Chlorhexidine Gluconate (CHG) Bathing Evidence-Based Practice

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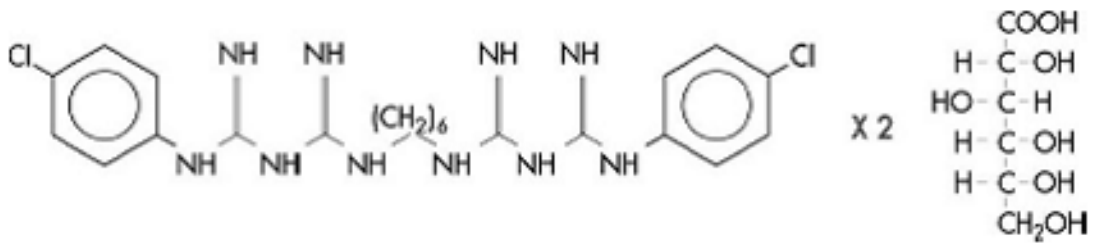
Disclosures:

Employee of Mölnlycke Health Care

Objectives:

Describe CHG history and uses to date

Understand the evidence for CHG bathing as an intervention for HAIs

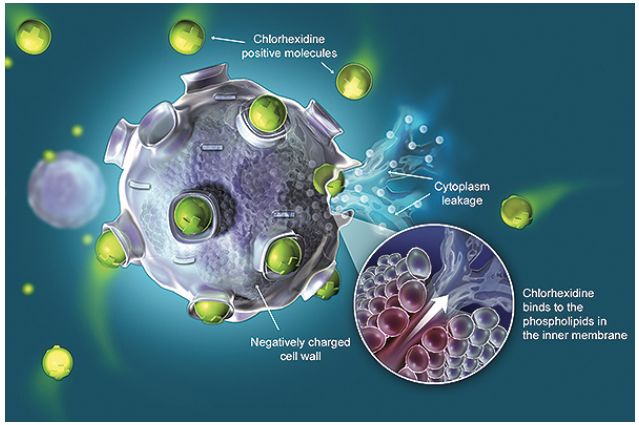


Academy of Medical-Surgical Nurses States:

- Evidence-based practice (EBP) is the conscientious use of current best evidence in making decisions about patient care.
- The EBP process is a method that allows the practitioner to assess research, clinical guidelines, and other information resources based on high-quality findings and then apply the results to practice.

Reference: Evidence-Based Practice, Published on *Academy of Medical-Surgical Nurses* (https://www.amsn.org)

What is CHG?



- Chlorhexidine gluconate
- CHG is a positively-charged molecule that binds to negatively-charged sites such as proteins on human skin and bacterial cell walls.
- The molecule has the unique ability to bind to the proteins present in human tissues such as skin and mucous membranes
- Protein-bound chlorhexidine releases slowly leading to prolonged activity.
- The bacterial uptake of the chlorhexidine is very rapid and leads to cell death

Reference: Chlorhexidine Facts: Mechanism of Action , http://www.chlorhexidinefacts.com/mechanism-of-action.html

History:
Chlorhexidine has been in use for 60 years

1950s
Chlorhexidine is discovered while researching the synthesis of anti-malarial agents.

1954
Chlorhexidine is first introduced commercially in the UK as a disinfectant and topical antiseptic.

1970s
Hand washing with chlorhexidine is shown to reduce skin flora by 86% - 92%. Chlorhexidine is first introduced into the US.

1976
Chlorhexidine demonstrates ability to inhibit the formation and development of plaque.

1981
The first urology lubricant with chlorhexidine.

1988
The first chlorhexidine and alcohol skin preparation.

1992
The first chlorhexidine-based vascular access catheter.

2010
The first chlorhexidine-impregnated needless connectors.

2012
The first chlorhexidine-based PICC.

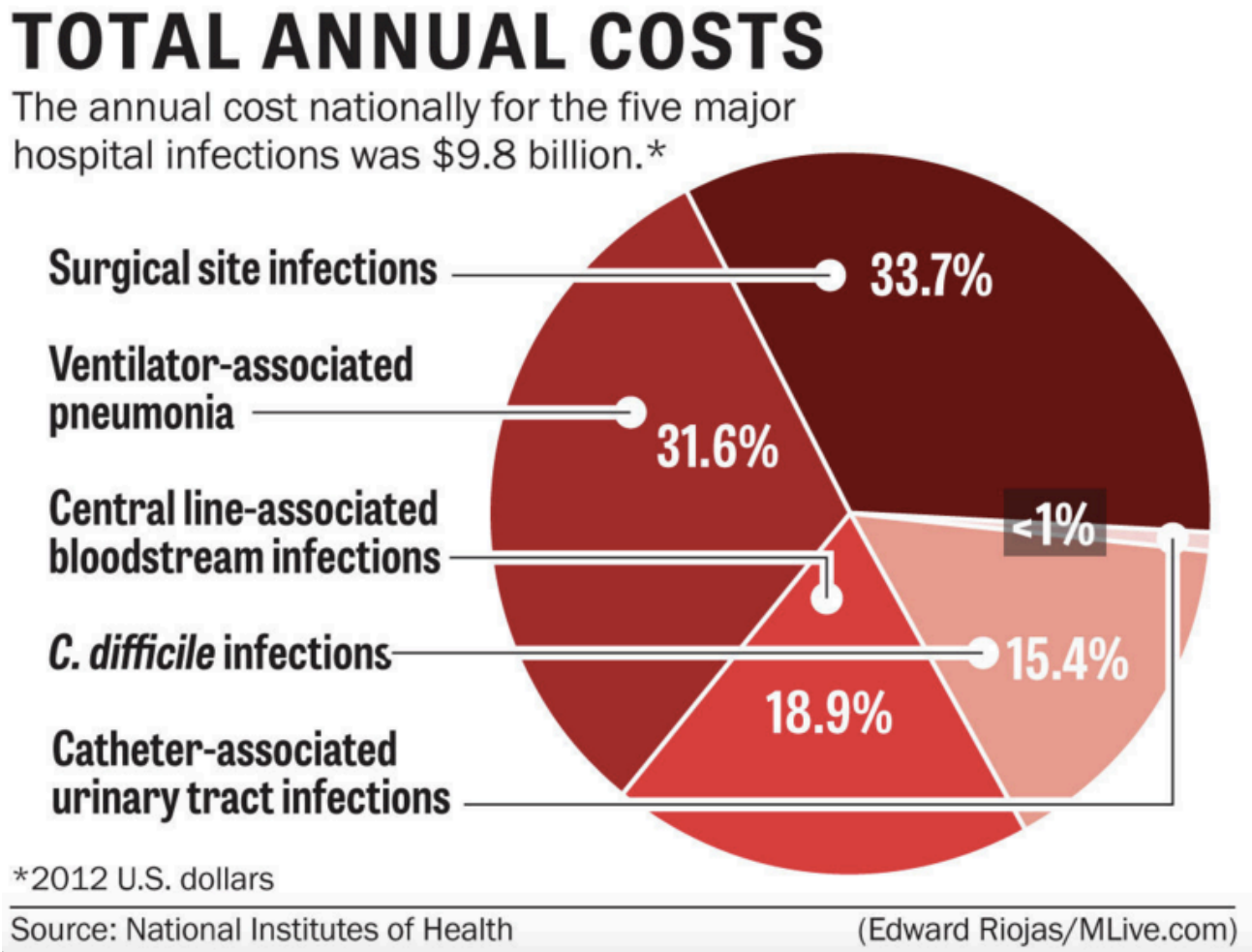
Reference:Chlorhexidine Facts: History of Chlorhexidine, http://chlorhexidinefacts.com/history-of-chlorhexidine.html

Facts from America's ICUs

- The average length of stay in an ICU unit is 4 days.[3]
- More than 4 million patients are admitted to ICUs each year in the United States.[3]
- Mortality rates in patients admitted to the ICU average 10 to 20 percent in most hospitals.[3]
- The annual cost of hospital ICUs in the United States is over $90 billion, accounting for more than 20% of total hospital acute-care costs.[2]
- Patients in ICUs occupy between 5 and 10 percent of inpatient beds in hospitals, but account for 20 to 35 percent of total hospital costs.[3]
- **ICU acquired infections are the leading cause of death.**[1]

References: 1. Dror Marchaim, MD, Infections and antimicrobial resistance in the intensive care unit: Epidemiology and prevention, www.uptodate.com ©2016 UpToDate
2. Muer Yang, et al, The ICU Will See You Now: E cient–Equitable Admission Control Policies for a Surgical ICU with Batch Arrivals
3. Facts & Figures | Facing Death | FRONTLINE | PBS , 3/18/2016

What Are We Fighting?



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Reference: Hospital infections: Tying dollars to data; money is the star around which everything revolves, http://www.mlive.com/news/index.ssf/2014/06/hospital_infections_tying_doll_1\

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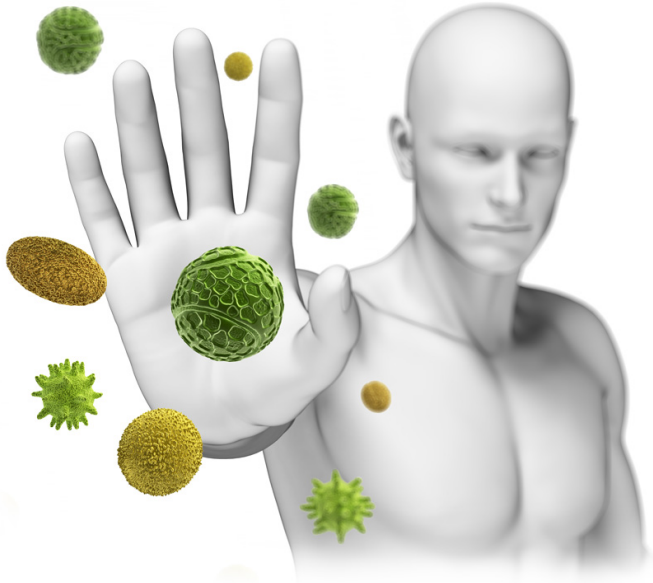
Kill the Bugs!



28 week cross over study compared soap and water to CHG bathing at Chicago's Cook County Hospital 22 bed MICU.

Patients in the CHG intervention group were significantly less likely to acquire a primary BSI (4.1 vs 10.4 infections per 1000 patient days).

- CHG cleansing results in a persistent log reduction in density of microbial skin colonization.
- Daily bathing with CHG ensures that most patients will have relatively low bacterial skin burden.
- This would compensate for deficiencies in skin antisepsis, minimize inadvertent contamination, and decrease other avenues of cross contamination.

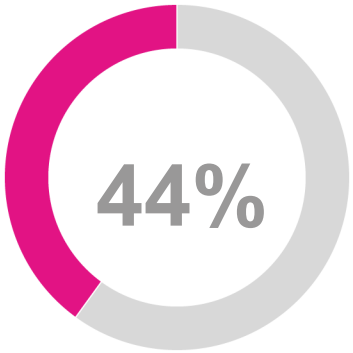
61%

Reference: Susan C. Bleasdale, MD; William E. Trick, MD, et al. Effectiveness of Chlorhexidine Bathing to Reduce Catheter-Associated Bloodstream Infections in Medical Intensive Care Unit Patients. Arch Internal Medicine/Vol 167 (NO. 19), OCT 22, 2007

Does CHG Bathing in ICUs Reduce Blood Culture Contamination?

The strength of this study was the large size and rigorous design. 43 hospitals were included over 18 months. The goal was to reduce CLABSIs using national guidance for best practice.

- All patients in ICU areas were bathed daily with CHG as part of a bundle to reduce CLABSIs.
- Other components included “scrubbing the hub”, standard connectors and wiping the proximal 6” of the line with CHG.



Results: Significant reduction in bloodstream infections. Also: 45% reduction in blood culture contamination.

Reference: Edward J. Septimus, MD; Mary K. Hayden, MD; et al. Does Chlorhexidine Bathing in Adult Intensive Care Units Reduce Blood Culture Contamination? A Pragmatic Cluster-Randomized Trial Infect Control Hospital Epidemiology 2014

CAUTI Bundles are Successful

The Yale-New Haven Hospital MICU spans 36 beds, making it the largest MICU in New England. They implemented the following bundle for CAUTI reduction:

- Standardized closed system used for urinary catheter placement.
- Foley was changed if in place for more than 48 hours prior to sample collection time.
- Rounds were done daily utilizing a check list including “catheter in use” All patients were bathed daily with 4% Chlorhexidine Gluconate (CHG).
- After implementing the bundle, CAUTI numbers decreased.

Reference: Laura DeVaux, Patient Safety Nurse MICU, Harry Byrne, Infection Preventionist Quality Improvement Support Services, et al. Zero Catheter Associated Urinary Tract Infections in the Medical Intensive Care Unit at Yale-New Haven Hospital (YNHH), Poster presentation APIC, 2013

Reducing VAPs and CAUTIs

The Dr José Eleuterio González University Hospital, a 450-bed tertiary care teaching hospital in Monterrey, Nuevo Leon, Mexico evaluated chlorhexidine bathing and hand hygiene compliance in the reduction of HAIs in the intensive care unit.

- The combined measures of routine daily CHG bathing (97% compliance) and enhanced HH compliance (Average HH compliance rates during the 3 periods were 59.48%, 71.23%, and 74.24%, respectively) reduced the rate of infection in critically ill patients.
- The combined intervention reduced the rates of VAP and CAUTIs.

1007 Patients included over 18 months

Infection rate increased after the discontinuation of CHG

Reference: Michel Fernando Martínez-Reséndez MD, et al. Impact of daily chlorhexidine baths and hand hygiene compliance on nosocomial infection rates in critically ill patients. American Journal of Infection Control 42 (2014) 713-7

Post-operative Period

Surgical site infections (SSIs) continue to occur despite high compliance with best practice measures. Evidence suggests that many SSIs occur as a result of pathogens gaining access to surgical wounds.

Evidence also supports frequent acquisition of methicillin-resistant Staphylococcus aureus (MRSA) during the postoperative period.[1]

Postoperative measures in the Mayo Clinic Colorectal study included:

- Patient shower with 4% CHG skin cleanser after dressing removal
- Dismiss patient with 4oz bottle of soap-based CHG
- Resulted in a significant reduction in SSIs from 9.8% to 4.0% overall and 4.9 to 1.5% in superficial SSIs.[2]

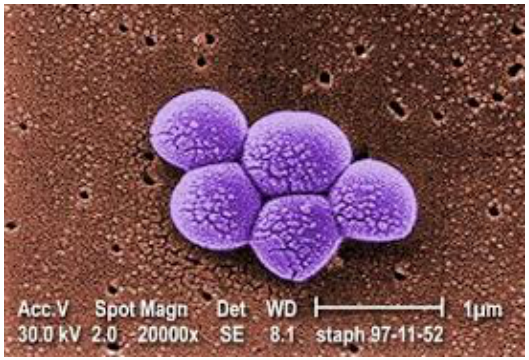
Reference:1. Farrin A. Manian, The Role of Postoperative Factors in Surgical Site Infections: Time to Take Notice. Clinical Infectious Diseases 2014
2. Robert Cima, MD, Eugene Dankbar, MS, et al. Colorectal Surgery Surgical Site Infection Reduction Program: A National Surgical Quality Improvement Program Driven Multidisciplinary Single-Institution Experience, J Am College Surgery, Vol. 216, No. 1, January 2013

MRSA Decolonization

Both targeted decolonization and universal decolonization of patients in intensive care units are strategies to prevent healthcare-associated infections, particularly those caused by MRSA.

43 hospitals (including 74 ICUs and 74,256 patients) were randomly assigned to one of three strategies:

- Group 1: Implemented MRSA screening and isolation
- Group 2: Targeted decolonization (screening, isolation, and decolonization of MRSA carriers).
- Group 3: Universal decolonization (no screening, and decolonization of all patients).
- Results: Universal decolonization was more effective than targeted decolonization or screening and isolation in reducing rates of MRSA clinical isolates.

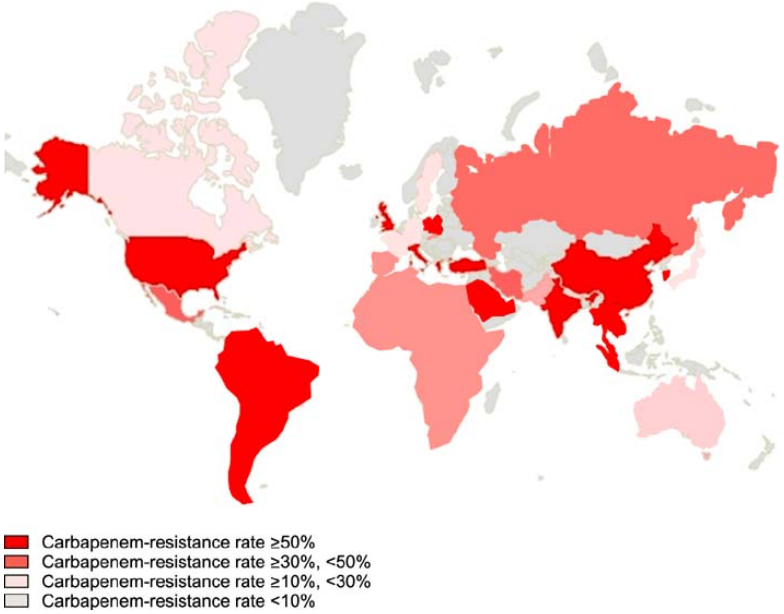


Reference: Susan S. Huang, M.D., M.P.H., Edward Septimus, M.D. et al. Targeted versus Universal Decolonization to Prevent ICU Infection,.The New England Journal of Medicine, May 30, 2013

Carbapenem-resistant *Acinetobacter baumannii* (CRAB)

A single-center, interventional study in the medical ICU initially spent 14 months implementing preemptive contact precautions with enhanced environmental cleaning. Despite these measures, there was no significant reduction either in acquisition or environmental contamination of CRAB

- Following a 12-month chlorhexidine bathing period there was a 51.8% reduction of CRAB acquisition rates
- In addition to the acquisition rates of CRAB, the rates of CRAB contamination on the environment (especially patient-staff gowns and bed rails) were reduced significantly from 30.7% to 9.5%.



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Reference: Yun Kyung Chung MD, PhD, Jae-Seok Kim MD, PhD, et al. Effect of daily chlorhexidine bathing on acquisition of carbapenem-resistant Acinetobacter baumannii (CRAB) in the medical intensive care unit with CRAB endemicity. American Journal of Infection Control (2015) 1-7

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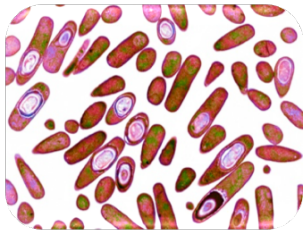
CHG Bathing Protocol Found Significant Decreases in *Clostridium difficile*



All patients in a 689-bed academic medical center (excluding neonates and infants) were included in a daily 4% CHG bathing protocol for 188,859 patient-days. 68,302 CHG baths were administered.

- 90% protocol adherence was seen in critical care units (57.7% adherence in non-critical areas)
- Results show that there was a 70% decline in CDIs in the ICU during the daily bathing period.
- The incidence of *C. difficile* infections increased once chlorhexidine bathing was halted.

90%

70%

Reference: Rupp ME. *Infect Control Hosp Epidemiol Clinical*

2015 CHG Bathing Study at Vanderbilt

In this trial, results indicated daily application of CHG did not reduce the incidence of HAIs including CLABSIs, CAUTIs, VAP, or *C difficile*. 2% CHG cloths were used.

There were several limitations to this study:

- Conflicts with many published, evidence based, peer reviewed studies.[3]
- Bundled interventions are also important, as demonstrated in the literature.
- Did not monitor adherence to the bathing protocol, so it is possible this reflected inadequate bathing.[3]
- Intervention was only 10 weeks long.[3]
- Single center with very low infection rate and very short ICU lengths of stay.[2]

References: 1. Michael J. Noto, MD, PhD et al, Chlorhexidine Bathing and Health Care–Associated Infections A Randomized Clinical Trial, http://jama.jamanetwork.com/ on 01/22/2015
2. Steady as She Goes: The Case for Daily Patient Bathing as Part of a Bundled Intervention Protocol
3. Decolonization in Prevention of Health Care-Associated Infections, Edward J. Septimus, Marin L. Schweizer. Clinical Microbiology Reviews, April 2016

Agency for Healthcare Research and Quality (AHRQ)

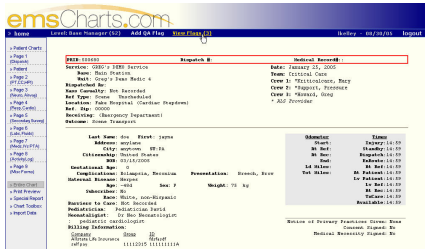
The following is a nursing protocol for adult ICUs implementing Universal Decolonization. There was a reduction in BSIs and MRSA clinical cultures when using this protocol as it is written:

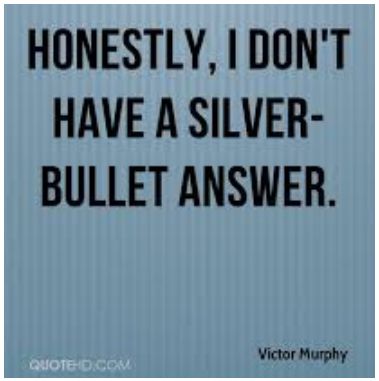
CHG Bathing Instructions:

- Lines and Tubes: CHG is safe on lines, tubes, and devices.
- Bathe with CHG right up to dressing. Okay to bathe over occlusive dressings.
- After bathing skin, clean 6 inches of tubes/Foley nearest patient.

Bundles, Steps, Systems, Documentation….Routine

Systems, or processes, within the hospital can help prevent human error in healthcare delivery by creating standard functions or actions and preventative feedback.



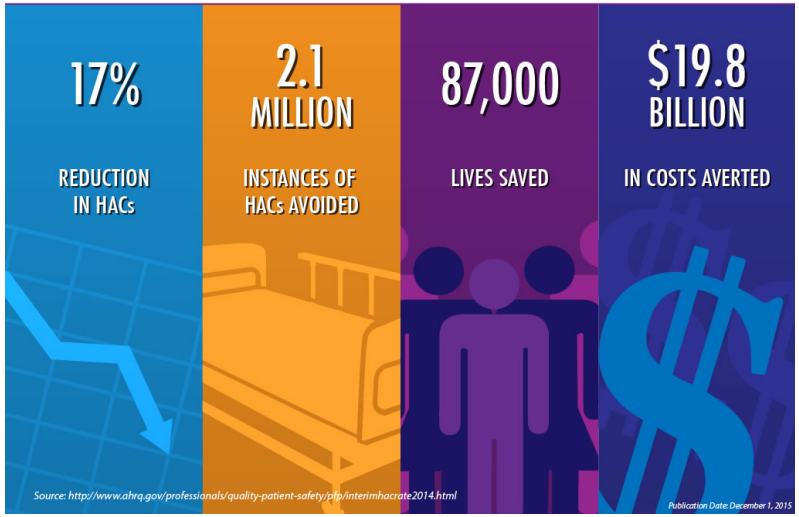


Reference: Why Hospital Quality Improvement Should Depend on Systems More Than People, http://www.beckershospitalreview.com

Evidence Demonstrates CHG Bathing Effectiveness

> 25 patients contracts a healthcare-acquired infection every single day, according to the CDC

- Chlorhexidine gluconate (CHG) is the skin decolonization agent that has the strongest evidence base.
- CHG skin decolonization is an effective horizontal strategy to reduce both the bioburden on the skin and subsequent infection.



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Questions?

Thank You!

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