payne, Linda Roach, Brittain Wood and Deverick J. Anderson
- 50** A pilot intervention trial to reduce the use of post-procedural antimicrobials after common endourologic surgeries
Daniel J. Livorsi, Vignesh T. Packiam, Qianyi Shi, Steven Y. Alberding, Knute D. Carter, James A. Brown, James B. Mason, Jeffrey P. Weiss and Ryan L. Steinberg
- 57** Patterns of inpatient antibiotic utilization by race and ethnicity at US children's hospitals
Bethany A. Wattles, Jeffrey I. Campbell, Theresa Kluthe, Yana B. Feygin, Kahir Jawad, Michelle D. Stevenson, Deborah Winders Davis, Jennifer Porter, V. Faye Jones, Matt Hall and Michael J. Smith
- 66** Say it ain't *Steno*: a microbiology nudge comment leads to less treatment of *Stenotrophomonas maltophilia* respiratory colonization
Stormy R. Boettcher, Rachel M. Kenney, Christen J. Arena, Amy E. Beaulac, Robert J. Tibbetts, Anita B. Shallal, Geehan Suleyman and Michael P. Veve
- 71** Positive impact of a diagnostic stewardship intervention on syndromic panel ordering practices and inappropriate *C. difficile* treatment
Dan Ilges, Erin H. Graf, Leah Grant, Ashley Long, Eric Siebeneck, Maria Teresa Seville, Thomas Grys and Lisa J. Speise

- 77 Multiplexed gastrointestinal PCR panels for the evaluation of diarrhea in patients with acute leukemia
Clyde D. Ford, Bert K. Lopansri, Bradley D. Hunter, Jacob Wilkes, Julie Asch and Daanish Hoda
- 81 Comparing the effectiveness of universal admission testing and risk-based testing at emergency admission for preventing nosocomial COVID-19: a multicenter retrospective cohort study in Japan
Kenta Iijima, Hitomi Osako and Kentaro Iwata
- 90 Utility of post-admission SARS-CoV-2 serial testing in hospitalized patients with cancer
Shauna Usiak, Anoshe Aslam, Judy Yan, Jerin Madhavappallil, Marissa Bokhari, Tiffany Romero, Tania N. Bubb, Rich Kodama, Esther Babady and Mini Kamboj

Concise Communications

- 93 Do blood contamination reduction devices work? A single institution comparison
Maria E. Navas, Salman Siddiq, Laurie Bauer, Jose A. Rivera, Anita J. White, Stella Ache, Mark Osborne, Nataliya Kachaluba, Brian Klonowski, Christine Robbins and Curtis Donskey
- 96 Analysis of diagnostic criteria for ECMO-associated pneumonia
Julie England, Rachael Lee, Tammy Marshall, Rongbing Xie, Peggy Blood, Keith Wille, Enrique Gongora, Anoma Nellore, James K. Kirklin and Jeremy Walker
- 99 Comparative quantification of varicella-zoster virus in air, pharyngeal swabs, and vesicle content in patients with varicella, disseminated zoster, and localized herpes zoster
Kei Yamamoto, Maki Nagashima, Motoko Ishida, Masayuki Ota, Yuichi Katanami, Ryoko Adachi, Ayako Shigeno, Takeshi Tamaki and Norio Ohmagari
- 102 Empiric antibiotic prescribing practices for gram-positive coverage of late-onset sepsis in neonatal intensive care units in North America
Dara Simcha Petel, Sandra Isabel, Kyong-Soon Lee, Joseph Yuk Ting, David A Kaufman, Pablo Jose Sanchez, Sarah Khan, Kathryn Timberlake, James Wright and Michelle Science
- 105 System infection prevention in hospital networks in the United States—an SHEA research network inquiry into operational characteristics and current challenges
Michael P. Stevens, Nkechi Emetuche, Catherine Passaretti, Graham Snyder, Rachael Snyders, Michael B. Edmond and Jonas Marschall

Letters to the Editor

- 108 Implementation of an initial specimen blood culture diversion device to reduce blood culture contamination: lessons learned
Francine Touzard Romo, Dianne Auld, Alison de Abreu, Kimberly Roberts, Gail Jackson, Valerie Whitehead, Emerald O'Rourke, Phinnara Has and Leonard A. Mermel
- 110 Sustainability of a customized electronic duplicate order alert for microbiology tests: assessment of alert fatigue 12 to 36 months after implementation
Maryza Graham, Victoria Hornidge, Gillian Yap, Allen Cheng, Anjali Dhulia and Beena Kumar
- 112 What can building information modeling do for you? A perspective on integration into infection prevention and control programs for patient safety
Scott C Roberts, Trini A Mathew, Windy D Tanner, Richard A Martinello and HIPSTER team

An Official Publication of the Society for Healthcare Epidemiology of America

EDITOR-IN-CHIEF

David P. Calfee, MD, MS • New York, NY, USA

DEPUTY EDITOR

Tara N. Palmore, M.D., Washington, D.C.

ASSOCIATE EDITORS

Westyn Branch-Elliman, MD, MMSc • Boston, MA, USA

Joshua K. Schaffzin, MD, PhD • Ottawa, ON, Canada

Trevor C. Van Schooneveld, MD • Omaha, NE, USA

David Weber, MD, MPH • Chapel Hill, NC, USA

STATISTICS CONSULTANTS

Jon P. Furuno, PhD • Portland, OR, USA

Jessina C. McGregor, PhD • Portland, OR, USA

MANAGING EDITOR

iche.managingeditor@shea-online.org

Lindsay MacMurray • Brooklyn, NY, USA

SOCIAL MEDIA EDITOR

Alexander J. Sundermann, DrPH, CIC, FAPIC,

Pittsburgh, PA, USA

PAST EDITORS, INFECTION CONTROL

Richard P. Wenzel, MD, Infection Control 1980-1987
(vols. 1-8)

PAST EDITORS, INFECTION CONTROL & HOSPITAL EPIDEMIOLOGY

Richard P. Wenzel, MD, 1988-1992 (vols. 9-13)

Michael D. Decker, MD, 1993-2001 (vols. 14-22)

Barry M. Farr, MD, 2000-2004 (vols. 23-25)

William R. Jarvis, MD, 2005-2006 (vols. 26 and 27)

Suzanne F. Bradley, MD, 2007-2021 (vols. 28-42)

EDITORIAL ADVISORY BOARD

Deverick Anderson, MD, MPH • Durham, NC, USA

Anucha Apisarnthanarak, MD • Pratumthani, Thailand

Lennox Archibald, MD, FRCP • Alachua, FL, USA

Jo Anne Bennett, RN, PhD • New York, NY, USA

David Birnbaum, PhD, MPH • Sidney, BC, Canada

Yehuda Carmeli, MD, MPH • Tel Aviv, Israel

Vincent C.C. Cheng, MBBS, MD. • Hong Kong, China

Christopher Crnich, MD, MS • Madison, WI, USA

Erika D' Agata, MD, MPH • Providence, RI, USA

Daniel Diekema, MD • Portland, ME, USA

Elizabeth Dodds Ashley, PharmD • Durham City, NC, USA

Curtis J. Donskey, MD • Cleveland, OH, USA

Charles E. Edmiston, Jr., PhD • Milwaukee, WI, USA

Katherine Ellingson, PhD • Tucson, AZ, USA

Charlesnika T. Evans, PhD • Chicago, IL, USA

Mohamad Fakih, MD, MPH • Grosse Pointe Woods,
MI, USA

Jeffery Gerber, MD, PhD • Philadelphia, PA, USA

Dale N. Gerding, MD • Hines, IL, USA

Donald A. Goldmann, MD • Boston, MA, USA

Nicholas Graves, PhD • Singapore, Singapore

Donna Haiduven, PhD, RN, CIC, CPH, FAPIC • Tampa,
FL, USA

Anthony D. Harris, MD, MPH • Baltimore, MD, USA

David K. Henderson, MD • Bethesda, MD, USA

Elizabeth Henderson, PhD • Calgary, AB, Canada

Loreen A. Herwaldt, MD • Iowa City, IA, USA

John A. Jernigan, MD, MS • Atlanta, GA, USA

Robin L.P. Jump, MD, PhD • Cleveland, OH, USA

Mini Kamboj, MD • New York, NY, USA

Carol A. Kauffman, MD • Ann Arbor, MI, USA

Michael Klompas, MD • MPH, Boston, MA, USA

Sarah Krein, RN, PhD • Ann Arbor, MI, USA

Karl Madaras-Kelly, PharmD • MPH, Boise, ID, USA

Eric T. Lofgren, MS, PhD • Pullman, WA, USA

Jasmine R. Marcelin, MD • Omaha, NE, USA

Allison McGeer, MD • Toronto, ON, Canada

Leonard A. Mermel, DO, ScM • Providence, RI, USA

Linda Mundy, MD • Collegeville, PA, USA

Ann-Christine Nyquist, MD, MSPH • Aurora, CO, USA

Pierre Parneix, MD • Bordeaux, France

Jan Evans Patterson, MD • San Antonio, TX, USA

David A. Pegues, MD • Philadelphia, PA, USA

Didier Pittet, MD, MS • Geneva, Switzerland

Anusha Rohit, MD, PhD • Dip RCPATH, Chennai, India

William A. Rutala, PhD, MPH • Chapel Hill, NC, USA

Lisa Saiman, MD, MPH • New York, NY, USA

Sanjay Saint, MD, MPH • Ann Arbor, MI, USA

Marin Schweizer, PhD • Madison, WI, USA

Lynne M. Schulster, PhD • Atlanta, GA, USA

John A. Sellick, DO • Amherst, NY, USA

Erica S. Shenoy, MD, PhD • Boston, MA, USA

Anna C. Sick-Samuels, MD, MPH • Baltimore, MD, USA

Rachel B. Slayton, PhD, MPH • Atlanta, GA, USA

Xiaoyan Song, PhD, MBBS, CIC • Washington, DC, USA

Arjun Srinivasan, MD • Atlanta, GA, USA

Kurt Stevenson, MD • MPH, Boise, ID, USA.

Nimalie Stone, MD • Atlanta, GA, USA

Thomas Talbot, MD MPH, • Nashville, TN, USA

Paul Tambyah, MBBS • Singapore

William Trick, MD • Chicago, IL, USA

Antoni Trilla, MD, PhD • Barcelona, Spain

Kavita Trivedi, MD • Alameda County Public Health

Department, San Leandro, CA, USA

Robert A. Weinstein, MD • Chicago, IL, USA

Marcus Zervos, MD • Detroit, MI, USA

Infection Control & Hospital Epidemiology (ISSN 0899-823X) is published monthly by Cambridge University Press, One Liberty Plaza, New York, NY 10006, USA. Printed by Sheridan, a CJK Group Company.

Editorial Office

Communications should be addressed to the Editor, *Infection Control & Hospital Epidemiology*, One Liberty Plaza, New York, NY 10006 (email: iche.managingeditor@cambridge.org). Contributors should consult the Instructions for Contributors, which is available at the journal's Web site.

Advertising

Please direct advertising inquiries to M. J. Mrvica Associates, 2 West Taunton Avenue, Berlin, NJ 08009 (e-mail: mjmrvica@mrvica.com; telephone: 856-768-9360, fax: 856-753-0064). Publication of an advertisement in *Infection Control & Hospital Epidemiology* does not imply endorsement of its claims by the Society for Healthcare Epidemiology of America, by the Editor, or by Cambridge University Press.

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>,

email: info@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 Cambridge University Press. Full details may be found at: www.cambridge.org/about-us/rights-permissions.

Subscriptions

The individual subscription prices for 2025 are: Print & Online: \$381; Online Only: \$286. Individuals have the option to order directly from Cambridge University Press. Institutional print + electronic and e-only subscriptions are available from Cambridge University Press and include unlimited online access; rates are tiered according to an institution's type and research output and may be reviewed at the journal's homepage on Cambridge Core: cambridge.org/ICHE.

Please direct subscription inquiries and requests for back issues to Customer Services at Cambridge University Press, e-mail: subscriptions_newyork@cambridge.org (USA, Canada, and Mexico) or journals@cambridge.org (outside of USA, Canada, and Mexico).

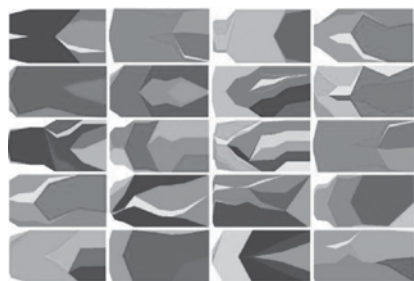
Postmaster: Send address changes to *Infection Control & Hospital Epidemiology*, Cambridge University Press, One Liberty Plaza, New York, NY 10006 USA.

About the cover:

Beginning with volume 43 (January 2022), the cover of *Infection Control & Hospital Epidemiology* (ICHE) will feature art inspired by or reflective of topics within the scope of the journal and their impact on patients, healthcare personnel and our society. These topics include healthcare-associated infections, antimicrobial resistance, and healthcare epidemiology. The intent is to feature original artwork that has been created by individuals who have a personal connection to one or more of these topics through their clinical work, research, or experience as a patient or an affected patient's family member, friend or advocate. The goal is to provide readers with a visual reminder of the human impact of the topics addressed in the journal and the importance of the work being done by those who read or contribute to ICHE and by all who are trying to make healthcare safer through the elimination of healthcare-associated infections.

For more information about the ICHE cover and how to submit artwork for consideration for a future cover, please visit the ICHE website: <https://www.cambridge.org/core/journals/infection-control-and-hospital-epidemiology/front-covers>

2025



Title: *The Dynamics of Bacterial Evolution*, 2020

Artist: Angharad Ellen Green, PhD

Medium: The artwork is made up of individual Muller plots representing *Streptococcus pneumoniae* bacteria lineages that were evolved separately within nasopharynx and lung environments. The command line program muller (v0.6.0 - <https://pypi.org/project/muller/>), with default parameters applied, was used to produce genotypes and trajectories tables for each of the evolved lineages. These tables were then used as inputs for ggplot2 (v3.3.2) and ggmuller (v0.5.4) in R-Studio (v4.0.2), to produce Muller plots. The individual plots were then assembled to produce the resulting artwork.

Dr. Green spoke to ICHE about her artwork.

What was the inspiration for this artwork? My postdoctoral research used an *in vivo* experimental evolution model to understand how *Streptococcus pneumoniae* (the pneumococcus) adapts to the lung and nasopharynx environments. The pneumococcus was experimentally evolved through a lung infection model and a nasopharynx infection model, producing independently evolved lung and nasopharynx lineages. We sequenced the evolved lineages and compared them to the ancestor to understand how their genomes had changed. This work also enabled us to determine how environmental differences between the upper and lower airways might shape pneumococcal adaptation and evolution. The resulting sequencing dataset was very large and complex with lots of interesting results. I wanted to use an effective method of visualising the data and Muller plots were chosen to display the evolutionary dynamics of mutations found in each evolved lineage over time. In these plots, each mutation is grouped as a genotype, which is represented by a different colour, and the blocks of colour expand when the genetic changes make the bacteria better able to survive in their local conditions. After completing the data analysis and publishing this work, I created this artwork as a memento of my postdoctoral research and I have a canvas of this work hanging in my apartment. Additionally, I wanted to demonstrate how scientific artwork can help visualise the complexities of evolution dynamics and help us to better understand bacterial processes.

What is your personnel connection to the content of ICHE? Throughout my career as a microbiologist, I have carried out research to investigate bacterial pathogenesis and antimicrobial resistance (AMR) of WHO-defined bacterial priority pathogens, such as *Pseudomonas aeruginosa*, methicillin-resistant *Staphylococcus aureus* (MRSA) and *Streptococcus pneumoniae*. I have actively promoted the importance of microbial genomic research to confront current global challenges, such as AMR and healthcare-acquired infections. I have championed microbiology research through my various roles in academia, volunteering on the Microbiology Society's Policy Committee and as a Research Manager at the Healthcare Infection Society. It is an honour for my bacterial evolution artwork to be on the cover of ICHE.

Given the scope of the journal, why is this work appropriate for the cover of *Infection Control & Hospital Epidemiology*? This artwork is made up of a collection of graphs called Muller plots, which are used to visualize how bacteria evolve when grown in diverse environments. The colours represent genetic changes that have taken place in the presence of environmental factors, such

Cover image: *The Dynamics of Bacterial Evolution*, 2020

as antimicrobials and the host immune system. The dynamics of evolution are complex and being able to visualise this process enables scientists to better understand bacterial processes, including the development of AMR. This artwork is appropriate for the cover of ICHE as it was created as a direct result of scientific research into how bacteria can adapt and evolve in diverse host niches to cause disease. Additionally, this artwork makes it possible for scientists to visualise the complexities of the dynamics of evolution and comprehend how bacteria adapt to different host environments.

Dr. Green is a Senior Research Data Steward in the Advanced Research Computing Centre (ARC) at UCL in London. Her postdoctoral research at the University of Liverpool was supported by a Sir Henry Dale Fellowship, awarded by the Wellcome Trust and the Royal Society (grant number 204457/Z/16/Z) to Dr. Daniel R Neill. The research from which this artwork was derived was published in Molecular Biology and Evolution (Green AE, Howarth D, Chaguza C, et al. Pneumococcal colonization and virulence factors identified via experimental evolution in infection models. Mol Biol Evol 2023; 38: 2209–2226).