

# The Role of Chlorhexidine in Vascular Access: Protecting Your Patient

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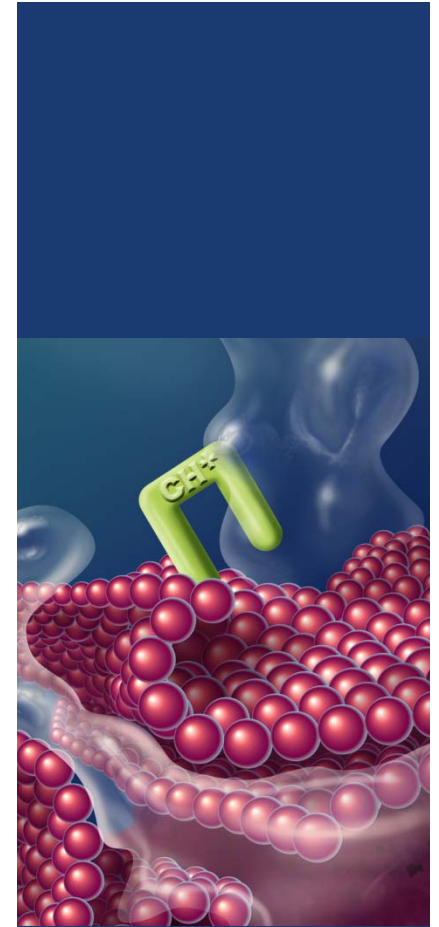
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## ACCREDITATION:

This program has been approved by the California Board of Registered  
Nursing, Provider #CEP 12422 for 1.0 Contact Hour.



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# Learning Objectives

- Discuss the antimicrobial properties of chlorhexidine.
- Compare and contrast the efficacy of alternative antimicrobials.
- List three uses of chlorhexidine in healthcare.
- Apply current standards of care and the tools described in the webinar to your clinical practice.

# Continuing Education Credit (CE)

- At the end of this webinar, you can obtain 1.0 contact hours by going to: [www.ChlorhexidineFacts.org](http://www.ChlorhexidineFacts.org) and click on: [Click Here for Webinar Credit](#)
- Complete the evaluation form
- Upon successful submission, you will receive your certificate of completion via e-mail to the address you enter in the course evaluation within 7 days
- Provider (Arrow International) is approved by the California Board of Registered Nursing. Provider #12422

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# The Role of Chlorhexidine in Vascular Access: Protecting Your Patient

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Professor of Medicine

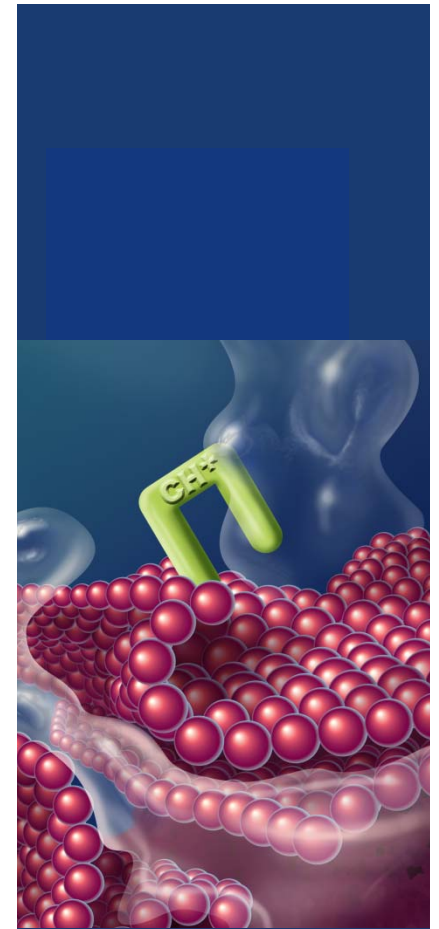
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# Financial Disclosures

- Consulting/Speaking:  
Theradoc, Schering-Plough, Ortho-McNeil,  
Wyeth/Pfizer, Forest Pharmaceuticals and  
Teleflex.

# Overview

- Healthcare-associated infection (HAI) update
- “Alternative” antimicrobials and antiseptics
- Chlorhexidine (CHG) – properties, mechanism of action
- CHG uses in healthcare
- Implementing CHG solutions in healthcare

# 100,000 People Die Each Year With HAIs





# HAI: Scope of the Problem

- Approximately 2 million patients acquire HAIs each year in the US
  - ~ 10 HAI/1,000 patient days<sup>1</sup>
  - 90,000 deaths<sup>1</sup>
  - ~ 5 billion dollars/year in attributable cost<sup>1</sup>
  - 80,000-92,011 CLABSIs per year <sup>2,3</sup>
  - 28,000 CLABSI deaths per year<sup>2</sup>
- Increasing recognition of HAI as patient safety issue
  - Regulatory – Medicare reimbursements
  - Media – Public reporting of hospital infections
  - Lawyers

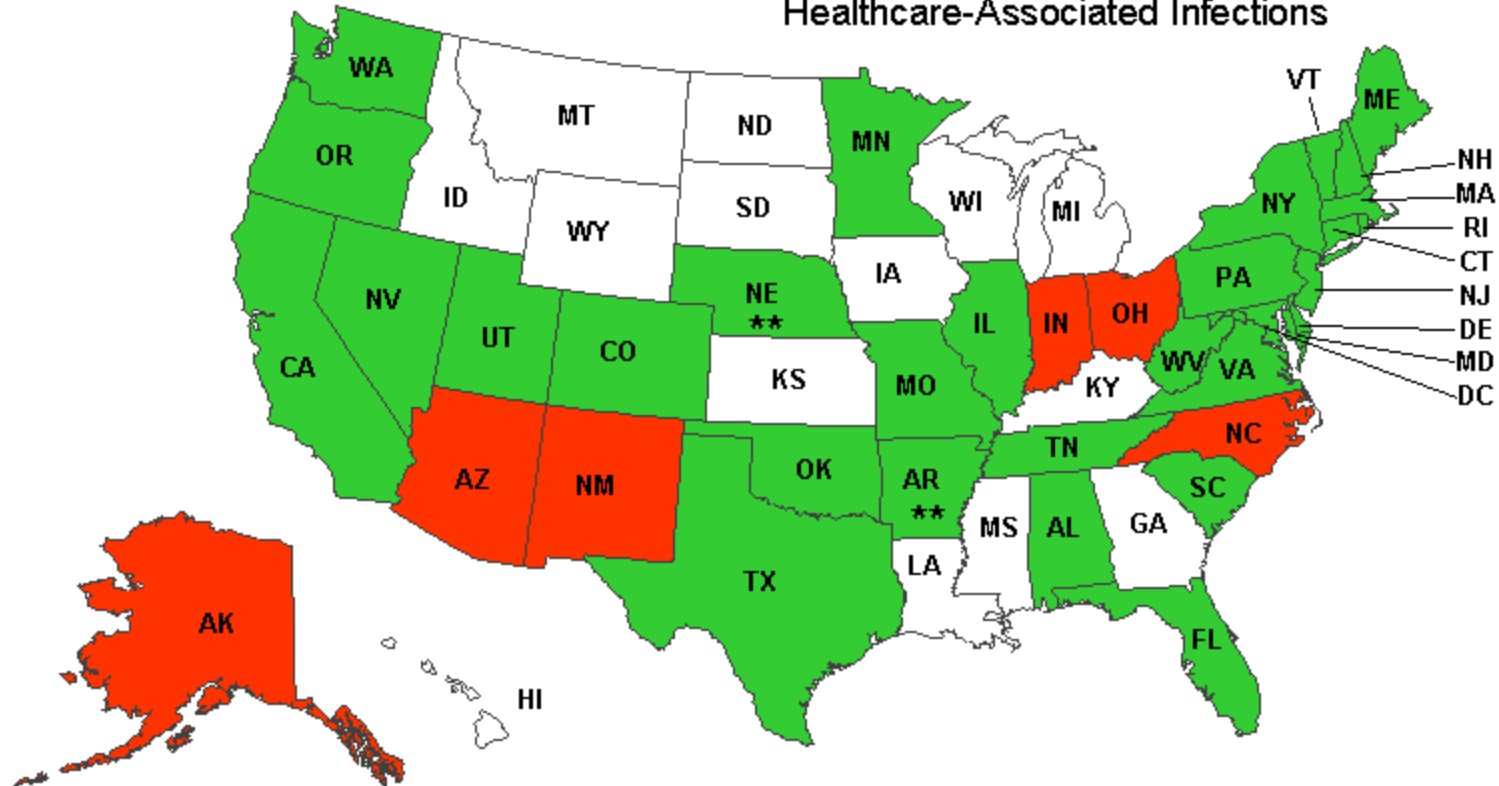
1) Klevens, Public Health Reports, 2007

2) Pronovost P, Needham D, Berenholtz S, et al. An intervention to decrease catheter-related bloodstream infections in the ICU. *N Engl J Med* 2006;355(26):2725

3) Scott RD. *The Direct Medical Costs of Healthcare-Associated Infections in U.S. Hospitals and the Benefits of Prevention*. Atlanta. 2009.

# HAI Reporting Laws and Regulations

States That Have Enacted Laws Relating to Reporting of Healthcare-Associated Infections



## ORIGINAL ARTICLE

## Underresourced Hospital Infection Control and Prevention Programs: Penny Wise, Pound Foolish?

Deverick J. Anderson, MD, MPH; Kathryn B. Kirkland, MD; Keith S. Kaye, MD, MPH; Paul A. Thacker II, BS; Zeina A. Kanafani, MD; Grace Auten, MD; Daniel J. Sexton, MD

TABLE 1. Cost Estimates for Specific Healthcare-Associated Infections (HAIs)

HAI type	Weight-adjusted cost per HAI, mean $\pm$ SE	Range of published estimates of cost per HAI
Ventilator-associated pneumonia <sup>10,11,25-28</sup>	25,072 $\pm$ 4,132	8,682-31,316
Healthcare-associated bloodstream infection <sup>29-33</sup>	23,242 $\pm$ 5,184	6,908-37,260
Surgical site infection <sup>17-24</sup>	10,443 $\pm$ 3,249	2,527-29,367
Catheter-associated urinary tract infection <sup>19,34</sup>	758 $\pm$ 41	728-810

NOTE. HAIs are defined on the basis of Centers for Disease Control and Prevention criteria.<sup>16</sup> Data are in 2005 US dollars.

# Hospital-Acquired Conditions for Potential Reduced Payment: Finalized by CMS August 2008<sup>1</sup>

- Catheter-associated urinary tract infections
- Vascular catheter-associated bloodstream infection (BSI)
  - CMS now has a specific code for central-line vascular catheters (CVC)
- Surgical site infection
  - Mediastinitis after coronary artery bypass graft (CABG) surgery. This infection has a specific complication code
- Selected orthopedic surgeries – Spinal fusion and other surgeries of the shoulder and elbow
- Bariatric surgery for morbid obesity - laparoscopic gastric bypass and gastroenterostomy

1) <https://www.premierinc.com/safety/topics/guidelines/cms-guidelines-4-infection.jsp>

# Centers for Medicare & Medicaid Services (CMS) - Value Based Purchasing Program<sup>1</sup>

- Pay for performance (P4P) program that links Medicare payment to the quality performance of hospitals
- Performance period began July, 2011
- Payments effected beginning federal fiscal year (FFY) 2013
- Will be phased in over 3 years
- CMS will calculate two scores for each measure
  - An achievement score and an improvement score
  - A final score for each measure will be the higher of the two scores
- Scores based on process of care, patient experience and outcomes.

1) [http://www.cms.gov/HospitalQualityInits/downloads/0210\\_Slides.pdf](http://www.cms.gov/HospitalQualityInits/downloads/0210_Slides.pdf)

# Value-Based Purchasing (VBP)

## Process of Care Measures

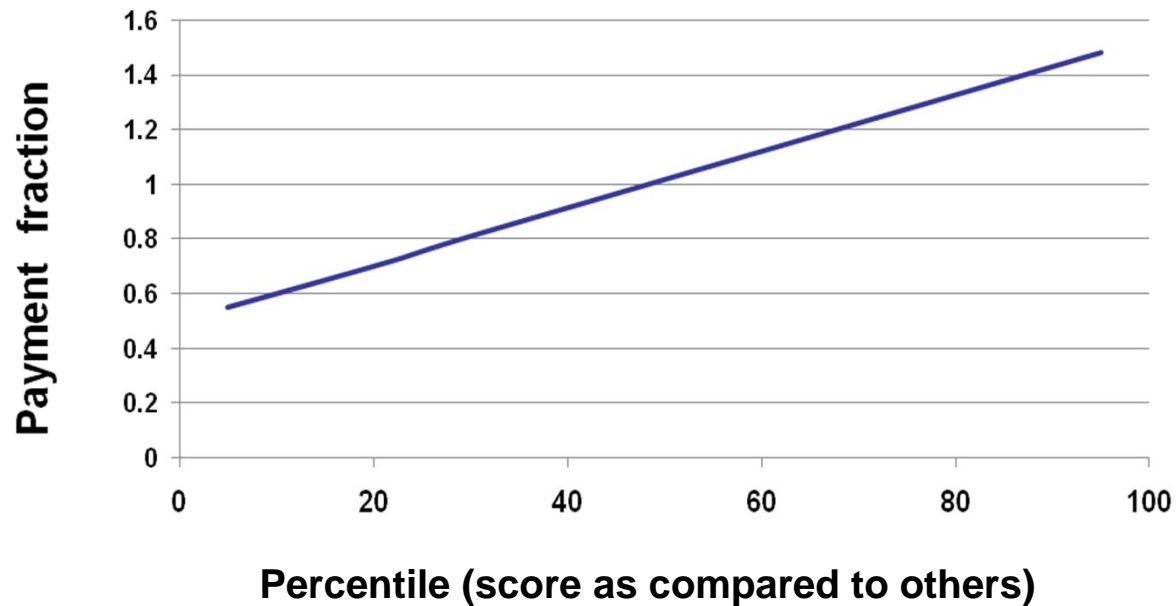
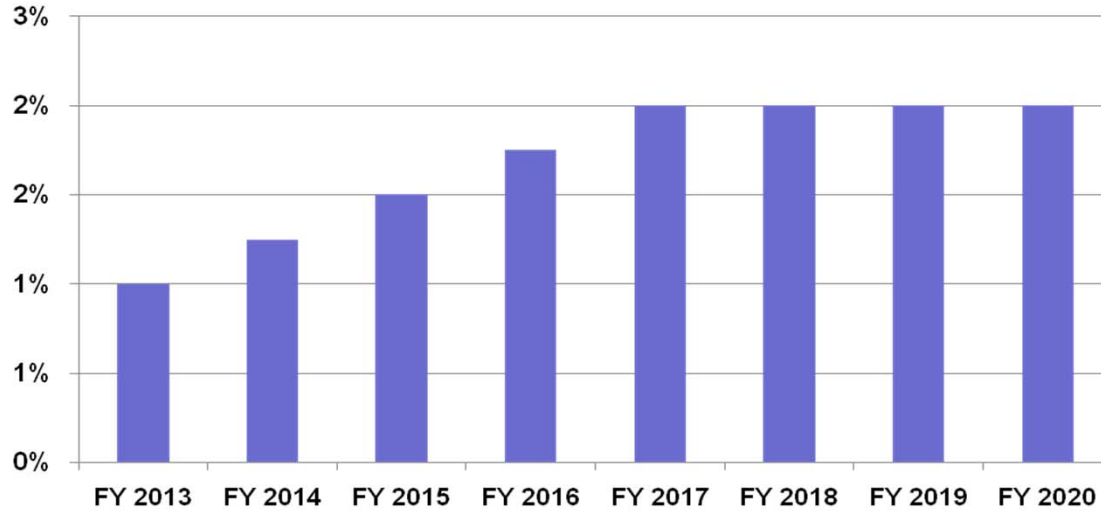
- Acute Myocardial Infarction (AMI)–7a -Fibrinolytic Therapy Received Within 30 Minutes of Hospital Arrival
- AMI–8a -Primary PCI Received Within 90 Minutes of Hospital Arrival
- Heart Failure (HF)–1 -Discharge Instructions
- Pneumonia (PN)–3b -Blood Cultures Performed in the Emergency Department (ED) Prior to Initial Antibiotic Received in Hospital.
- PN–6-Initial Antibiotic Selection for CAP in Immunocompetent Patient
- Surgical Care Improvement Project (SCIP)–Inf-1 -Prophylactic Antibiotic Received Within 1 Hour Prior to Surgical Incision
- SCIP–Inf-2 -Prophylactic Antibiotic Selection for Surgical Patients
- SCIP–Inf-3 -Prophylactic Antibiotics Discontinued Within 24 Hours After Surgery
- SCIP–Inf-4 -Cardiac Surgery Patients w/ Controlled 6AM Postoperative Serum Glucose
- SCIP–VTE–1 -Surgery Patients with Recommended Venous Thromboembolism Prophylaxis Ordered
- SCIP–VTE–2 -Surgery Patients Who Received Appropriate Venous Thromboembolism Prophylaxis Within 24 Hours Prior to Surgery to 24 Hours After Surgery
- SCIP-Card -Surgery Patients on Beta Blocker Prior to Arrival that Receive a Beta Blocker During the Preoperative Period

# VBP Outcome Measures (FFY 2014)

- **Mortality Measures**
  - AMI 30-day mortality
  - HF 30-day mortality
  - PN 30-day mortality
- **AHRQ PSI and IQI Composite Measures**
  - Complication/patient safety for selected indicators (composite)
  - Mortality for selected medical conditions (composite)
- **HAC Measures**
  - Foreign Object Retained After Surgery
  - Air Embolism
  - Blood Incompatibility
  - Pressure Ulcer Stages III & IV
  - Falls and Trauma (fracture, dislocation, intracranial injury, burn, electric shock)
  - **Vascular Catheter-Associated Infections**
    - Catheter-Associated Urinary Tract Infection (UTI)
    - Manifestations of Poor Glycemic Control

# Medicare Payment Cuts and Payment Adjustments

Medicare payment cuts





# Infection Control-Defined Infections Used as Quality Metrics: Getting to Zero

- CDC definitions developed for surveillance purposes
  - Overly sensitive, not extremely specific
  - Not always clinically relevant
- These definitions are now being publicly reported, used to determine hospital payments
- Reported on administrative dashboards, balanced scorecard
- Now increasing fiscal impact in P4P programs
- More pressure on infection control to eliminate ALL HAIs

# Antimicrobials and Antiseptics

- Antimicrobial agents: agents that can kill microorganisms or suppress their multiplication or growth
  - Antibiotic: an antimicrobial that is produced by a microorganism
- Antiseptic agents: agents that destroy pathogenic organisms to prevent infection
- Differences between antimicrobials and antiseptic agents
  - Antimicrobials are often given systemically to kill bacteria and/or treat infections
  - Antiseptics are often applied topically to person or device to prevent or arrest the cultivation of microorganisms and prevent infection
  - Resistance to many antimicrobials develops relatively rapidly

# Use of Antimicrobials and Antiseptics to Prevent Infections

- Systemic (eg pre-operative prophylaxis)
- Topical (skin prep prior to insertion of central vascular catheter)
- Disinfection (eg oral care of mechanically ventilated/intubated patient)
- Source control (pre-operative bathing of patients with antimicrobial agents)
- Coating/impregnating of medical devices to protect from colonization and infection

# Silver

- Heavy metal
- Long history in medicine and public health (>6000 years)
- Broad spectrum antimicrobial, but need high concentrations
- Poorly soluble, limited skin penetration
- Mechanism of Action (MOA):
  - Targets bacterial plasma or cytoplasmic membrane
  - Causes release of K<sup>+</sup> from bacteria
- Hemodialysis catheters, endotracheal tubes, urinary catheters, wound care
- Limitations: duration of activity; limited track record in clinical infection

# Povidine Iodine (PI)

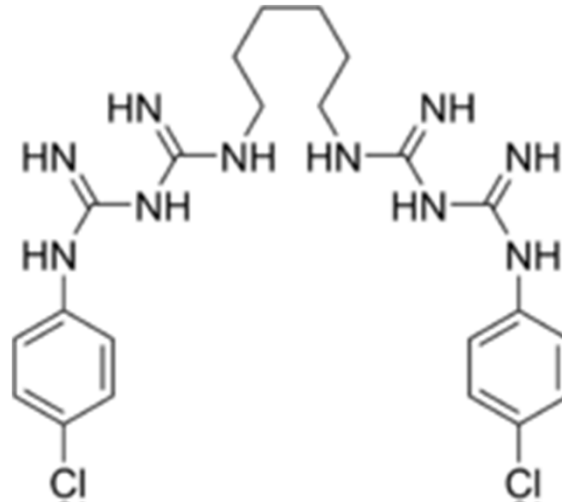
- Preferred iodine antiseptic since 1955
- Broad spectrum: bacteria, fungi, viruses, protozoans
- No evidence that bacteria develop resistance to PI
- Uses
  - Treatment of minor wounds/ skin infection
  - Treatment of ulcers
  - Pre and post-operative skin cleansing
- Limitations
  - Skin irritation
  - Staining of surrounding tissues

# Alcohol

- Isopropyl alcohol, ethyl alcohol, propanol
- Optimal antimicrobial activity at 50-90% concentration<sup>1</sup>
- Mechanisms of action: membrane disruption, protein denaturation and cell lysis
- Rapid onset of activity, but doesn't last long
- Broad spectrum activity versus bacteria, fungi, viruses
- Uses include:
  - Skin antisepsis
    - Disinfecting pads
    - Surgical patient preparation (in combination with other agents)
  - Waterless hand hygiene, surgical scrub
  - Disinfectant of hard surfaces

1) Mcdonnell, Clin Micro Rev, 1999, 147-179

# Chlorhexidine



- In healthcare, Chlorhexidine Digluconate (CHG) is one of the common forms of Chlorhexidine
  - Soluble in water - - enhances delivery of CHG
  - Commonly used in a solution with alcohol
- Chlorhexidine Diacetate (DHA) has been bonded with polyurethane for use in medical devices

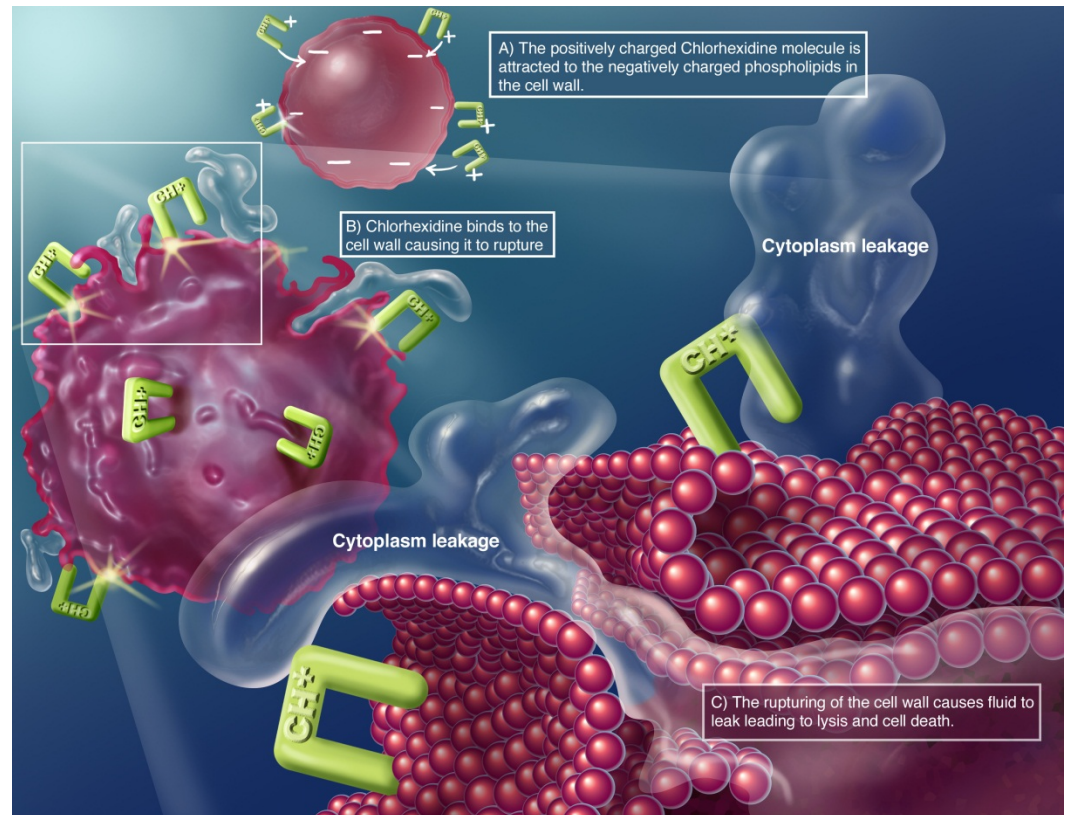
# Chlorhexidine's Mechanism of Action (1)

- Broad spectrum (Gram-positive and Gram-negative bacteria, fungi and enveloped viruses )
- Bactericidal and/or bacteristatic depending on concentration
- Works rapidly (can kill 100% of bacteria within 30 seconds)
- Can kill all categories of microbes
  - Little risk for development of resistance



# Chlorhexidine's Mechanism of Action (2)

- Binds to cell wall –  
interferes with osmosis  
–Destabilizes, but does not lyse cell
- Then binds to cytoplasmic (inner) membrane – - - - - > leakage of intercellular contents - - - - > cell death
- Some ability to inhibit development of biofilm formation



# Antimicrobial Resistance

- MOA of a Antibiotic
  - Slow Acting
  - Limited Spectrum
  - Specific MOA for select organisms
  - Slow action and specific MOA creates resistant organisms (i.e. MRSA, VRE)
- MOA of Chlorhexidine
  - Fast Acting
  - Broad spectrum (Gram-Positive, Gram-Negative and Fungi)
  - Nonspecific MOA for all organisms (disrupts the cell wall)
  - Short exposure and non-organism specific MOA limits resistance
  - 60 Years of Use without resistance in a clinical setting

# Chlorhexidine's Mechanism of Action in Healthcare Applications

- Skin

- Binds to proteins in human tissue
- Substantivity: released over extended period of time with limited bodily absorption
- Antimicrobial activity can last up to 48 hours
- Not effected by presence of bodily fluids

- Oral

- Binds to mouth or oral mucosa
- Released over time
- Can prevent dental plaque

- Medical Devices

- Impregnated into dental implants, vascular catheters, needless IV connectors and dressings
- Kills organisms, prevents colonization & biofilm formation

# History of Chlorhexidine in Healthcare: 60 Years of Killing Microbes

- 1950s – Discovered
- 1954 – CHG introduced commercially in UK – disinfectant and topical antiseptic
- 1970s – Handwashing with chlorhexidine shown to reduce skin flora by ~ 90%
- 1976 – Ability to inhibit dental plaque demonstrated
- 1981 – First urologic lubricant with chlorhexidine cleared
- 1988 – First 2% chlorhexidine and alcohol skin prep combination launched in US
- 1992 – First chlorhexidine-based vascular catheter becomes available (impregnated with chlorhexidine and silver sulfadiazine)
- 1993 – First chlorhexidine-impregnated sponge dressing cleared
- 2005 – First chlorhexidine cloth for bathing is cleared
- 2005 – First 3.15% chlorhexidine and alcohol skin prep cleared by the FDA
- 2010 – First chlorhexidine-impregnated end caps are cleared
- 2010 – First chlorhexidine based peripherally inserted central catheter (PICC) is cleared for antimicrobial indication
- 2012 – Chlorhexidine PICC cleared for antithrombogenic indication

# Benefits and Uses of Chlorhexidine (1)

- Skin care
  - Chlorhexidine cloths demonstrated greater reduction in vancomycin-resistant enterococcus (VRE) than soap or water
- Preoperative scrub for patients
  - Preop skin preparation with chlorhexidine and alcohol combination was associated with reduction in surgical site infection (SSI); greatest reduction in skin bacteria for up to 24 hours
- Urology
  - Part of protocol for urinary catheter insertion
  - 0.005% chlorhexidine concentrate bladder irrigation has been shown to reduce urinary tract infections during prolonged urinary catheterization

# Benefits and Uses of Chlorhexidine (2)

- Ventilator oral care
  - Used as part of an oral care bundle
- Hand hygiene
  - Many hand hygiene products in hospitals contain both chlorhexidine and alcohol
  - Longer duration of action than alcohol
  - Surgical scrub – antimicrobial activity lasts up to 6 hours
- Vascular Access (to be addressed later in the webinar)
  - Catheters
  - Skin prep
  - Needleless connectors
  - Dressings

# Managed Risk

- Follow product instructions and organizational guidelines
- Reactions are rare
- Recognizing Sensitivity
  - Minor Reactions (Contact dermatitis, photosensitivity and contract urticaria)
    - Discontinue chlorhexidine use
    - Seek an alternative antimicrobial or non-antimicrobial device
  - Severe Reactions (Anaphylactic shock)
    - Discontinue chlorhexidine use
    - Provide immediate respiratory and cardiovascular support
    - Report the reaction

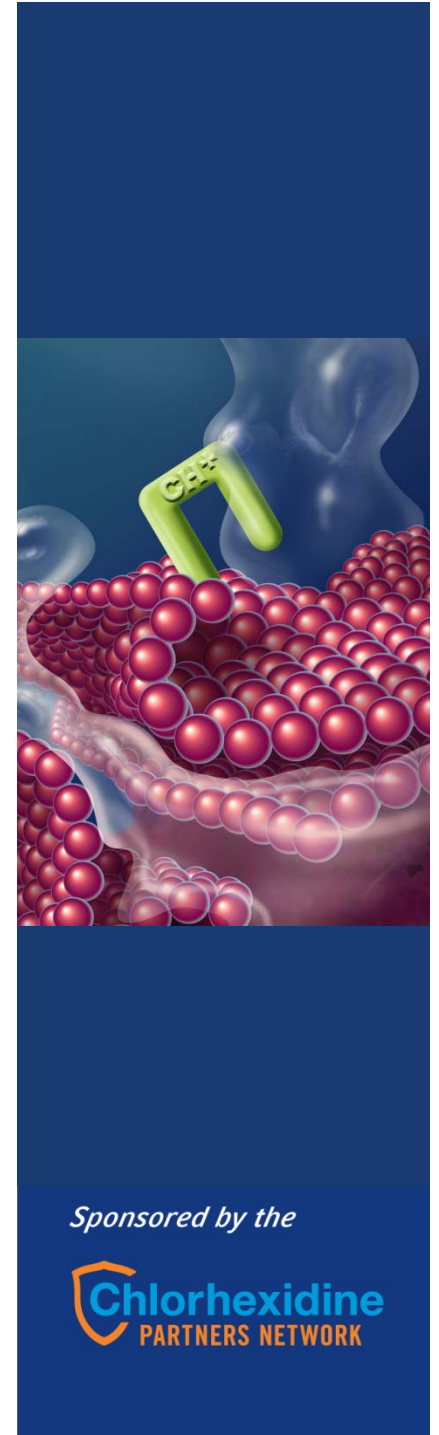
# Managed Risk

- Mitigating Risk
  - Immunoglobulin E (IgE) antibodies
  - IgE/sensitivity tests (Phadia AB<sup>®</sup> and Reflab ApS<sup>®</sup>)
  - If suspected or confirmed
    - Document
    - Alternative antimicrobial (ex. Povidone Iodine)
    - Non-antimicrobial devices



# The Role of Chlorhexidine in Vascular Access: Protecting Your Patients

Constance Girgenti, RN, VA-BC  
Vascular Access Coordinator  
Provena Saint Joseph Medical Center



# Disclosures

## Financial Disclosure:

- Speaker/Advisor/Consultant: Genentech, MedComp, Access RN & Teleflex.

# Overview

- Understand the role of Chlorhexidine options available for Vascular Access Specialists
- Understand the standards of care recommending Chlorhexidine

# Chlorhexidine and Vascular Access: Hand Hygiene

- Must be practiced
- Alcohol based hand sanitizers
- Antiseptic soaps & detergents
- Non-antimicrobial soaps
- Chlorhexidine/alcohol solutions
  - Solutions with Alcohol/Chlorhexidine are superior to alcohol only<sup>1</sup>
  - Shown to Reduce Skin Flora by 86% - 92%<sup>2</sup>
  - Longer Duration<sup>3</sup>



1) United States. CDC. Guideline for Hand Hygiene in Health-Care Settings. By John M. Boyce and Didier Pittet. CDC, 25 Oct. 2002. Web. 8 Aug. 2013.  
2) Milstone, Aaron M., Catherine L. Passaretti and Trish M. Perl. "Healthcare Epidemiology: Chlorhexidine: Expanding the Armamentarium for Infection Control and Prevention." *Clinical Infectious Diseases* 46.2 (2008): 274-81. Print.  
3) Lim, K. S. and P. A. A. Kam. "Chlorhexidine--pharmacology and Clinical Applications." *Anaesthesia and Intensive Care* 36.4 (2008). Print.

# Standards of Care Hand Hygiene

- **Infusion Nurses Society 2011** Hand hygiene must be performed before and after touching a patient, and before handling an invasive device. Alcohol-based hand rubs are preferred.
- **Center for Disease Control 2011** Proper hand hygiene can be achieved through the use of either an alcohol based product or with soap and water with adequate rinsing.
- **Society for Healthcare of America/Infectious Disease of America** Perform hand hygiene before catheter insertion or manipulation, using an alcohol-based waterless product or antiseptic soap and water.



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# Chlorhexidine Skin Prep

- ChloraPrep® by CareFusion
  - 2% Chlorhexidine and 70% Isopropyl Alcohol
- ChloraScrub™ by PDI
  - 3.15% Chlorhexidine and 70% Isopropyl Alcohol



# Chlorhexidine Skin Prep

- Evidence in Vascular Access
  - Superior to Povidone Iodine
    - 50% Risk Reduction for CLABSI compared to povidone iodine<sup>1</sup>
  - Alcohol/Chlorhexidine Combination
    - Alcohol
      - Quick Kill Rate and Broad Spectrum<sup>2</sup>
    - Chlorhexidine
      - 20 Second Kill Rate and Broad Spectrum<sup>3</sup>
      - Antimicrobial Activity on the Skin for 48 hrs.<sup>4</sup>
      - Antimicrobial Activity on the Skin for 7 Days – 3.15% CHG solution<sup>5</sup>
      - Binds to Skin Proteins<sup>4</sup>
  - Recommended as Part of the CLABSI Reduction Bundle

1) Lim, K. S. and P. A. A. Kam. "Chlorhexidine--pharmacology and Clinical Applications." *Anaesthesia and Intensive Care* 36.4 (2008). Print.

2) Health Organization. WHO Guidelines on Hand Hygiene in Health Care. WHO, 2009. Web. 13 Aug. 2012.

3) McDonnell, Gerald and A. Denver Russell. "Antiseptics and Disinfectants: Activity, Action and Resistance." *Clinical Microbiology Reviews* 12.1 (1999): 147-79. Print.

4) Hibbard J. Analysis comparing the antimicrobial activity and safety of current antiseptics: a review. *Journal of Infusion Nursing* 2005; 28(3): 194-207.

5) Data on file. Nice Pak.

# Standards of Care

## Skin Prep

- **Infusion Nurses Society 2011** Chlorhexidine solution is preferred for skin antisepsis.
- **Center for Disease Control 2011** Prep skin with a >0.5 % Chlorhexidine preparation with alcohol before central venous catheter and peripheral arterial catheter insertion and during dressing changes.
- **Society for Healthcare of America/Infectious Disease of America** Use a Chlorhexidine-based antiseptic for skin preparation in patients older than 2 months.



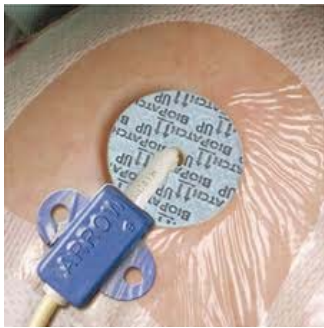
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# Chlorhexidine Dressing & Vascular Access

- BioPatch<sup>®</sup> by Ethicon (Chlorhexidine Sponge)
- Tegaderm CHG<sup>®</sup> by 3M (Chlorhexidine Gel)
- IV Clear<sup>™</sup> by Covalon (Chlorhexidine/Silver Dressing)
- GuardIVa<sup>™</sup> by Hemcon (Chlorhexidine/Hemostatic Dressing)



BioPatch and Ethicon are registered trademarks of Ethicon Inc.

3M<sup>™</sup> and Tegaderm<sup>™</sup> are trademarks of 3M.

IV Clear and Covalon are registered trademarks of Covalon Technologies Ltd.

HemoCon and GuardIVa are trademarks or registered trademarks of Hemcon Technologies Incorporated.

# Chlorhexidine Dressings

- All of these have a broad spectrum antimicrobial activity lasting 7 days
- Used at the time of insertion
- Used in an effort to reduce CLABSI
- The chlorhexidine sponge dressing:
  - 60% reduction in CRBSI<sup>1</sup>
  - 44% reduction in local site infection<sup>2</sup>

1) Mermel, L. A. "New Technologies to Prevent Intravascular Catheter-related Bloodstream Infections." *Emerging Infectious Diseases* 7.2 (2001): 197-99. Print.

2) Maki, D.G., L.A. Mermel, Genthner D and Hua S Chiacchierini RP. An evaluation of BIOPATCH® Antimicrobial Dressing compared to routine standard of care in the prevention of catheter-related bloodstream infection. Johnson & Johnson Wound Management, a division of ETHICON, INC. 2000. Data on file.



# Standards of Care Dressings

- **Infusion Nurses Society 2011** The use of a Chlorhexidine–impregnated dressing with short term central vascular access devices should be considered.
- **Center for Disease Control 2011** Use a Chlorhexidine-impregnated sponge dressing for temporary short-term catheters. No recommendation is made for other types of Chlorhexidine dressings. *Unresolved issue*
- **Society for Healthcare of America/Infectious Disease of America**  
Use Chlorhexidine-containing sponge dressings for CVCs.



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# Chlorhexidine & Vascular Access Catheters

- **ARROWg<sup>+</sup>ard Blue<sup>®</sup> by ARROW – 1<sup>st</sup> Generation**
  - Chlorhexidine Acetate/Silver Sulfadiazine (Externally Impregnated Only)
- **ARROWg<sup>+</sup>ard Blue PLUS<sup>®</sup> by ARROW – 2<sup>nd</sup> Generation**
  - Chlorhexidine Acetate/Silver Sulfadiazine (3 Times the Chlorhexidine Impregnated Externally and Chlorhexidine Only Internally)
- **Chlorag<sup>+</sup>ard<sup>®</sup> by ARROW – 3<sup>rd</sup> Generation**
  - Chlorhexidine Acetate (Impregnated Internally and Externally)
- **Chlorhexidine-Impregnated Catheters Are Used to Protect Against CLABSI**



# Chlorhexidine & Vascular Access Devices

- Chlorhexidine/Silver Sulfadiazine Catheters
  - Demonstrated 79% Reduction in CRBSI<sup>1</sup>
  - Over 30 Published Studies<sup>2</sup>
  - 20 Years of Use
- Chlorhexidine PICC (3<sup>rd</sup> Generation)
  - Indicated as antimicrobial and antithrombogenic
    - 99.99% reduction in colonization for gram-positive and gram-negative, and fungi for at least 30 days<sup>3</sup>
    - 61% reduction in thrombus for at least 30 days<sup>3</sup>

1) Maki, D.G., S. M. Stolz, S. Wheeler and L.A. Mermel "Prevention of Central Venous Catheter-Related Bloodstream Infection With an Antiseptic-Impregnated Catheter: A Randomized, Controlled Trial." *Annals of Internal Medicine*, August 15, 1997, Vol. 127, Issue 4, pp. 257–266.

2) ARROWg+ard Clinical Bibliography. Arrow International Website.

3) Data on File, Teleflex Incorporated.

# Standards of Care

## CVADs

- **Infusion Nurses Society 2011** The nurse should collaborate with the multidisciplinary team to consider anti-infective CVADs. These include devices coated with or impregnated with Chlorhexidine and Silver Sulfadiazine.
- **Center for Disease Control 2011** Use a Chlorhexidine/Silver Sulfadiazine or Minocycline/Rifampin impregnated CVAD in patients whose catheter is expected to remain in place greater than 5 days.
- **Society for Healthcare of America/Infectious Disease of America** Use antiseptic or antimicrobial-impregnated CVCs for adult patients.



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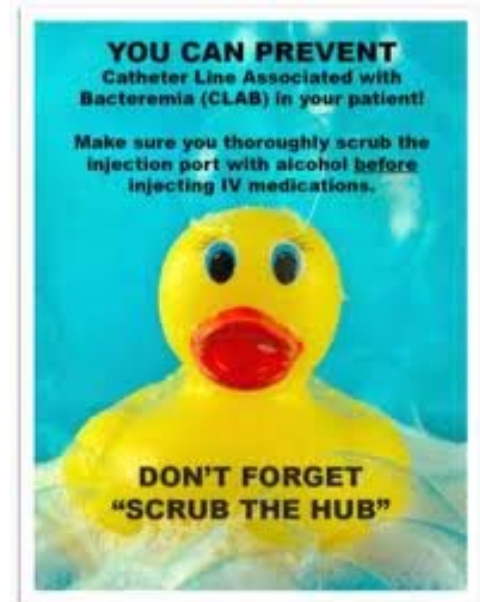
# Chlorhexidine & Needless Connectors

- InVision-Plus CS<sup>®</sup> by RyMed
  - Chlorhexidine & Silver impregnated septum
  - Active microbial kill for 7 days
  - Adding Chlorhexidine to silver
  - 7 Log reduction proven *in vitro*<sup>1</sup>:
    - *MRSA*
    - *E. coli*
    - *S. aureus*
    - *P. aeruginosa*
    - *A. baumannii*
    - *S. Epidermis*
    - *K. pneumoniae*
    - *C. albicans*



# Chlorhexidine and “Scrubbing the Hub”

- Before accessing any CVAD
  - Using Friction
- Isopropyl Alcohol
- Chlorhexidine
- “Chlorhexidine/alcohol solution appears to be most effective in reducing colonization.”
  - 2011 CDC Guidelines





# Standards of Care

## “Scrubbing the Hub”

- **Infusion Nurses Society 2011** The needleless connector should be consistently and thoroughly disinfected using alcohol or Chlorhexidine gluconate/alcohol combination prior to each access.
- **Center for Disease Control 2011** To minimize the contamination risk by scrubbing the access port with Chlorhexidine or alcohol.
- **Society for Healthcare of America/Infectious Disease of America** Before accessing catheter hubs or injection ports, clean them with an Chlorhexidine preparation or 70% alcohol to reduce contamination.



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# Standard of Care & Chlorhexidine

American Society of  
Anesthesiologists 



IHI



World Health  
Organization

# Conclusion

- Chlorhexidine is an effective antiseptic
- Preparations combined with alcohol provide more rapid and longer reductions in bacterial counts
- Venous catheter infection can be reduced
  - Hand washing
  - Skin prep
  - Dressing
  - End caps
  - Coated catheters

Achieving Zero is the GOAL!

# Getting Chlorhexidine Into Your Hospital (1)

- Standard of care/as part of evidence-based bundles
- Regulatory requirements focused on infection and antimicrobial resistance prevention
- Public reporting
- Decreased reimbursement for central line-associated bloodstream infection (CLABSI)

# Getting Chlorhexidine Into Your Hospital (2)

- Prioritize items/devices you want or need
- Discuss with key administrators/clinicians
- Align your goals with goals of institution/key leaders
- Make a business case

# Cost Estimates for CLABSI

- CLABSI - \$56,267<sup>1</sup>

1) Dimick, Arch Surg, 2001

# Additional Costs of Multi-Drug Resistant Organisms (MDROs)

Clostridium difficile (C. diff): ~ \$5,000/episode

MRSA Infection: ~ \$5,000/episode

ESBL: ~ \$10,000

Acinetobacter: ~ \$20,000

# System X Opportunities

Infection	Number	DMC Cost
BSI (house wide)	150	3,510,000
10% Reduction	Savings	351,000



# System X Antimicrobial and HAI Costs and Cost-Saving Estimates

		Cost savings with 10% reduction (\$)
2008 antibiotic purchases (\$)	7,345,000	734,500
Infection costs (Basic + Resistance)	11,314,000	1,131,400
<b>Total infection and antibiotic costs</b>	<b>18,659,000</b>	<b>1,865,900</b>

# Summary

- HAIs continue to be a huge patient safety issue
- Increasing fiscal and regulatory pressure to eliminate HAIs
- Infection control and antimicrobial stewardship are critically important
- Alternative antimicrobials and antiseptics to prevent infections have become increasingly important
  - Chlorhexidine is one of the most effective and important agents

# Questions...

## Continuing Education Credit (CE)

- To obtain 1.0 contact hours, go to:  
[www.ChlorhexidineFacts.org](http://www.ChlorhexidineFacts.org)  
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**Thank you for your attention!**  
**This session has been recorded and will be archived on:**  
**[www.ChlorhexidineFacts.org](http://www.ChlorhexidineFacts.org)**  
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