

The following resources related to this article are available online at jada.ada.org (this information is current as of February 9, 2010):

Updated information and services including high-resolution figures, can be found in the online version of this article at:

<http://jada.ada.org/cgi/content/full/134/7/906>

Information about obtaining **reprints** of this article or about permission to reproduce this article in whole or in part can be found at:

<http://www.ada.org/prof/resources/pubs/jada/permissions.asp>

PREPARED BY THE ADA DIVISION OF SCIENCE ON BEHALF
OF THE ADA COUNCIL ON SCIENTIFIC AFFAIRS

Antiseptic antimicrobial hand washes

PRODUCT NAME AND MANUFACTURER

Hibiclens Antiseptic Antimicrobial Skin Cleanser—G.C. America, 3737 W. 127th St., Alsip, Ill. 60803, 1-800-323-3386, “www.gcamerica.com”

Hibiclens is a 4 percent chlorhexidine gluconate skin cleanser. Chlorhexidine, which is a broad-spectrum antimicrobial, exerts its properties by disrupting microbial cell membranes.¹ A cationic bisbiguanide chlorhexidine was introduced in the United States in the 1970s after decades of use in the United Kingdom and Canada.¹

CONSIDERATIONS FOR ACCEPTANCE— SAFETY AND EFFICACY DATA

Skin cleansers containing chlorhexidine gluconate have been shown to be effective antimicrobial agents.²⁻⁶ These studies demonstrated a significant, or at least a 2 logarithm, reduction in colony-forming units on hand surfaces washed with 4 percent chlorhexidine gluconate compared with control.

Chlorhexidine has broad-spectrum activity; however, it exhibits varying degrees of activity against different types of organisms. For example, studies have shown that chlorhexidine is more effective against gram-positive bacteria than it is against gram-negative bacteria; is minimally active against tubercle bacillus; is somewhat effective against fungi; demonstrates in vitro activity against HIV, herpes simplex virus, cytomegalovirus and influenza; and reduces



Bacillus atrophaeus spore (a surrogate of *B. anthracis*) contamination.⁷⁻¹⁰ Furthermore, antibiotic resistance may be predictive of a decreased susceptibility of microbes to chlorhexidine.^{11,12}

The antimicrobial effect of alcohol-based antiseptics is more rapid than that of chlorhexidine; however, a comparable reduction in flora is achieved after 30 seconds of hand washing.¹ Chlorhexidine binds strongly to skin, mucosa and other tissues, resulting in a persistent antimicrobial effect.¹³⁻¹⁵ This binding affinity also results in poor percutaneous and oral absorption. The activity of chlorhexidine is reduced in the presence of organic soil.¹⁶

The safety of chlorhexidine gluconate has been demonstrated for cleansing the skin of adults and infants, with a low potential for eliciting dermal reactions.¹⁷⁻¹⁹

Antiseptic hand wash products intended for use by health care workers are regulated by the U.S. Food and Drug Administration, or FDA, as over-the-counter drug products. The requirements for in vitro and in vivo testing of these products, as well as surgical hand scrubs, are described in the FDA Tentative Final Monograph for Health-care Antiseptic Drug Products.²⁰

CONTRAINDICATIONS AND ADVERSE EFFECTS

Hand washes that contain chlorhexidine are contraindicated in people who have shown a hypersensitivity reaction to chlorhexidine. Allergic reactions to chlorhexidine, however, are uncommon.¹⁹ Skin irritation is concentration-dependent, so products containing 4 percent chlorhexidine are the most likely to cause dermatitis with frequent use.²¹ Ototoxicity can result with middle ear contact. Corneal damage can result after eye contact.

1. Larson EL. APIC guideline for handwashing and hand antiseptics in health care settings. *Am J Infect Control* 1995;23(4):251-69.

2. Leyden JJ, McGinley KJ, Kaminer MS, et al. Computerized image analysis of full-hand touch plates: a method for quantification of surface bacteria on hands and the effect of antimicrobial agents. *J Hosp Infect* 1991;18(supplement B):13-22.

3. Butz AM, Laughon BE, Gullette DL, Larson EL. Alcohol-impregnated wipes as an alternative in hand hygiene. *Am J Infect Control* 1990;18:70-6.

4. Webster J, Faoagali JL. An in-use comparison of chlorhexidine gluconate 4% w/v, glycol-poly-siloxane plus methylcellulose and a liquid

soap in a special care baby unit. *J Hosp Infect* 1989;14(2):141-51.

5. Larson E, Mayur K, Laughon BA. Influence of two handwashing frequencies on reduction in colonizing flora with three handwashing products used by health care personnel. *Am J Infect Control* 1989; 17:83-8.

6. Larson DL, Eke PI, Laughon BE. Efficacy of alcohol-based hand rinses under frequent-use conditions. *Antimicrob Agents Chemother* 1986;30:542-4.

7. Denton GW. Chlorhexidine. In: Block SS. *Disinfection, sterilization, and preservation*. 4th ed. Philadelphia: Lea & Febiger; 1991: 274-89.

8. Montefiori DC, Robinson WE, Modiszewski A, Mitchell WM. Effective inactivation of human immunodeficiency virus with chlorhexidine antiseptics containing detergents and alcohol. *J Hosp Infect* 1990; 15:279-82.

9. Bernstein D, Schiff G, Echler G, Prince A, Feller M, Briner W. In vitro virucidal effectiveness of a 0.12%-chlorhexidine gluconate mouth rinse. *J Dent Res* 1990;69:874-6.

10. Weber DJ, Sickbert-Bennett E, Gergen MF, Rutala WA. Efficacy of selected hand hygiene agents used to remove *Bacillus atrophaeus* (a surrogate of *Bacillus anthracis*) from contaminated hands. *JAMA* 2003;289:1274-7.

11. Koljalg S, Naaber P, Mikelsaar M. Antibiotic resistance as an indicator of bacterial chlorhexidine susceptibility. *J Hosp Infect* 2002;51:106-13.

12. Irizarry L, Merlin T, Rupp J, Griffith J. Reduced susceptibility of methicillin-resistant *Staphylococcus aureus* to cetylpyridinium chloride and chlorhexidine. *Chemotherapy* 1996;42:248-52.

13. Ayliffe GAJ. Surgical scrub and skin disinfection. *Infect Control* 1984;5:23-7.

14. Coolman BR, Marretta SM, Kakoma I, Wallig MA, Coolman SL, Paul AJ. Cutaneous antimicrobial preparation prior to intravenous catheterization in healthy dogs: clinical, microbiological, and histopathological evaluation. *Can Vet J* 1998;39:757-63.

15. Nicoletti G, Boghossian V, Borland R. Hygienic hand disinfection: a comparative study with chlorhexidine detergents and soap. *J Hosp Infect* 1990;15:323-37.

16. Nicoletti G, Boghossian V, Gurevitch F, Borland R, Morgenroth P. The antimicrobial activity in vitro of chlorhexidine, a mixture of isothiazolinones ('Kathon' CG) and cetyl trimethyl ammonium bromide (CTAB). *J Hosp Infect* 1993;23:87-111.

17. Gongwer LE, Hubben K, Lenkiewicz RS, Hart ER, Cockrell BY. The effects of daily bathing of neonatal rhesus monkeys with an antimicrobial skin cleanser containing chlorhexidine gluconate. *Toxicol Appl Pharmacol* 1980;52:255-61.

18. Alder VG, Burman D, Simpson RA, Fysh J, Gillespie WA. Comparison of hexachlorophane and chlorhexidine powders in prevention of neonatal infection. *Arch Dis Child* 1980;55:277-80.

19. Rosenberg A, Alatry SD, Peterson AF. Safety and efficacy of the antiseptic chlorhexidine gluconate. *Surg Gynecol Obstet* 1976;143: 789-92.

20. U.S. Food and Drug Administration. Tentative final monograph for healthcare antiseptic drug products: proposed rule. *Fed Regist* 1994;59:31441-52.

21. Stingeni L, Lapomarda V, Lisi P. Occupational hand dermatitis in hospital environments. *Contact Dermatitis* 1995;33:172-6.

Hand hygiene

In October 2002, the Centers for Disease Control and Prevention, or CDC, released new guidelines for hand hygiene in health care settings.¹ These recommendations were developed by the CDC's Healthcare Infection Control Practices Advisory Committee, in collaboration with the Society for Healthcare Epidemiology of America, the Association of Professionals in Infection Control and Epidemiology and the Infectious Disease Society of America, to improve adherence to hand hygiene in health care settings. According to the CDC, using gloves in health care settings reduces hand contamination by 70 to 80 percent, prevents cross-contamination and protects patients and health care personnel from infection, but it does not eliminate the need for hand hygiene.

Some of the hand hygiene recommendations made in the CDC guidelines are:

- When hands are visibly dirty or contaminated with proteinaceous material or are visibly soiled with blood or other body fluids, wash hands with either a nonantimicrobial soap and water or an antimicrobial soap and water.

- If hands are not visibly soiled, wash with an antimicrobial soap and water or use an alcohol-based hand rub for routinely decontaminating hands.

- Decontaminate hands before having direct contact with patients.

- Decontaminate hands before donning sterile gloves.

- Decontaminate hands before inserting invasive devices that do not require a surgical procedure.

- Decontaminate hands after contact with a patient's intact skin.

- Decontaminate hands after contact with body fluids or excretions, mucous membranes, nonintact skin and wound dressings if hands are not visibly soiled.

- Decontaminate hands if moving from a contaminated-body site to a clean-body site during patient care.

- Decontaminate hands after contact with inanimate objects (including medical equipment) in the immediate vicinity of the patient.

- Decontaminate hands after removing gloves.

- Before eating and after using a restroom, wash hands with a nonantimicrobial soap and water or with an antimicrobial soap and water.

- Antimicrobial-impregnated wipes (for example, towelettes) may be considered as an alternative to washing hands with nonantimicrobial soap and

water. Because they are not as effective as alcohol-based hand rubs or washing hands with an antimicrobial soap and water for reducing bacterial counts on the hands of health care workers, they are not a substitute for using an alcohol-based hand rub or antimicrobial soap.

Hand hygiene preparations include plain (nonantimicrobial) soap, alcohol, chlorhexidine, chloroxylenol, hexachlorophene, iodine and iodophors, quaternary ammonium compounds and triclosan.

In addition to regular hand washing with soap and water, the new CDC hand hygiene guidelines also recommend the use of alcohol-based hand rubs. This recommendation was made to address the obstacles to frequent hand washing in health care settings. The benefits of using alcohol-based hand rubs are that they are fast-acting, they are more accessible than sinks, they take less time to use, and skin irritation or allergic contact dermatitis is very uncommon. Hand rub dispensers

should not be placed near sinks, where they could be confused with soap dispensers.

Since these recommendations were made, the installation of alcohol-based hand rub dispensers has raised fire safety concerns in hospitals. These hand rubs are classified as a class I flammable liquid, which limits placement of dispensers, volume of solution in storage and disposal of containers.

Later this year, the CDC and ADA will be issuing revised recommendations encompassing all infection control practices in the dental office.

For the complete CDC Hand Hygiene Guidelines, visit "www.cdc.gov/handhygiene/". ■

1. Boyce JM, Pittet D. Guideline for hand hygiene in health-care settings: recommendations of the Healthcare Infection Control Practices Advisory Committee and the HICPAC/SHEA/APIC/IDSA Hand Hygiene Task Force. Society for Healthcare Epidemiology of America/Association for Professionals in Infection Control/Infectious Diseases Society of America. *MMWR Recomm Rep* 2002;51(RR-16): 1-45.