INFECTION CONTROL& HOSPITAL EPIDEMIOLOGY

VOLUME 27, NUMBER 6

JUNE 2006

EDITORIAL

537 The Challenges of Pertussis Outbreaks in Healthcare Facilities: Is There A Light at the End of the Tunnel? • Kathryn M. Edwards, MD; Thomas R. Talbot, MD, MPH

ORIGINAL ARTICLES

- 541 Measures to Control an Outbreak of Pertussis in a Neonatal Intermediate Care Nursery After Exposure to a Healthcare Worker • Kristina A. Bryant, MD; Kraig Humbaugh MD, MPH; Kyle Brothers, MD; Judy Wright, BSN; F. Brian Pascual, MPH; John Moran, MD; Trudy V. Murphy, MD
- 546 Outbreak of Pertussis Among Healthcare Workers in a Hospital Surgical Unit F. Brian Pascual, MPH; Candace L. McCall, DVM, MPH; Aaron McMurtray, MD; Tony Payton, BS; Forrest Smith, MD;
 Kristine M. Bisgard, DVM, MPH
- **553 Risk Factors for Nosocomial Primary Bloodstream Infection in Pediatric Intensive Care Unit Patients: A 2-Year Prospective Cohort Study** • Alexis M. Elward, MD; Victoria J. Fraser, MD
- 561 Incidence of Pediatric and Neonatal Intensive Care Unit-Acquired Infections Shailendra N. Banerjee, PhD; Lisa A. Grohskopf, MD, MPH; Ronda L. Sinkowitz-Cochran, MPH; William R. Jarvis, MD; National Nosocomial Infections Surveillance System; Pediatric Prevention Network
- **571 Risk Factors for Nosocomial Infection in a Neonatal Intensive Care Unit** Renato C. Couto, MD, PhD; Tania M. G. Pedrosa, MD, MS; Cristina de Paula Tofani, MD; Enio R. P. Pedroso, MD, PhD
- 576 Risk Factors for Candidemia in Pediatric Patients With Congenital Heart Disease Lucía García-San Miguel, MD, PhD; Javier Cobo, MD, PhD; Isabel Martos, MD; Enrique Otheo, MD; Alfonso Muriel, MSC; Vicente Pintado, MD, PhD; Santiago Moreno, MD, PhD
- 581 Outbreak of Methicillin-Resistant Staphylococcus aureus Colonization and Infection in a Neonatal Intensive Care Unit Epidemiologically Linked to a Healthcare Worker With Chronic Otitis • Mary L. Bertin, RN, BSN, CIC; Joan Vinski, RN, MSN; Steven Schmitt, MD; Camille Sabella, MD; Lara Danziger-Isakov, MD; Michael McHugh, MD; Gary W. Procop, MD; Geraldine Hall, PhD; Steven M. Gordon, MD; Johanna Goldfarb, MD
- 586 Outbreak of Salmonella javiana Infection at a Children's Hospital Alexis Elward, MD; Autumn Grim, MPH; Patricia Schroeder, RN, MBA, CIC; Patricia Kieffer, RN; Patricia Sellenriek; Rhonda Ferrett; Hilda Chaski Adams, MPH; Virginia Phillips; Rhonda Bartow; Debra Mays; Steven Lawrence, MD; Patrick Seed, MD, PhD; Galit Holzmann-Pazgal, MD; Louis Polish, MD; Terry Leet, PhD; Victoria Fraser, MD
- 593 Molecular Characterization of Methicillin-Resistant Staphylococcus aureus Spread by Neonates Transferred From Primary Obstetrics Clinics to a Tertiary Care Hospital in Korea • Kwan Soo Ko, PhD; Sulhee Park, MS; Kyong Ran Peck, MD, PhD; Eun Jung Shin, RN, MS; Won Sup Oh, MD, PhD; Nam Yong Lee, MD, PhD; Jae-Hoon Song, MD, PhD
- 598 Review Article: Infection Control in Pediatric Extended Care Facilities Jo-Ann S. Harris, MD

CONTENTS CONTINUED INSIDE



THE OFFICIAL JOURNAL OF THE SOCIETY FOR HEALTHCARE EPIDEMIOLOGY OF AMERICA

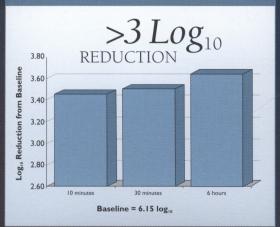
Introducing the first alcohol-free chlorhexidine gluconate skin prep in a full-size cloth.

Sage[®] 2% Chlorhexidine Gluconate¹ Cloths

Fast-acting. Broad-spectrum. Persistent. We've taken the best attributes of CHG and made them easier than ever to apply. Our exclusive cloth removes debris and organic matter—while distributing a uniform dose of CHG to the skin. No drips, runs, spills or pooling associated with other skin preps.

Rinse-free. Quick-drying. Proven effective. Our patentpending formulation exceeds all FDA requirements for antimicrobial efficacy.² And it does all this without alcohol or harsh detergents. No flammability concerns. Less risk of drying out skin. Just effective, skin-friendly bactericidal action.





 Equivalent to 500mg chlorhexidine gluconate per cloth. 2. Data on file. 3. Mangram AJ. et al., Guideline for prevention of surgical site infection, 1999. CDC/HICPAC, Atlanta GA.
Microorganisms on the skin.



Feared by bugs. Loved by skin.

Address a known risk factor for surgical site infections.³⁴ Call 800-323-2220.



Visit us online at www.sageproducts.com.

INFECTION CONTROL & HOSPITAL EPIDEMIOLOGY

VOLUME 27, NUMBER 6

CONTENTS CONTINUED FROM COVER

- 604 Exposure to Tuberculosis among Newborns in a Nursery: Decision Analysis for Initiation of Prophylaxis • Frank E. Berkowitz, MB, BCh; Johan L. Severens, PhD; Henry M. Blumberg, MD
- 612 Effect of A Hospital Campaign for Influenza Vaccination of Healthcare Workers Joon Young Song, MD; Cheong Won Park, MD; Hye Won Jeong, MD; Hee Jin Cheong, MD, PhD; Woo Joo Kim, MD, PhD; Sung Ran Kim
- 618 Survey on Use of and Attitudes Toward Influenza Vaccination Among Emergency Department Staff in a New York Metropolitan Hospital • Barbara Piccirillo, MS, RPA-C; Theodore Gaeta, DO, MPH

CONCISE COMMUNICATIONS

- 623 Adult Pertussis Is Hazardous for the Newborn Ellen Bamberger, MD; Orna Starets-Haham, MD; David Greenberg, MD; Argyro Karidis, MD; Nurit Porat, PhD; Gad Bar-Joseph, MD; Rosa Gershtein, PhD; Isaac Srugo, MD
- 626 Feasibility of Azithromycin Prophylaxis During a Pertussis Outbreak Among Healthcare Workers in a University Hospital in Paris • Camila Giugliani, MD; Gwenaëlle Vidal-Trécan, MD, PhD; Souleymane Traore, MD; Hervé Blanchard, MD; Gabriela Spiridon, MD; Florence Rollot, MD; Odile Launay, MD; Myriam Gorodestski, MD; Jean-Luc Marande, MD; Christophe Vinsonneau, MD; Loïc Guillevin, MD, PhD; Dominique Salmon-Céron, MD, PhD
- 630 Nosocomially Acquired *Pseudomonas stutzeri* Brain Abscess in a Child: Case Report and Review Stephanie Yee-Guardino, DO; Lara Danziger-Isakov, MD; Mark KnouseMD; William Bingaman, MD; Camille Sabella, MD; Johanna Goldfarb, MD
- 633 Health Care-Associated Rotavirus Illness in Pediatric Inpatients in Germany, Austria, and Switzerland Ivo M. Foppa, DSc, MD; Wilfried Karmaus, MD, MPH; Birgit Ehlken, MSc; Martin Frühwirth, MD; Ulrich Heininger, MD; Anita Plenge-Bönig, DVM, MPH; Johannes Forster, MD, MME
- 636 Father-to-Infant Transmission of Community-Acquired Methicillin-Resistant Staphylococcus aureus in a Neonatal Intensive Care Unit • Jaffar A. Al-Tawfiq, MD
- 638 Factors That Affect Influenza Vaccine Uptake Among Staff of Long-Term Care Facilities Anja M. Hauri, MD, MSc; Helmut Uphoff, PhD; Volker Gussmann, MSN; Stefan Gawrich, PhD

LETTER TO THE EDITOR

Outbreak of *Ralstonia pickettii* Pseudobacteremia Among Patients With Hematological Malignancies •
F. Barbut, PharmD, PhD; M.-J. Kosmann, RN; V. Lalande, PharmD; D. Neyme, BSc; P. Coppo, MD, PhD;
N. C. Gorin, MD, PhD

JUNE 2006

An Official Publication of the Society for Healthcare Epidemiology of America

EDITOR

William R. Jarvis, MD • Hilton Head, SC

DEPUTY EDITOR David P. Calfee, MD, MS • New York, NY

ASSISTANT EDITOR Preeti N. Malani, MD, MSJ • 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

Donald A. Goldmann, MD • Boston, MA Didier Pittet, MD, MS • Geneva, Switzerland Andreas Widmer, MD, MS • Basel, Switzerland

SECTION EDITORS

Beyond Infection Control: The New Hospital Epidemiology

Wing Hong Seto, MD • Hong Kong

Disinfection and Sterilization William A. Rutala, PhD, MPH • Chapel Hill, NC

From the Laboratory Marcus Zervos, MD • Royal Oak, MI

Infections in Immunocompromised Patients Kent Sepkowitz, MD • New York, NY

Information Management John A. Sellick, DO • Amherst, NY

Issues in Surgery James T. Lee, MD, PhD • St. Paul, MN

Medical News Gina Pugliese, RN, MS • Chicago, IL Martin S. Favero, PhD • Irvine, CA

Practical Healthcare Epidemiology Loreen A. Herwaldt, MD • Iowa City, IA Statistics for Hospital Epidemiology

David Birnbaum, PhD, MPH • Sidney, British Columbia

Topics in Long-Term Care Philip W. Smith, MD • Omaha, NE

Topics in Occupational Medicine David Weber, MD, MPH • Chapel Hill, NC

MANAGING EDITOR

Gordon Rudy, PhD, ELS • Chicago, IL

EDITORIAL ADVISORY BOARD

Miriam Alter, PhD, MD • Atlanta, GA Hilary Babcock, MD • St. Louis, MO Elise M. Beltrami, MD, MPH • Decatur, GA Marc J. M. Bonten, MD, PhD • Utrecht, The Netherlands

John M. Boyce, MD • New Haven, CT Christian Brun-Buisson, MD • Creteil, France John P. Burke, MD • Salt Lake City, UT Yehuda Carmeli, MD, MPH • Tel Aviv, Israel Carol Chenoweth, MD • Ann Arbor, MI 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 Charles E. Edmiston, Jr., PhD • Milwaukee, WI Theodore C. Eickhoff, MD • Denver, CO Jean Yves Fagon, MD, MPH • Paris, France Mark Farrington, MA, FRCPath • Cambridge, UK Richard A. Garibaldi, MD • Farmington, CT Petra Gastmeier, MD • Hanover, Germany Dale N. Gerding, MD • Hines, IL Stephan Harbarth, MD, MS . Geneva, Switzerland Anthony D. Harris, MD, MPH • Baltimore, MD David K. Henderson, MD • Bethesda, MD 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 Jacob L. Kool, MD, PhD • Fort Collins, CO Ebbing Lautenbach, MD, MPH • Philadelphia, PA Allison McGeer, MD • Toronto, Ontario John E. McGowan, Jr., MD • Atlanta, GA 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 Juhani Ojajärvi, MD • Helsinki, Finland Michael T. Osterholm, PhD, MPH • Minneapolis, MN 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 Michael A. Pfaller, MD • Iowa City, IA Samuel Ponce de Leon, MD, MSc • Mexico City Isaam Raad, MD • Houston, TX Jordi Rello, MD, PhD • Tarragona, Spain Manfred L. Rotter, MD, DipBact • Vienna, Austria Henning Rüden, MD • Berlin, Germany Lisa Saiman, MD, MPH • New York, NY Sved A. Sattar, PhD • Ottawa, Ontario William E. Scheckler, MD • Madison, WI Lynne M. Sehulster, PhD • Atlanta, GA Andrew E. Simor, MD • Toronto, Ontario Denis W. Spelman, MD • Prahan, Victoria, Australia Susan Springthorpe, MSc • Ottawa, Ontario Jeffrey R. Starke, MD . Houston, TX Janet E. Stout, PhD • Pittsburgh, PA Michael L. Tapper, MD . New York, NY Clyde Thornsberry, PhD • Franklin, TN Jerome Tokars, MD, PhD • Atlanta, GA Timothy R. Townsend, MD • Baltimore, MD Antoni Trilla, MD, PhD • Barcelona, Spain Robert A. Weinstein, MD · Chicago, IL

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 offices are 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 *ICHE* Web site.

Advertising

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 business office in Chicago (see above).

Permissions

The copyright code on the first page of an article in this journal indicates the copyright owner's consent that copies of the article may be made only for personal or internal use or for the personal or internal use of specific clients and provided that the copier pays the stated per-copy fee through the Copyright Clearance Center (CCC), 222 Rosewood Dr., Danvers, MA 01923. To request permission for other kinds of copying, such as copying for general distribution, for advertising or promotional purposes, for creating new collective works, or for resale, please write to the Permissions Department, University of Chicago Press, 1427 East 60th St., Chicago, IL 60637-2954. For articles in the public domain, permission to reprint should be obtained from the author.

Subscriptions

Subscription orders and correspondence should be addressed to the University of Chicago Press, P.O. Box 37005, Chicago, IL 60637-2954. Checks should be made out to the University of Chicago Press. All orders must be in US currency. Telephone: (8:00 A.M.–5:00 P.M. Central Standard Time, Monday–Friday) US and Canada toll free, (877) 705-1878; Rest of World, (773) 753-0347. Fax: US and Canada toll free, (877) 705-1879; Rest of World, (773) 753-0811. E-mail: subscriptions@press.uchicago.edu; Web site: http://www.journals.uchicago.edu.

Subscription rates (1 year) for Infection Control and Hospital Epidemiology (ICHE):

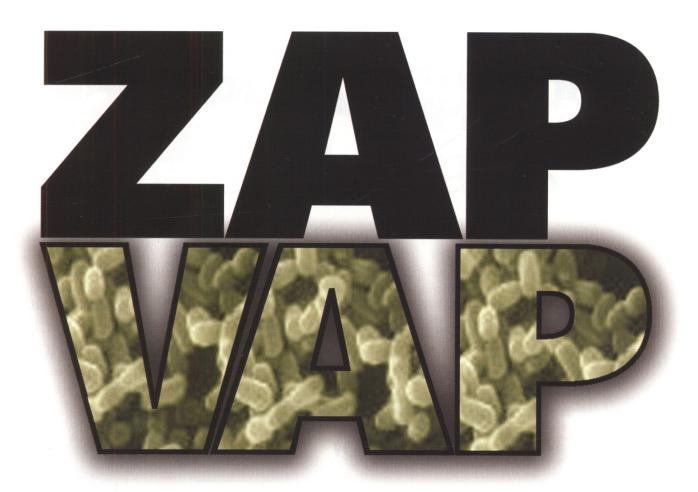
	Foreign With			
	Domestic	Air Freight	Canadian	
Institutions	350.00	399.00	389.50	
Individuals	150.00	199.00	175.50	
Fellows	55.00	104.00	73.85	

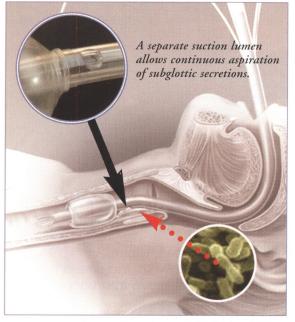
Note: All rates in US dollars. All new subscriptions will begin with the January issue. All rates include postage. Canadian rates include 7% GST. *ICHE* single copies: institutions, \$30.00: individuals, \$14.00. Japanese subscription agent: Kinokuniya Company Ltd.

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, IL. © 2006 by The Society for Healthcare Epidemiology of America. All rights reserved. This publication is printed on acid-free paper.





1. Smulders K., et al: Chest. 2002, 121-858-862.

O 2006 Nellcor Puritan Bennett Inc. All rights reserved. All trademarks belong to Tyco Healthcare Group LP or an affiliate.

Ventilator-associated pneumonia (VAP) costs lives and resources. Clinical evidence demonstrates that continuous aspiration of subglottic secretions (CASS) reduces VAP. The *Mallinckrodt*[®]

Hi-Lo Evac[®] ET tube is the only CASS tube on the market, and it's only available from Nellcor. **We invite you to learn more.** For more information, contact your Nellcor representative by calling 1-800-NELLCOR, or view our informative multimedia presentation at the web address listed below.

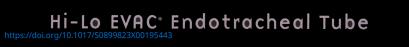


The Hi-Lo Evac ET tube has

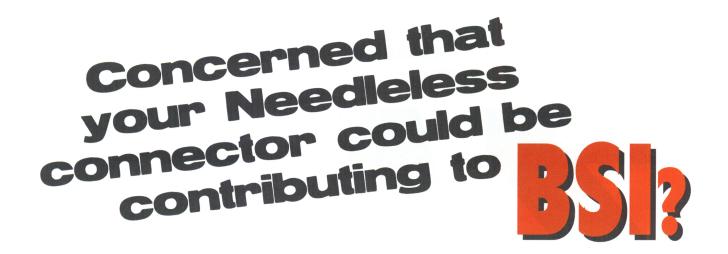
reduce the incidence of ventilator-

been clinically shown to

SEE THE MULTI-MEDIA PRESENTATION AT







Recent publications identify only one product which has the proven track record for infection control, and has also been proven to reduce contamination of the catheter hub.^{1,2}

CLAVE[®] NeedleFree Connector

1. Maragakis L. MD, MD; Karen L. Bradley, RN, BSN; Xiaoyan Song, MD, MS; Claire Beers, RN, MSN; Marlene R. Miller, MD, MSc; Sara E. Cosgrove, MD, MS; Trish M. Perl, MD, MSc. Increased Catheter-Related Bloodstream Infection Rates After the Introduction of a New Mechanical Valve Intravenous Access Port. ICHE; vol. 27, No.1, p. 67-70.

2. Bouza E, Munoz P, Lopez-Rodriquez J, Jesus Perez M, Rincon C, Martin Rabadan P, Sanchez C, Bastida E. A needleless closed system device (CLAVE) protects from intravascular catheter tip and hub colonization: a prospective randomized study. JIH (2003) 54: 279-287.





STERILE FIELD

WOUND MANAGEMENT

You can't argue with the facts.

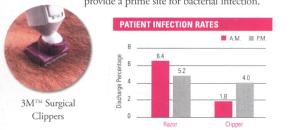
Using the 3M[™] Clip, Prep, Drape system can help improve patient outcomes.

Fact #1: Treating Healthcare Associated Infections (HAI) costs more than preventing them.

The Center for Disease Control (CDC) reports that for each case of HAI, hospitals spend an average of \$1,779 treating it.

Fact #2: Clipping is far superior to shaving.

Clinical evidence proves that as a method of pre-op body hair removal, clipping hair with surgical clippers is far superior to shaving! Shaving produces cuts, nicks and microscopic epidermal injury which provide a prime site for bacterial infection.



Fact #3: One-third of all Healthcare Associated Infections can be prevented.²

3M[™] Surgical Clippers, 3M[™] DuraPrep[™] Surgical Solution and 3M[™] Ioban[™] Antimicrobial Incise Drapes are all proven to control skin bacteria. And with a strong correlation between bacterial colonization and surgical site infection,³ controlling skin bacteria becomes of paramount importance.

Fact #4: Skin preps that go on fast and kill fast save you time and money.

The AORN, CDC and APIC recommend preoperative skin preps that are fast-acting, broad spectrum and provide residual action. In addition, 3M DuraPrep Surgical Solution provides another important difference – it requires less time to apply than traditional scrub and paint.

That means with today's high operating costs, less prep time is money saved.

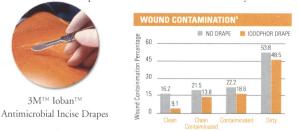
Skin Prepping Cost ⁴	DuraPrep Solution	Traditional 5-10 minute lodophor scrub and paint	
Time to Prepare Patient	3.5 minutes	9.7 minutes	
Total Cost	\$93.36	\$248.91	



3M[™] DuraPrep[™] Surgical Solution

Fact #5: Using the right incise drapes makes a clinical difference.

Even with the most careful and rigorous disinfection, bacteria remaining on the skin or regrowth during surgery can still contaminate the surgical site. 3M Ioban incise drapes help to eliminate this problem because they provide continuous antimicrobial activity and a sterile barrier.



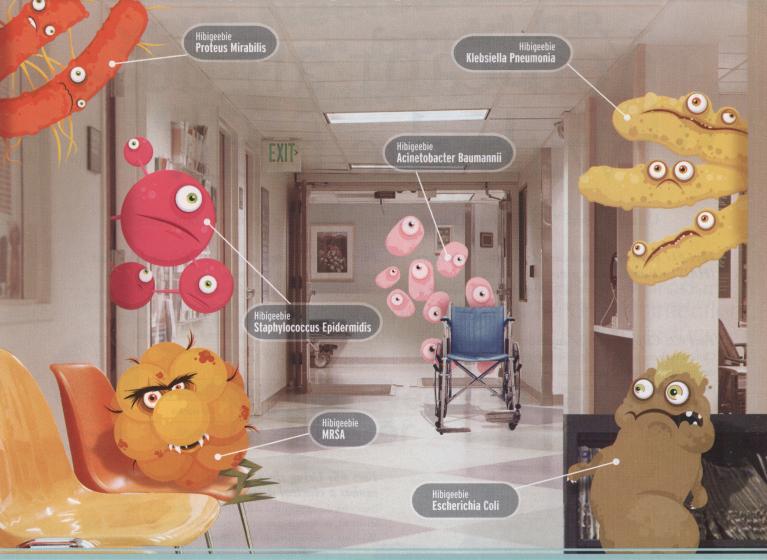
For more information, call the 3M Health Care Customer Helpline at 1-800-228-3957. 3M Infection Prevention Solutions. A vital step in Infection Prevention.

'Alexander, J.W., Fischer, J.E., Boyajian, M., et al: The influence of hair-removal methods on wound infections. *Archives of Surgery* 1983: 118:347-352. [◦]Jarvis, W.R. 1996. Selected aspects of the socioeconomic impact of nosocomial infections: morbidity, mortality, cost and prevention. Infection Control and Hospital Epidemiology. 17:552-557. [◦]Garibaldi, R.A., Cushing, D. and Lerer, T. 1991. Risk factors for postoperative infection. *American Journal of Medicine*, 1991, (Suppl 3B): 158S-163S. ¹Jacobson, Cassie, Osmon, Douglas R., Hanssen, Arlen, et al: Prevention of Wound Contamination Using DuraPrep[™] Solution plus Ioban[™] 2 Drapes. *Clinical Orthopaedics and Related Research*. Oct. 2005: Vol. 439. ¹Dewan, P.A., Van Ru, A.M., Robinson, R.G., et al: The use of iodophor-impregnated plastic incise drape in abdominal surgery = a controlled clinical trial. *Nur. J. Surg* 1987: 57:859-863.

3M Medical

from the 3M Health Care family

Hands and germs hang out in the same places. Especially in your hospital.



Hands are the first, and last, lines of defense against the spread of pathogens. It's not a job for just any antiseptic. The CDC advises that alcohol alone is not appropriate when hands are visibly dirty or contaminated with proteinaceous materials.¹

Compare washing with Hibiclens to using other antiseptic solutions like alcohol, iodine and PCMX:

- Broad-spectrum residual action lasts up to 6 hours after washing.²
- Efficacy is **not** compromised by contact with organic matter like blood.³
- Proprietary formulation is gentler on your skin.⁴
- For 34 years, the standard by which all others are compared
- Removes dirt and debris leaving hands clean.
- With Hibiclens as your first, and last, wash of the day, you'll have one less thing to worry about.

Kill the Hibigeebies with HIBICLERS Antimicrobial Antiseptic Skin Cleanser

HIBICLENS



ideline for Hand Hygiene in Health-Care Settings. Recommendations of the Healthcare Infection Control Practices Advisory Committee and the HICPAC/SHEAAPIC/IDSA Hand jiene Task Force.October 25, 2002 / Vol. 51 / No. RR-16. Accessed at: http://www.cdc.gov/mmwr/PDF/rr/r5116.pdf on 18 September 2005. Regent Medical Study #030917-150 Ispendent Lab Test Time-Kill Study 5 Minutes S. epidermidis ATCC #12228. Protocol #040907-150 "PRACS report #R05-0225 and R05-0871"

Hibiclens, Hibistat, Hibigeebies, the Hibiclens logo Hibistat logo and Molnlycke are registered trademarks of Molnlycke RM Ltd. and registered in the US, UK, and other countries globally. Distributed by Molnlycke Health Care US, LLC, Norcross, Georgia 30092. © 2006 Molnlycke RM Ltd. All rights reserved. **1.800.843.8497 www.hibigeebies.com** Published online by Cambridge University Press