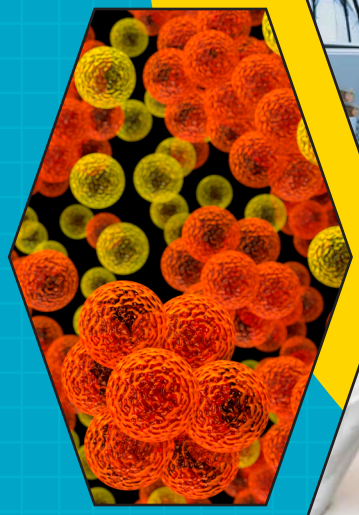

Universal ICU Decolonization Toolkit: An Enhanced Protocol

PREVENT
HAIs
Healthcare-Associated Infections

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Universal ICU Decolonization: An Enhanced Protocol

Prepared for:
Agency for Healthcare Research and Quality
Rockville, MD

Centers for Disease Control and Prevention
Atlanta, GA

Contract No. HHSA290201000008i

Prepared by:

The REDUCE MRSA Trial Working Group
Harvard Pilgrim Health Care
University of California Irvine
Hospital Corporation of America

AHRQ Publication No. 13-0052-EF
September 2013

Preparation of this enhanced protocol was supported by the Agency for Healthcare Research and Quality (AHRQ) through contract HHSA290201000008i. The opinions presented here are those of the authors and do not necessarily represent the position of the U.S. Department of Health and Human Services, AHRQ, or the Centers for Disease Control and Prevention (CDC).

Suggested citation:

Universal ICU Decolonization: An Enhanced Protocol. (Prepared by The REDUCE MRSA Trial Working Group, under contract HHSA290201000008i). AHRQ Publication No. 13-0052-EF. Rockville, MD: Agency for Healthcare Research and Quality; September 2013.

Authors

University of California Irvine

Susan Huang, MD, MPH
Adrijana Gombosev, BS
Leah Terpstra, BA

Harvard Pilgrim Health Care

Richard Platt, MD, MS
Julie Lankiewicz, MPH, CCRC
Katie Haffenreffer, BS

Hospital Corporation of America (HCA)

Edward Septimus, MD
Jason Hickok, MBA, RN
Julia Moody, MS
Jonathan Perlin, MD, PhD

John Stronger Hospital of Cook County

Robert Weinstein, MD

Rush University

Mary Hayden, MD

Centers for Disease Control and Prevention

Jonathan Jernigan, MD, MPH

Contents

Appendixes

Introduction and Welcome

This enhanced protocol is based on materials successfully used in the REDUCE MRSA Trial (**R**andomized **E**valuation of **D**ecolonization vs. **U**niversal **C**learance to **E**liminate Methicillin-Resistant *Staphylococcus aureus*), which found that universal decolonization was the most effective intervention. Universal decolonization led to a 37 percent reduction in MRSA clinical cultures and a 44 percent reduction in all-cause bloodstream infections.

This protocol will provide you with instructions for implementing universal decolonization in adult intensive care units (ICUs). In addition to the scientific rational provided in this overview to the protocol, this resource includes:

- Information to help you prepare for launch, as well as a flow chart (Appendix A).
- Information on decisionmaking and implementation readiness (Appendix B).
- An overview statement and information on universal decolonization in adult ICUs (Appendix C).
- A universal ICU decolonization nursing protocol (Appendix D).
- Training and educational materials (Appendix E).
- Protocol skills assessment (Appendix F).
- Product safety information (Appendix G).

Universal ICU Decolonization: Overview

Introduction to the Protocol

The Universal ICU Decolonization protocol combines a comprehensive implementation readiness assessment with scientific rationale and training tools for implementation of a universal decolonization strategy to reduce Methicillin-Resistant *Staphylococcus aureus* (MRSA) and bloodstream infections in adult intensive care units (ICUs). It is intended for use by acute care hospitals that serve critically ill adults in dedicated ICUs. This enhanced protocol provides a scientific foundation for hospital leaders of critical care and infection prevention programs to assess the value of and need for this intervention in their hospital for decisionmaking purposes. It also provides materials and steps for implementation.

Created for clinicians by clinicians, the protocol is designed to serve as a roadmap for hospital champions of this intervention and front-line staff. The initial portion of the protocol is intended to provide the necessary information and decisionmaking tools required to perform an evidence-based assessment of the readiness for adoption. Once the decision has been made to implement universal ICU decolonization, the protocol will provide front-line staff with teaching tools and resources to support change at the unit level. Information is presented in the form of a step-by-step guide that includes the decolonization protocol, a training module, visual aids and skills assessment, and answers to frequently asked questions (see Appendixes A through G).

The protocol assumes existing infrastructure for quality improvement (QI) by which QI and patient safety interventions usually occur. It is well-suited for acute care hospital leaders in QI seeking a practical, evidence-based strategy to improve care, lower adult ICU infection rates, and reduce multi-drug resistant pathogens.

Purpose of the Protocol

This enhanced protocol does the following:

- Provides decisionmaking tools and a rationale to help hospital leaders understand the effectiveness of ICU decolonization with mupirocin and chlorhexidine gluconate (CHG) and determine whether this strategy represents the best course of action for their facility.
- Provides directions on how to garner institutional support from key stakeholders to support the adoption of a universal ICU decolonization strategy within adult units.
- Describes the roles of unit-based physician and nursing champions who oversee the decolonization intervention and provide protocol and educational/training materials for front-line staff.
- Provides tools to assess adherence to the decolonization protocol and reinforce training.

The protocol does not:

- Provide directions for building a comprehensive QI program.

- Address construction of basic infrastructure needs that underlie all improvement campaigns.
- Aim to be appropriate for all hospitals. Hospital-based assessment and decisionmaking are necessary components of the implementation process.
- Provide information on decolonization for children. Pediatric studies and special considerations for pediatric and neonatal ICUs are not addressed here.

Scientific Rationale

The Burden of Health Care-Associated Infections

Health care-associated infections (HAIs) are a significant cause of illness, death, and excess costs in all health care settings. They affect 1 out of every 20 hospital patients at any given time.[1] Some of the most serious HAIs are those that involve the bloodstream. HAIs also prolong hospitalizations and lead to readmissions.[2,3,4] Finally, patients with HAIs incur large costs, with average direct medical costs of approximately $500-$1,000 per urinary tract infection and $10,000-$20,000 per surgical site infection, central line-associated bloodstream infection, or pneumonia, all of which can be serious enough to incur bloodstream infection.[5]

Importance of the MRSA Subset of HAIs

MRSA is arguably the most important single pathogen in health care-associated infection when accounting for virulence, prevalence, diversity of disease spectrum, and propensity for widespread transmission.[6,7,8,9]

Among HAIs in 2009-2010, *S. aureus* was the most common cause of health care-associated infections.[10] Also, it is the most common cause of ventilator-associated pneumonia and surgical site infection and the second most common cause of central-line associated bloodstream infections.[10] Notably, two-thirds of *S. aureus* HAIs were due to MRSA.

Pathogenesis and Preventability of Health Care-Associated Infections

The largest fraction of HAIs are caused by bacteria, such as MRSA, that reside on the skin and in the nose and gain access to the bloodstream, lungs, and bladder by way of devices and incisions that breach normal host defenses. These bacteria may be the patient's normal flora, or they may be new, often antimicrobial-resistant organisms acquired during hospitalization. Current evidence and expert opinion suggests that 65-70 percent of catheter-related bloodstream and urinary tract infections may be preventable.[11]

Rationale for Universal Decolonization in Intensive Care Units

A recent national survey estimated that 5 percent of inpatients harbor MRSA.9 Other hospital-wide surveys have found estimates of 6-7 percent.[10,12] Prevalence is even higher in ICUs.[13] Among 12 ICUs in 5 academic hospitals, we found 18 percent of patients carried MRSA.[14] A worldwide ICU study of infection has shown that 18 percent of patients are infected by MRSA on any given day among 83 North American ICUs.[15] Furthermore, studies have shown a high risk of later infection among MRSA carriers, sometimes as high as 33 percent in the year following hospitalization.[16,17,18] These findings led to efforts not only to prevent the spread of MRSA to those who have yet to acquire it, but also to reduce infection among prevalent MRSA carriers.

Chlorhexidine bathing has been previously evaluated in single center and small multicenter studies, which have supported its ability to reduce environmental contamination due to multi-drug resistant organisms (MDROs), MDRO acquisition, and bloodstream infections.[19,20,21,22] Its use in surgical skin preparation, preoperative bathing, and central line skin preparation, as well as its longstanding use in dental hygiene has further supported the role of chlorhexidine in skin and mucosal antisepsis.

The REDUCE MRSA Trial

The REDUCE MRSA Trial (**R**andomized **E**valuation of **D**ecolonization vs. **U**niversal **C**learance to **E**liminate Methicillin Resistant *Staphylococcus aureus*) was undertaken to provide a definitive large-scale ICU trial to establish whether targeted decolonization of MRSA carriers versus universal decolonization of all ICU patients was the most effective intervention.

The REDUCE MRSA Trial was a three-way cluster-randomized trial of 43 hospitals (74 ICUs) in the Hospital Corporation of America health system.[23] The three arms included:

1. Screening and Isolation: Nasal screening for MRSA followed by isolation if positive.
2. Targeted Decolonization: Nasal screening, followed, if positive, by isolation and decolonization with chlorhexidine 2% cloth baths and nasal mupirocin for 5 days.
3. Universal Decolonization: Cessation of nasal screening and universal application of mupirocin for 5 days plus daily chlorhexidine 2% cloth baths for the duration of the ICU stay.

The REDUCE MRSA Trial involved nearly 75,000 patients and more than 280,000 patient days in 74 adult ICUs located in 16 States and included predominantly community hospitals.

The materials provided in this enhanced protocol were used by facilities that participated in the REDUCE MRSA Trial.

Effectiveness of Decolonization with Mupirocin and Chlorhexidine

Mupirocin is a prescription drug that was approved by the Food and Drug Administration (FDA) in 2002 for topical treatment of mild wounds due to *S. aureus* and *Streptococcus pyogenes*. A nasal formulation is also approved for eradicating nasal carriage of *S. aureus*. Mupirocin is highly effective in eradicating *S. aureus* in the short term. Several studies have shown 90 percent efficacy within 2 weeks of a 5-day regimen.[24,25,26,27] It also significantly reduces short-term hospital-associated MRSA transmission and infections by over 50 percent in observational and cross-over intervention studies.[28,29,30] Importantly, one study suggests that the combination of mupirocin and CHG is better at eradicating MRSA than mupirocin alone.[31]

Safety of Mupirocin and Chlorhexidine

Both mupirocin and CHG have excellent safety profiles. Systemic absorption of both drugs is minimal.[32,33,34,35,36] Of the minimal amount of mupirocin that is absorbed, nearly all is rapidly

converted to monic acid, an inactive metabolite.[32,34] Multiple observational studies and randomized controlled trials have also shown no systemic absorption of mupirocin following intranasal application.[37,38] Safety data for mupirocin from the manufacturer show that less than 1 percent of patients in clinical trials withdrew due to adverse events.

As an over-the-counter skin cleanser used in health care for over 50 years, CHG has an even more extensive safety record.[39,40,41,42,43,44] Several groups have confirmed the absence of systemic absorption following topical use or oral rinsing with CHG.[45,46,47,48] It is also safe on any superficial wound, including stage 1 and 2 decubitus ulcers, friable skin/rash, and superficial burns. No deleterious effects have been reported with daily use in either long-term ICU patients or outpatient daily bathing for many months. The REDUCE MRSA Trial found negligible rate of skin reactions (<1 percent) from CHG use; two other large scale studies reported the incidence of skin reactions to be no greater than 2 percent.[23,49,50]

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Appendix A. Steps for Implementing Universal Decolonization

1. Assess the quality of the evidence and the need for intervention
2. Decision to adopt Universal ICU Decolonization per REDUCE MRSA Trial
3. Consider intervention scope across adult ICUs
4. Assess timing of intervention and elements of provided protocol
5. Garner institutional support from key stakeholders
6. Identify physician and nursing champions for each participating ICU
7. Finalize protocol and obtain committee approval
8. Set launch date, stock product, and address compatibility issues
9. Education and training
10. Assess adherence and impact

Appendix B. Decisionmaking and Readiness for Implementation

Assessing the Quality of the Evidence

There are several factors to consider when assessing whether to adopt a new intervention. Often, new literature or growing literature around a strategy with a strong rationale for positive impact can propel hospitals to adopt that strategy, especially in the case of a perceived need. The balance between early adoption before definitive clinical trials versus adoption after definitive trials must be determined based on local needs and culture.

The results of the REDUCE MRSA Trial provide strong evidence in support of universal decolonization to reduce MRSA and other pathogens in adult ICUs. In assessing the quality of evidence underpinning a new strategy, well-conducted, randomized controlled trials provide the highest level of certainty about the effects of an intervention. The REDUCE MRSA Trial has the following high quality features:

- **Randomized controlled trial.**
- **Large scale trial.** The trial involved 43 hospitals and 74 ICUs.
- **Pragmatic application.** The intervention was applied to all adult ICU patients. This means that the intervention was studied in the way it would generally be applied to patients for quality improvement purposes.
- **Pragmatic implementation.** The decolonization strategy was implemented by the same hospital staff and processes usually responsible for quality improvement campaigns. This means that it was rolled out in a manner that reflects how most hospitals would implement this strategy.
- **Generalizable approach.** Unlike many studies of hospital-based interventions which are conducted in major academic centers, the REDUCE MRSA was conducted in mostly community hospitals. Although the study was conducted in facilities owned by a single hospital system (the Hospital Corporation of America), the results of this trial are likely to be widely applicable.

Comparison to current best practice. Sometimes trials compare an intervention to older strategies that are no longer considered best practice. The REDUCE MRSA Trial compared two decolonization strategies to a strategy of high compliance ICU MRSA screening and contact precautions and showed superiority.

- **Evidence-based intervention**. While the combination of universal mupirocin plus chlorhexidine gluconate (CHG) had not been studied prior to the REDUCE MRSA Trial, there are several other

studies that have supported the use of universal chlorhexidine bathing alone. These include multicenter clinical trials[1,2] and single-center observational studies.[3,4,5]

Assessing the Need for this Intervention

Once the evidence is well-understood, it is important to assess the likely gains that the hospital will attain if the universal decolonization strategy from the REDUCE MRSA trial is adopted. Since this trial has an impact on adult ICU bloodstream infection rates and MRSA clinical cultures, the following baseline assessments are recommended:

- **Determining ICU bloodstream infection rates.** The REDUCE MRSA Trial showed a 44 percent reduction in all-cause bloodstream infections when baseline rates were 4 to 6 per 1,000 attributable ICU days. These are total bloodstream infection rates from all causes, not just those limited to central line infection bloodstream events. It may be helpful to estimate the expected impact should universal decolonization be adopted in the hospital. Census data and data from the clinical microbiology laboratory are needed for this estimate.
    - **Comprehensive Estimate:** The infection measure used in the REDUCE Trial was the number of ICU patients with bloodstream infections attributed to the ICU area (numerator) divided by the number of attributable ICU days (denominator). Attribution to an ICU is defined by the CDC as events that occur more than 2 days after ICU admission through 2 days after ICU discharge. Specifically, the number of attributable ICU bloodstream infections within a reasonable length of time (i.e. 1 year) should be divided by the number of attributable ICU patient days in that same year.

ICU bloodstream infection rates should be obtained from positive blood cultures occurring more than 2 days after ICU admission through 2 days after ICU discharge. To avoid having persistent bacteremia count as multiple events, allow only one event per patient. Two positive blood cultures should be required for skin commensals to be considered an infection. This is consistent with CDC guidance.[6,7] Denominators should include patient days beginning from day 3 of an ICU stay through 2 days beyond ICU discharge if the patient remains hospitalized.
To change the calculated rate into a rate per 1,000 patient days, simply multiply rate (number of events/denominator of ICU patient days) by 1,000 = total events per 1,000 ICU patient days.

- **Simplified Estimate**: If the comprehensive estimate is too difficult to obtain, a simplified estimate can be made by identifying all ICU patients who have a positive blood culture within their ICU stay and dividing that number by total ICU patient days. As a reminder, the desired estimate is ICU bloodstream infections from all causes, not just those limited to central line infection bloodstream events.

- **Determining MRSA clinical cultures.** The universal decolonization strategy of the REDUCE MRSA Trial also reduced MRSA clinical cultures attributable to the ICU by 37 percent. It may be of value to estimate the benefit to reducing MRSA burden in the ICU. This can be estimated in one of two ways:
    - **Comprehensive estimate:** The percent of ICU patients that have any MRSA clinical cultures within a reliable window of time (e.g. 1 year).
    - **Alternative estimate:** The percent of ICU patients that harbor MRSA (based upon a MRSA flag or tag in the medical record). Use a reliable window of time (e.g. 1 year)
- **Calculate rates for each adult ICU.** For the ICU outcomes above, knowing the rate for each of the hospital's adult ICUs may help in several ways. It provides a baseline on which to assess improvement following implementation. It may identify adult ICUs most in need of an intervention strategy or those most likely to have important gains due to universal decolonization. In addition, if a staged roll out is desired, it may identify ICUs that could be good candidates (e.g. due to high rates) for a pilot evaluation to learn any hospital-specific logistical issues that need to be overcome before rolling the intervention out to all adult ICUs.

Decision to Implement

Once the evidence has been reviewed and baseline data on ICU MRSA burden and ICU bloodstream infections have been collected, the information should be used to determine the need for universal decolonization based on the following criteria:

- The strength of the evidence that this intervention will impact care in the hospital. This includes the magnitude of impact found in published studies, and similarities of the hospital to the patient populations studied. The latter includes case mix, hospital type, and whether the comparator groups in the studies reflect current infection prevention standards at the hospital.
- The amount of ICU MRSA burden (prevalence, incidence, and infection rate) and all-pathogen bloodstream infections found in adult ICUs and the hospital leadership's desire and need to target these outcomes for improvement. Importantly, these data can also be used for internal benchmarking to assess the impact of the intervention once a decision to implement has been made.
- Alignment with existing guidance and position statements from national committees and societies, survey requirements for accreditation, and State laws. As evidence increases on prevention of health care-associated infections, legislative and regulatory requirements may change. It is important to know State legislative mandates and

accreditation requirements, as well as guidance provided by the CDC and other national societies related to health care-associated infections.[8,9,10,11,12]

Assessing the Intervention Scope

- Experience with successful implementation of prior strategies can help guide the type of roll out. Hospitals with robust experience in rolling out ICU strategies may be able to engage in a full simultaneous roll out. In addition, hospitals with considerable prior experience with chlorhexidine bathing due to preoperative bathing or other reasons may be able to perform an all-ICU roll out.
- Reasons for an initial single ICU pilot roll out may include:
    - Working out logistics and training with a single ICU before expanding to all ICUs.
    - Strong champion in one ICU but uncertain support in other ICUs. Success in one ICU could help drive additional support and adoption.
    - Concern about cost. Hospital leadership would like to see returns on a single ICU before expanding to others.

Hospitals will differ on whether they wish to adopt an intervention based on published trial results or await guidance from the CDC or national societies. Higher rates of ICU bloodstream infection and MRSA burden may help drive decisionmaking.

Assessing the Timing of the Decolonization Intervention

Once the evidence-base is understood and baseline rates have been defined, it is important to assess whether the timing is right for a new intervention. Considerations for timing include:

- Urgency related to high bloodstream infection rates or high MRSA prevalence.
- National guidance or regulatory standards.
- Other recent campaigns or new educational training for staff. Does this intervention fit with an ongoing ICU campaign? If not, is there a better time in the near future to adopt this when ICU staff and educators have the time and availability for another campaign? Is there a scheduled training update for clinical staff to which this could be easily added?
- It may be best to avoid launching new campaigns over the holidays unless all collective stakeholders determine that it is the most appropriate time.

Garnering Institutional Support

Once the rationale, baseline data, and timing support the implementation of universal ICU decolonization, it is important to ensure institutional support. Key elements of ensuring institutional support include the following:

- Develop a brief overview statement (see Appendix C for an example). Select pieces of the above rationale, your hospital rates for outcomes, and comments on timing.
- **Business Case:** Develop a business case for hospital leadership. Basic steps needed to develop a business case for infection prevention strategies have been well described by Perencevich and colleagues.[13]
    - For universal ICU decolonization, the business case will require the following:
        - Number of annual hospital-specific ICU bloodstream infections (see above). As a reminder, since universal decolonization resulted in a 44 percent reduction in bloodstream infections from all causes in the REDUCE MRSA Trial, the proper estimate is broader than estimates limited to central line infection bloodstream events.
        - Estimated cost of an ICU-attributable bloodstream infection of $18,000 ($7,000-$29,000) based on several commonly cited sources:[14,15,16,17]
    - Number of annual patient days in the adult ICUs that will be adopting universal decolonization as an estimate of the number of baths to be given.
    - Number of annual ICU admissions as an estimate of the number of mupirocin courses to be given.
    - Hospital-specific cost of chlorhexidine bathing product (each bath).
    - Hospital-specific cost of a 5-day course of mupirocin (or the average length of ICU stay, if shorter than 5 days).
    - If able to evaluate hospital throughput, consider adding cost estimates for reduction in hospital length-of-stay due to prevention of 44 percent of bloodstream infections, as well as reductions in gown and glove use due to reduction in contact precautions associated with screening. Formal cost effectiveness analyses are being pursued for the REDUCE MRSA Trial.
- **Stakeholder Support:** Broach and review overview statement and nursing protocol (Appendix D) with key stakeholders, such as the Chief Medical Officer, Chief Nursing Officer, Director of Infection Control and Prevention, Director of Quality Improvement, and the Chair of the Critical Care Committee. Key stakeholders should include high position personnel that are able to offer institutional support for the implementation of the protocol. The order of approaching these key stakeholders will depend on the culture, standard processes, and existing relationships at the hospital, but they should all be included in the decisionmaking process.
    - **Infection Prevention Program:** The hospital Infection Prevention and Control program may be one of several groups to initiate this safety effort. If so, it will be important for the initiator to ensure that the entire Infection Prevention program (e.g. hospital epidemiologist, director of infection prevention, infection

preventionist providing support to adult ICUs) is fully supportive, understands the above rationale, and can speak to this endeavor.

- **ICU Directors (nursing, physician):** The hospital intensivist team may be another group to initiate this campaign and is essential for support. The nursing and medical director can provide critical support and insight to the process and important logistical considerations for universal decolonization, such as bathing shift, recommended bathing time, approach to developing an ICU standardized protocol, successful method for roll out, and concurrent campaigns.
- **Purchasing:** The purchasing department can provide not only the current hospital-specific cost of certain products, but may be able to engage in price negotiations due to anticipated increases in the amount of products purchased.
- **Hospital Administration and Leadership:** Support is required from the Chief Executive Officer, Chief Medical Officer, and Chief Nursing Officer to have a successful campaign. Advance preparation of the business case (including anticipated product costs and cost-savings due to prevention of bloodstream infections), description of supporting stakeholders within the hospital, and implementation strategy are important.

Common Stakeholder Questions

Common stakeholder questions regarding universal decolonization should be anticipated. These include the following:

- **What is the evidence for universal decolonization?**
  See Appendix B.

- **What is the hospital's need for this intervention?**
  See earlier section on assessing the need for the intervention. The response to this question should include consideration of hospital rates of MRSA and bloodstream infection, national guidelines, regulation, and any relevant State legislation.

- **What is the cost of this intervention and how is it justified?**
  See the earlier section on developing a business case.

- **Who is supportive of this intervention?**
  Be prepared to demonstrate support from key stakeholders as described above.

- **Is universal decolonization just about reducing MRSA?**
  No. In fact, the REDUCE MRSA Trial found that the best strategy for reducing bloodstream infections due to all pathogens was universal decolonization consisting of

daily chlorhexidine and up to 5 days of mupirocin in all ICU patients. This strategy reduced all-cause bloodstream infections by 44 percent, and it was significantly better than either targeting decolonization to MRSA carriers or actively screening for MRSA to enhance time to contact precautions. Since chlorhexidine is broadly active against most bacteria and some fungi, there is a strong basis for reducing infections due to all pathogens.

- **What is the added benefit of mupirocin over the daily chlorhexidine baths?**
  There are several reasons to pursue universal decolonization using a combination of chlorhexidine plus mupirocin in adult ICUs.
  - *Staphylococcus aureus* is the number one cause of health care-associated infections in the United States. It is the most common cause of ventilator-associated pneumonia, the most common cause of surgical site infection, and the second most common cause of central line associated bloodstream infection. This includes both methicillin-sensitive (MSSA) and methicillin-resistant (MRSA) strains.[18]
  - The nose is the major reservoir of *S. aureus.* Evidence supports use of mupirocin as an essential component of eradication and, because of the nasal reservoir, suggests that eradication of MRSA and MSSA is better with mupirocin than with chlorhexidine alone.[19,20]
  - Even among hospitals where ICU screening for MRSA is currently occurring or is mandated by State law, it is important to recognize that MSSA is a major pathogen. Nationally, MSSA accounts for 45-55 percent of *S. aureus* health care-associated infections.[18] A single nasal screening is only 70-80 percent effective in detecting *S. aureus* in the nose.

- **Are there specific formulations of chlorhexidine and mupirocin that should be used?**
  There have not been direct comparisons of the effectiveness of different formulations in reducing infection. However, the significant reduction in bloodstream infection and MRSA clinical cultures achieved in the REDUCE MRSA trial was based on the use of 2% chlorhexidine cloths and a paraffin-based nasal mupirocin ointment. Theoretically, methods that deliver an equivalent amount of active decolonizing agent to the skin and nose should be effective. However, it is worth noting that the method of application may have appreciable effects on achieving appropriate concentrations of chlorhexidine on the skin. Prior evidence suggests that no-rinse applications of chlorhexidine using a 2% cloth achieve significantly higher concentrations of chlorhexidine on the skin than applications of 4 percent with rinsing. In addition, attention to skin coverage in applying CHG is critical. Shower-based liquid applications have been shown to result in gaps in skin antisepsis compared to cloth-based applications.[21]

- **Should we be concerned about producing antimicrobial resistance?**
  The benefits and potential risks should be weighed with any strategy. As with all antimicrobials, we must be vigilant about antimicrobial resistance. Some discussion points include:
    - Because chlorhexidine is an antiseptic used for decolonization but not to treat active infection, resistance to this agent will not result in the loss of an antimicrobial for therapy.

    - Mupirocin ointment is used for decolonization but is also used for topical treatment of some infections. Under some circumstances, extensive use of nasal mupirocin might favor the emergence of strains resistant both to mupirocin and to unrelated antimicrobials.

    - Evidence for emergence of antimicrobial resistance during the use of mupirocin is mixed. The literature has reported evidence of increased mupirocin resistance with broad use of mupirocin,[22,23] increased resistance to mupirocin in the absence of broad use of mupirocin,[24] and no increase in resistance with broad use.[25,26,27,28,29] Thus, surveillance by researchers and national surveillance systems will be important in monitoring resistance. Alternative agents for use in place of mupirocin are also being studied.

    - Additional analysis is being conducted as part of the REDUCE-MRSA trial to determine if resistance has developed in the ICUs that have implemented this protocol.

    - Since mupirocin resistance is not routinely tested by microbiology laboratories, most hospitals will not have local data to guide their decision. If the hospital does have these data for the ICU, they can be used to guide the use of this agent.

    - Chlorhexidine resistance has been rarely reported in the United States. However, it is important to ensure that bathing is done properly and according to protocol to provide the best chance of removing harmful bacteria from the skin.

- **Aren't some bacteria good for us? Will this strategy remove good bacteria?**
  Even usual bacteria on the skin can become harmful during hospitalization. The use of lines and devices, as well as surgical wounds and other breaks in the skin, result in a higher chance that our normal body bacteria can enter sterile places and produce

infection during high-risk periods. Thus, universal decolonization is being advocated during the ICU stay to remove bacteria from the body because of the high-risk setting.

Identifying Unit Champions

For each ICU that will adopt this strategy, it is important to identify nursing and physician champions who are well-respected by their peers and can speak in strong support of the intervention. Unit champions differ from key stakeholders in that they are personnel that are routinely staffing or providing oversight within the ICUs such as the Medical Director or Nurse Manager/Director. Unit champions should be able to

1. Promote the intervention and serve as a peer leader for this intervention.
2. Speak to the rationale of universal decolonization during ICU rounds, nursing huddles, and ICU teaching sessions.
3. Provide baseline and followup data on intervention targets, such as MRSA burden and ICU infections.
4. Provide adherence data on use of decolonizing products and bathing checks.
5. Encourage high compliance among unit staff. Highly compliant and consistent application is essential to the success of this strategy.

Finalizing the Protocol and Obtaining Committee Approvals

Using the provided protocol (Appendix D), make edits to reflect the usual hospital infrastructure by which mupirocin and chlorhexidine can be used in a standardized protocol for the ICU. We encourage you to use all steps of the protocol as written, since this was the trial protocol that demonstrated significant effectiveness in reducing MRSA clinical cultures and bloodstream infections due to all pathogens.

In finalizing the protocol, elements should include:

- Discussion with nursing leadership, pharmacy, and the ICU medical directors about the best way to implement universal decolonization using a hospital protocol. Options include a standardized nursing protocol or an ICU admission order set.
- The use of mupirocin will need a physician order, which some hospitals have arranged by having standing orders under the ICU medical director's name or the Chief Medical Officer's name. Others place it in a standing admission order set that is activated when the admitting ICU physician places admission orders. The best mechanism will be hospital-dependent and requires discussion.
- Pharmacy and supply chain staff will need to confirm the best way for documentation and re-stocking to occur.

Most hospitals have required committees for approval of standing nursing protocols and standing order sets. Such committees may include, but are not limited to, the Critical Care Committee and the Medical Executive Committee. Identifying the committee approval process for the hospital will be important. Scheduling for presentation to these committees will be essential to the planning and timing of this intervention.

Set Launch Date

A launch date should be set that accounts for the following:

- Timing of committee approvals.
- Timing required for product stocking and compatibility assessment (see below).
- Timeline required for educational training, including possible computer-based training modules, presentations to nurse manager forums, nursing staff meetings, and medicine or critical care grand rounds or other ICU physician forums.
- Sequence of timing for expansion if sequential roll out to multiple ICUs is planned.
- Other competing campaigns and holidays.

Stock Product and Address Compatibility Issues

Once the protocol is approved by the required committees and is scheduled for launch, the following launch details should be addressed.

- **Stocking the products**: Preparations for adequate stocks of mupirocin and chlorhexidine should be made. If chlorhexidine cloths are used, mechanisms for warming should be addressed.
- **Compatibility:** Replacing bathing products that are incompatible with chlorhexidine (certain soaps, lotions, and skin barrier products will inactivate chlorhexidine and negate the antiseptic effect) with ones that are compatible. Compatibility should be discussed with the manufacturers of all skin products used in the ICU.

Formulate Education and Training Plans

- **Education and training:** Education and training should be planned with nurse managers, nurse educators, infection prevention, and the ICU medical directors. Options include a brief computer-based training module for nurses and nursing assistants, train-the-trainer sessions, and discussions at nursing huddles, plus presentations at critical care or medicine grand rounds. The following resources are provided in this protocol:
    - Instructional materials for computer-based training modules.
    - Frequently asked questions.

- Just-in-time training document.
- Do and don't factsheet.
- CHG bathing wall poster.

Assuring Adherence and Reinforcing Training

As with any campaign, it is important to provide regular assessments of adherence to intervention protocols. In this protocol, we provide the "Bathing Skills Assessment" tool for observing bathing practice and asking key questions to ensure understanding. For example, a small number of baths could be observed in the weeks post-implementation. This could be done by the ICU nursing director, facility nurse educator, or a designee. The frequency of sample observations (weekly, monthly) should be tailored to the results of these assessments (i.e. more frequent observations if protocols are not fully adhered to or if understanding appears limited; less frequent if highly compliant).

Nurse training can be reinforced with the following, which are provided in this protocol (Appendix E):

- Instructional materials for computer based training modules.
- Frequently asked questions by staff.
- Just-in-time training document.
- Do and don't factsheet.
- CHG bathing wall poster.

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Appendix C. Universal Decolonization in Adult ICUs

Overview Statement on Strategy to Reduce MRSA Burden and Bloodstream Infection from All Pathogens

What is Universal Decolonization?

Universal decolonization is the routine use of special soaps and nose ointments to reduce bacteria on the body during periods of high risk for infection, such as ICU stays. Risk is high in the ICU because of lines, devices, surgical and nonsurgical wounds, and other reductions in body defenses.

Universal Decolonization consists of:

- Daily chlorhexidine bathing which replaces soap and water bath.
- 5 days of nasal mupirocin.

Rationale for Decolonization: The REDUCE MRSA Trial

- The results of the REDUCE MRSA Trial provide strong evidence in support of universal decolonization to reduce MRSA and other pathogens in adult ICUs.
- The trial involved 43 hospitals, 74 ICUs, and over 75,000 ICU patients.
- It resulted in a 44 percent reduction in all-cause bloodstream infections (not just central line infections).
- It also resulted in a 37 percent reduction in MRSA clinical cultures.

Estimated Benefit from Universal Decolonization

	Current Annual #	After Adoption of Universal Decolonization
Annual ICU bloodstream infections	AA	(AA * (1-0.44))
Annual ICU MRSA clinical cultures	BB	(AA * (1-0.37))

Cost Effectiveness of Universal Decolonization

	Cost
Cost saved from bloodstream infections averted	(AA * (1-0.44)) * $18,000
Product cost	[($CHG cost * ICU patient days) + (mupirocin cost * ICU LOS[1] * ICU admissions)]
Intervention savings	Difference

[1] or 5 days, whichever is less.

Appendix D. Universal ICU Decolonization Nursing Protocol

The following is a nursing protocol for adult ICUs implementing Universal Decolonization. The REDUCE MRSA Trial found a 44 percent reduction in all-cause bloodstream infections and a 37 percent reduction in MRSA clinical cultures when using this protocol as it is written. Modifications to this protocol may be done; however, variations may not achieve the same results as in the trial.

Key Elements

1. Daily chlorhexidine (CHG) bathing for duration of ICU stay.
2. 5-day mupirocin administration during ICU stay.
3. Cessation of ICU screening (if not required by law).

Detailed Protocol

For each adult ICU patient, each day:

1. Stop admission ICU screening (if not required by law).
2. Determine if any CHG exclusion criteria exist.
    a. CHG allergy.
3. Determine if any mupirocin exclusion criteria exist.
    a. Mupirocin allergy.
    b. Nasal packing or physical inability to use mupirocin.
4. Bathe patient with CHG daily, starting on day 1 of ICU admission, for entire ICU stay.
5. Administer mupirocin to patient twice a day, starting on day 1 of ICU admission, for 5 days or until ICU discharge (if prior to 5 days).
6. If patient is readmitted, restart the protocol for both CHG and mupirocin.
7. Stop protocol upon discharge or transfer from the ICU.

Mupirocin Application

1. Place patient's bed at 30 degrees, if tolerated.
2. Apply 0.5 grams (about the size of a blueberry) of mupirocin onto a sterile cotton swab.
3. Apply the swab directly into nostril. Ensure coating of the sides of the nostril.
4. Repeat for other nostril.
5. Press nostrils together and massage gently for 60 seconds.
6. Do this twice a day for 5 days.
7. Avoid contact with eyes and other intranasal products.
8. If nasal devices are in place (e.g. nasal intubation, NG tubes), place mupirocin around tubing and massage gently to distribute ointment.

Chlorhexidine (CHG) 2% Bathing Cloths

1. A CHG bathing wall poster (Appendix E) is available to print for patient rooms, which outlines the CHG bathing process.
2. After routine washing of face and hair, remove one batch of CHG cloths (three bundled packages of two cloths each = six cloths).
3. You may use a warmer to warm up the cloths. Warming is for patient comfort, it is not required. Cold cloths are active and can be used if patient desires a cool cloth.
4. CHG removes bacteria from the skin during bathing. Cloths should be used to bathe the skin with firm massage.
5. Do not use CHG above the jawline.[a] Chlorhexidine should not come in contact with eyes or ear canals.
6. CHG should be used for all bathing purposes, including once a day full-body bathing, incontinence care, or for any other reasons for additional cleaning.

[a] Chlorhexidine has been safely used on the face and hair in several studies with special attention to avoid the eyes and ear canals. Risk is if chlorhexidine comes in direct contact with nerves, as may be the case with a perforated ear drum or with direct contact with the eyes. In the REDUCE MRSA trial, we avoided the skin above the jawline to ensure chlorhexidine did not contact these areas.

7. CHG replaces soap and water baths. It should not be used as a “top coat” after bathing. Rather, it is the soap and cleansing process for removing bacteria and binding to skin for persistent antibacterial activity lasting 24 hours.
8. Use the six cloths for bathing all body areas below the jawline:
    - Cloth 1: Neck, shoulders and chest.
    - Cloth 2: Both arms, hands, web spaces, and axilla.
    - Cloth 3: Abdomen and then groin/perineum.
    - Cloth 4: Right leg, foot, and web spaces.
    - Cloth 5: Left leg, foot, and web spaces.
    - Cloth 6: Back of neck, back and then buttocks.
9. Use additional CHG bathing cloths, if necessary, to thoroughly cleanse the body.
10. After application to each body site, clean tubing from Foleys, drains, G-tube/J-tubes, rectal tubes, chest tubes within 6 inches of the patient.
11. Ensure thorough cleaning, with special attention to commonly soiled areas such as the neck, skin folds, and perineal areas. CHG is safe to use on perineal areas, including external mucosa. CHG is also safe for superficial wounds, including stage 1 and stage 2 decubitus ulcers.
12. Pay special attention to cleaning skin areas surrounding lines and other devices to ensure removal of bacteria from skin. CHG is safe on devices and can be used over semi-occlusive dressings.
13. If incontinence occurs, rinse the affected area with water and clean with chux. Then clean skin with CHG cloths. Use CHG-compatible barrier products if needed.
14. Skin may feel sticky for a few minutes after application.
15. Do not rinse with water or wipe off. Allow to dry naturally.
16. CHG cloths have moisturizers. If additional moisturizer or lotion is needed, only use lotions that are known to be compatible with chlorhexidine. CHG compatibility should be assessed by the product’s manufacturer.
17. Do not place CHG cloths directly on bedding, as contact with bleach can create a brown stain.

18. Dispose of CHG cloths in the trash. Do not flush.

Appendix E. Training and Educational Materials

Daily Chlorhexidine Bathing Patient Information

Why the special bathing?

This hospital is dedicated to improving medical care for our patients. Common bacteria on the skin and nose can produce infection during high-risk periods such as an ICU stay because patients are critically ill and often require lines, tubes, and other devices. The adult intensive care units (ICUs) in this hospital are providing patients with a daily no-rinse bath using special skin cleanser that removes potentially harmful bacteria on the skin and reduces the risk of infection during the high-risk period of critical care. An antibiotic ointment is also provided for the nose to remove common bacteria that can produce infection. This is part of a strategy called Universal Decolonization, and it has been proven in research studies to protect ICU patients from infection and reduce the risk of having antibiotic-resistant bacteria on the body. The ultimate goal of this effort is to prevent infections.

What is chlorhexidine?

Patients will receive daily bathing with cloths that contain an antiseptic agent called chlorhexidine gluconate (CHG), which has been used safely in hospitals for over 50 years and is available over the counter at your local drugstore.

Why is a chlorhexidine bath administered daily?

Chlorhexidine has been shown to keep bacteria off the skin for up to 24 hours. Patients in the ICU are bathed daily to protect them from infections during this high-risk period.

Am I really clean without using soap and water to bathe?

Chlorhexidine actually works better than standard soap and water for removing bacteria from the skin. It continues to work for up to 24 hours.

Who can provide me with more information?

Please talk to your nurse if you have a question or want additional information.

Frequently Asked Questions by Staff

Decolonization

1. **What is Universal Decolonization?**
   Your ICU will be decolonizing all patients with mupirocin and CHG. This will include applying nasal mupirocin twice daily for 5 days. You will be using CHG for all bathing needs (below the jawline) for the entire ICU stay.

2. **Do MRSA-negative patients receive decolonization?**
   MRSA-negative patients should also receive mupirocin and chlorhexidine. Prior ICU policies for preoperative patients should remain as before. This decolonization protocol applies to ALL ICU patients, regardless of their MRSA status.

3. **Should the protocol continue to be applied to ICU patients who are temporarily transferred out for radiologic or surgical procedures?**
   Yes. The protocol should continue for patients being transferred for procedures in radiology and surgery. Mupirocin and the daily CHG bath can be applied during the time when the patient is physically in the ICU. In the event the patient is incontinent and being sent to radiology, communicate that the patient is on this intervention and, if needed, use the standard clean up available in radiology (i.e. barrier cloths) and upon returning to the ICU use the protocol for incontinence clean up.

4. **Some ICU patients leave the ICU for a short time and return in less than 24 hours. When these patients return, does the mupirocin 5-day regimen pick up where they left off (e.g., Day 3) or start over at Day 1?**
   The protocol begins anew for each readmission, regardless of the duration of absence.

5. **Does Universal Decolonization affect the use of chlorhexidine for preoperative bathing?**
   No. If your hospital already has a policy for preoperative bathing with CHG, then this practice should continue.

6. **Does Universal Decolonization affect the use of skin preps before a surgical procedure?**
   No. Standard skin preps prior to a surgical procedure or for a bedside procedure should be utilized on patients. Presurgical or preprocedure preps with CHG plus alcohol or an iodophor-based solution plus alcohol are considered the standard of care.

7. **Some of the ICU patients can perform their own bed bath. What should be used and can the patient do it themselves?**

CHG bathing cloths should replace routine daily bathing. To ensure consistent application, the nurse should bathe the ICU patient daily with CHG even if the patient is able to bathe themselves.

8. **Should gloves be worn or changed during bathing with CHG cloths?**
   Yes. Although it is safe to handle the CHG cloths with bare skin, gloves should be worn for bathing patients. If gloves become soiled, they should be changed.

9. **Is it true that CHG cloths can stain sheets?**
   CHG can sometimes produce a brown stain if it comes into contact with bleach. To avoid this, please place CHG cloths on a chux or another surface other than directly on sheets. Once applied to skin, CHG will bind to skin proteins and will not stain sheets.

10. **Does Universal Decolonization affect our hand hygiene products?**
    No. Use your usual routine hand hygiene product.

11. **Will long-term use of CHG cloths cause bacteria to become resistant?**
    Thus far, despite wide use, CHG resistance has rarely been reported in the United States.

Stopping MRSA Screening

1. **Do we stop MRSA screening in the ICU?**
   Yes, all routine MRSA screening for ICU admissions should stop. This includes stopping screening for all high-risk groups admitted to the ICU setting (e.g. dialysis patients, nursing home residents). Nurses must be educated so that screening stops during the patient's entire ICU stay. If there is a State law or policy to screen select high-risk patients (for example, patients newly starting dialysis) or all patients with a prior MRSA history, then refer to question 4 (below) to develop a facility-specific plan to initiate screening on transfer out of a participating ICU to a non-participating location (e.g. non-ICU).

2. **Why are we stopping screening for MRSA?**
   Screening and isolating MRSA+ patients is not the only effective strategy to reduce MRSA burden and infection. The REDUCE MRSA trial showed that universal decolonization is more effective than either screening and isolating alone or screening and targeting MRSA+ patients for decolonization. Screening is costly, and results may not be returned immediately. Some people have raised the important issue that screening for all antibiotic-resistant pathogens is not feasible and that a different strategy should be entertained. Still others are concerned that placing more and more people on contact precautions raises unintended consequences, such as issues about patients feeling isolated and having fewer visits by clinical staff.

3. **Isn't decolonization more costly than screening with nasal swabs?**
   We believe it to be cost-saving. The cost burden of decolonization is a shift from lab costs (MRSA swab, nurse time, technician time, ChromAgar or PCR, incubator etc.) and isolation

supplies (gowns, gloves, masks) to pharmacy (nasal mupirocin) and bathing supplies (CHG cloths). In addition, by removing bacteria, decolonization has been shown to reduce 37 percent of clinical MRSA cultures and 44 percent of all-cause bloodstream infections and their associated costs, which total approximately $18,000 per infection. Thus, one averted infection could cover the costs for numerous CHG baths. A formal cost-effectiveness analysis is being conducted for the REDUCE MRSA trial.

4. **Are there any exceptions to stopping MRSA screening in the ICU?**
   If your hospital has a policy for cardiac or orthopedic surgery patients to undergo nares screening for *Staphylococcus aureus* prior to surgery, then this practice should continue. In addition, if a physician orders nares screening for any reason, then screening should occur. However, physicians should be reminded that your ICU has implemented Universal Decolonization where screening should not be routinely performed on patients. As mentioned above, some facilities may have explicit screening rules for high-risk patients, such as hemodialysis patients, especially for cases of newly initiated dialysis.

5. **What if we want to continue to screen other high-risk patients throughout the hospital?**
   Several States require screening of high-risk patients, and you should continue with usual processes to identify and screen these patients. If high-risk, non-ICU patients are of interest, identification and screening outside of the ICU may continue. Some hospitals may want high-risk MRSA screening to resume when the patient is transferred to a non-ICU ward. If so, these hospitals need to develop a specific plan to reinitiate such screens upon transfer to a non-ICU location. Due to the decolonization performed in the ICU, you may have more negative results among patients screened upon transfer to a non-ICU.

   The REDUCE MRSA Trial only demonstrated that universal decolonization was better than screening and targeted decolonization for ICU patients. The value of other strategies external to the ICU is not well known.

Contact Precautions

1. **How does Universal Decolonization affect the contact precaution policy for MRSA+ patients?**
   Universal Decolonization does not affect application of contact precautions. If a patient is known to be MRSA+ or positive for another multi-drug-resistant organism (MDRO) like Resistant Gram Negative Rods or vancomycin-resistant enterococci (VRE), then contact precautions should apply.

2. **Since stopping screening will mean that we will not know if some patients are MRSA+, should we apply contact precautions to all ICU patients?**
   No. Contact precautions should continue to be applied only to patients who are known to be MRSA+ or to patients who satisfy other reasons for application of contact precautions.

3. **Do contact precautions apply for patients who are discovered to be MRSA+ because of a screening swab taken in a non-ICU setting?**
   Yes. Contact precautions apply to all MRSA+ patients regardless of how or when the MRSA status came to be known. Do not disregard results from screening cultures taken from other units, even if the result returns after the patient is transferred into the ICU.

4. **Do contact precautions continue to apply to other MDROs?**
   Yes. There is no change to any precaution policy. Implement contact precautions for MRSA, Resistant Gram Negative Rods, VRE, *Clostridium difficile*, and other organisms that require precautions.

Communication

1. **What should staff tell patients and their families when decolonization products are applied?**
   Staff should provide the same information they would provide for any applied skin product. For example, it would be reasonable to say: "This bathing cloth is routinely used in this ICU for bathing patients. It has a skin cleanser which is antibacterial and will keep bacteria away for several hours. It is much better at removing bacteria than regular soap. It also has moisturizers in it and should not be rinsed off."

   As another example, for nasal mupirocin, it would be reasonable to say: "Some bacteria make their home in the nose and can increase your risk of infection. We routinely use an antibiotic ointment in the nose to keep bacteria away to reduce the risk of infection during your ICU stay."

2. **Can patients refuse decolonization?**
   Similar to any medical care or routine ICU practice, patients can refuse any therapy. However, as you know, it is not routine practice to ask patients whether they want to refuse each component of usual ICU standard of care (e.g. admission orders, type of bathing or shampoo product). If, in the course of usual explanation of the bathing/decolonization process (see above question), the patient does not wish to have this done, it is their right.

3. **What if a patient or patient's family would like more information?**
   There is a patient information sheet included in this protocol discussing the use of CHG (see Daily Chlorhexidine Bathing Patient Information). If more information is needed, the patient/patient's family should be directed to the patient's nurse or the ICU Director.

Wound Care

1. **For what types of wounds is chlorhexidine (CHG) application safe?**

CHG can be applied to any superficial wound, including stage 1 and stage 2 decubitus ulcers, friable skin/rash, and superficial burns. We recommend not using CHG on large or deep open wounds.

2. **How firmly should I apply CHG cloths to a wound?**
   It depends on whether the wound is over a bony prominence or not. If the wound is not over a bony prominence, then CHG should be applied with a firm massage to ensure adequate contact and antibacterial activity. However, if the wound is in the location of a bony prominence, a gentle massaging motion should be used to avoid causing additional soft tissue damage or extension of the wound due to pressure against the bone.

3. **Will CHG be absorbed if I put it on a wound?**
   There is minimal to no systemic absorption when using CHG on a superficial wound. In addition, the CHG may be particularly important to eliminate bacteria in an open wound.

4. **Should I be concerned about CHG having a stinging effect on patients with wounds?**
   Antiseptic over-the-counter products often contain alcohol and will sting when applied to wounds. In contrast, CHG cloths do not contain alcohol and will not sting. In fact, CHG cloths contain dimethicone and aloe, which are moisturizers, and actually have a soothing effect on the superficial wound area.

5. **Can I use CHG cloths over a closed surgical incision?**
   CHG can and should be applied over a closed surgical incision to eradicate bacteria and hopefully prevent infection.

6. **What if my patient has a wound vac?**
   CHG should be applied over any semi-permeable or occlusive dressing. This includes wound dressings that meet that criteria, as well as wound vacs. CHG can also be applied over sutured or stapled wounds. If the dressing is permeable (for example, gauze), then use CHG up to the dressing.

7. **I am having trouble with applying bandages after bathing my patients with CHG. Does CHG weaken bandage adhesive?**
   If you are having trouble reapplying a bandage after bathing a patient with CHG, it's usually because not enough time has elapsed to allow for drying. After bathing a patient, please allow the CHG to dry for about 5 minutes. This should provide ample time for the CHG to absorb and not affect the bandage adhesive. If you cannot wait the full 5 minutes, and if the patient's skin still feels tacky, this will prevent the bandage from sticking properly.

Universal ICU Decolonization

DO

- Use chlorhexidine (CHG) baths in place of daily bathing with soap and water.
- Massage firmly into skin to bind skin proteins and prevent bacteria for 24 hours.
- Give CHG baths every day for entire ICU stay.
- Use nasal mupirocin twice a day for 5 days of ICU stay.
- Only use CHG-compatible lotions.
- Restart entire protocol for readmitted ICU patients.
- Clean 6 inches of tubing closest to body.
- Use over superficial wounds, including stages 1 and 2 decubitus ulcers.

DON'T

- Do NOT use above jawline.
- Do NOT rinse or wipe off CHG. Let air dry.
- Do NOT flush CHG cloths (discard in trash, not toilet or commode).
- Do NOT continue protocol after ICU discharge.
- Do NOT include patients who are allergic to mupirocin and/or CHG.

Universal ICU Decolonization Protocol for CHG Bathing

- Chlorhexidine gluconate (CHG) replaces routine bathing for entire ICU stay.
- Do NOT use soap below the jawline. Certain soaps and lotions can inactivate CHG.
- Only use CHG-compatible lotions and/or barrier products.
- Dispose of all cloths in the trash. Do NOT flush.

BATHE WITH CHG USING FIRM MASSAGE TO REMOVE BACTERIA

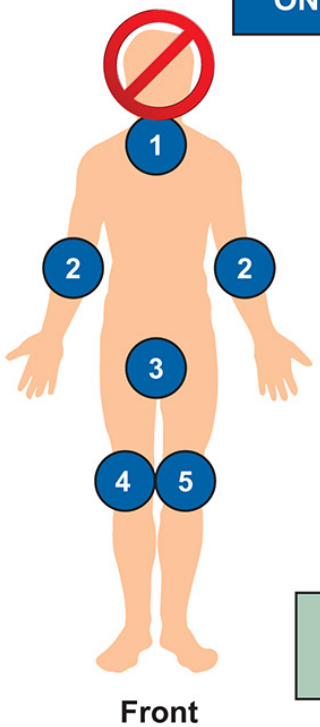
INCONTINENCE:

- Clean with chux and water, NOT soap.
- Then bathe with CHG cloths, air dry.
- Use as many CHG cloths as needed.
- Apply CHG compatible barrier.
- Repeat throughout the day, as needed.

LINES AND TUBES:

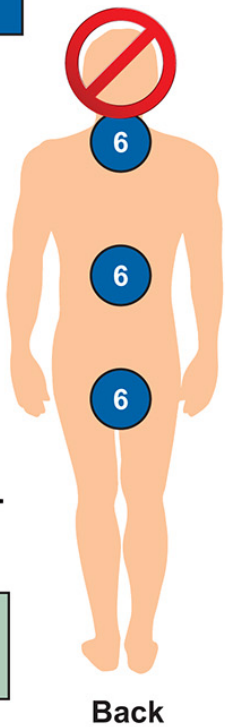
- CHG is safe on lines, tubes, and devices.
- Bathe with CHG right up to dressing.
- Okay to bathe over occlusive dressings.
- After bathing skin, clean 6 inches of tubes/Foley nearest patient.

ONLY USE CHG CLOTHS *BELOW* THE JAWLINE



Front

1. Neck, shoulders, and chest.
2. Both arms and hands.
3. Abdomen then groin and perineum.
4. Right leg and foot.
5. Left leg and foot.
6. Back of neck, back, and then buttocks.



Back

Skin may feel sticky for a few minutes.
Do NOT wipe off. Allow to air dry.

Protocol Training
Part 1: Mupirocin

Background

- 2% Topical cream FDA approved December 1987.
- 2% Nasal ointment FDA approved August 1995.
- Anti-staph action by stopping RNA synthesis.
- Commonly used for:
    - MRSA decolonization.
    - MRSA or MSSA decolonization prior to cardiac and orthopedic surgery.
    - Topical wound treatment.
- Nasal ointment is not systemically absorbed.
- High rate of MRSA and MSSA eradication for first 2 weeks after 5-day application.
- Goal is to prevent MRSA and MSSA infection during high-risk periods (ICU stays, post-op).

Application

- Apply twice a day.
- Repeat for 5 days of ICU stay.
    - Discontinue once transferred to non-ICU.
    - Begin again if readmitted to ICU (includes transfer between ICUs).
- Place patient's bed at 30 degrees, if tolerated.
- Apply 0.5 g (blueberry-size) amount of mupirocin onto sterile cotton swab.
- Apply swab directly into nostril.

- Repeat for other nostril.
- Press nostrils together and massage gently for 60 seconds.
- Do this twice a day for 5 days during ICU stay.
- Avoid contact with eyes and other intranasal products.
- If nasal devices are in place (e.g. nasal intubation, NG tubes), place mupirocin around tubing and massage gently to distribute ointment.

Safety

- U.S. Trials (N=210):
    - Headache 9%.
    - Rhinitis 6%.
    - Congestion 5%.
    - Pharyngitis 4%.
    - Taste perversion 3%.
    - Burning/stinging 2%.
    - Cough 2%.
    - Pruritis 1%.
- European Trials (N=2130):
    - Rhinitis 1%.
    - Taste perversion 0.8%.
    - Pharyngitis 0.5%.

Protocol Training
Part 2: Chlorhexidine (CHG)

Background

- Topical cleansing agent, over the counter.
- Used in health care for more than 50 years.
- Marked reduction in skin/room bacteria.
- Commonly used for:
    - MRSA decolonization.
    - Preoperative bathing/showering.
    - Skin prep before central lines/operations.
- Not systemically absorbed in adults.
- CHG reduces bacteria for up to 24 hours and prevents infection.
- Rapid drop in skin bacteria counts.
- Kills almost all bacteria and viruses.
- Goal is to prevent MRSA during high-risk periods (ICU stays, post-op).
- 2% CHG bathing cloths:
    - Fast-acting.
    - Broad spectrum.
    - Continued antimicrobial activity up to 24 hours after application.
    - Alcohol-free.
    - Contain moisturizers.
    - Rinse-free.

- Disposable.

CHG Bathing Cloths

- Six- cloth bundle (three packets).
- Use all six cloths.
- Do not use above jawline.
- Disposable.

CHG Bathing Process

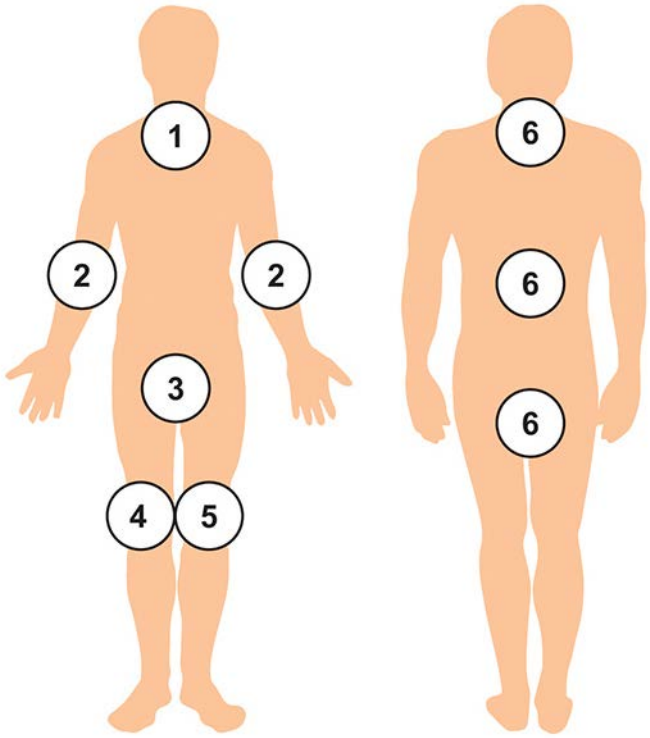
- There are six total cloths in each bundle, three banded packages of two cloths per package.
- If using a cloth warmer, warm cloths before use.
- If using a warm CHG cloth, check the temperature of the CHG cloth prior to use. Gloves diminish sense of heat.
- Cloths may be used without being warmed.
- Open bundle by using notch on back of package.
- Bathe with CHG once daily for entire ICU stay.
- Use a clean CHG cloth for each area of the body to reduce the chance of spreading germs from one area to another.
- Do not use above jawline.
- Do not not rinse off.

Use Prior Routine for Face, Scalp, and Hair

- Wash face and head first before starting with CHG.
- Use shampoo cap or directly use shampoo sparingly, avoid contact with rest of the body, as it may deactivate CHG.
- Cleanse face with regular washcloth.
- Do **NOT** use 2% CHG cloths near eyes or ears.

CHG Bathing Process – Using All Cloths

- Use all six cloths in the following order:
    - Cloth 1: Neck, shoulders, and chest.
    - Cloth 2: Both arms, both hands, web spaces, and axilla.
    - Cloth 3: Abdomen and then *g*roin/perineum.
    - Cloth 4: Right leg, right foot, and web spaces.
    - Cloth 5: Left leg, left foot, and web sp
    - Cloth 6: Back of neck, back, and then
- After application to each body site, be sure to clean tubing from Foleys, drains, G-tube/J-tubes, rectal tubes, chest tubes within 6 inches of the patient.
- Use additional cloths if needed for incontinence or for obese patients.



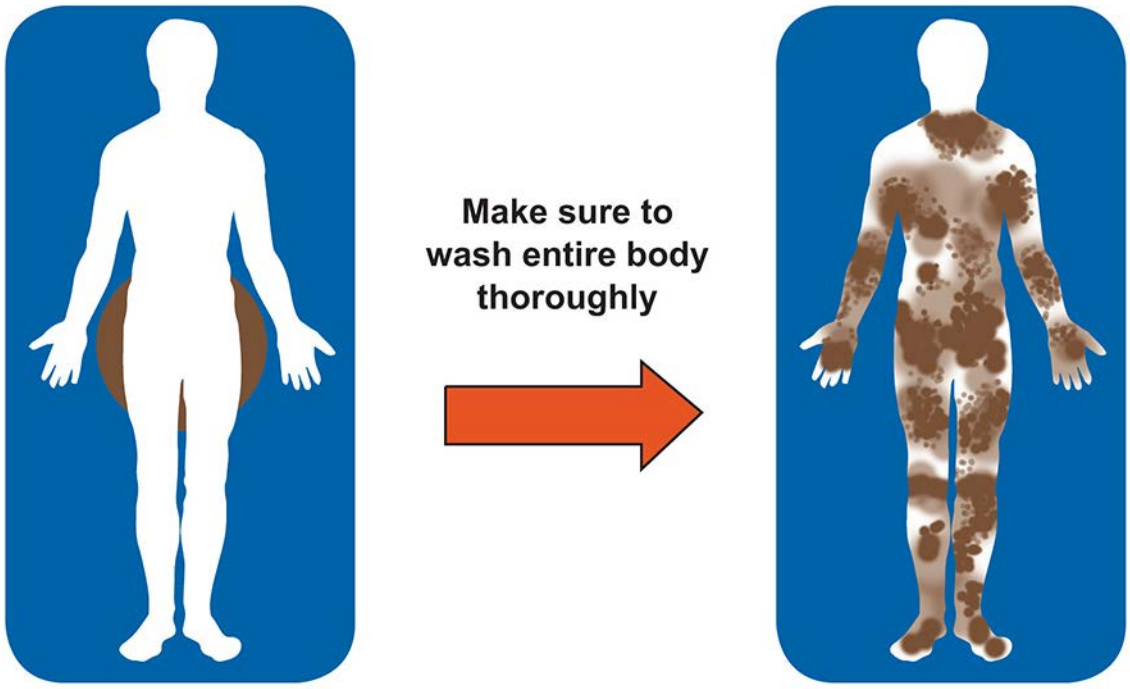
CHG Bathing Process – Key Points

- ***Firmly*** massage skin with CHG cloth.
    - Skin may feel sticky for a few minutes.
- Clean neck well even if it is not visibly soiled.
- The neck:
    - Commonly accumulates debris and moisture.
    - Is a high-risk area for contaminating lines.

- CHG replaces routine bathing:
    - Do **NOT** bathe with soap and water while using CHG.
    - Exception: hair and face washed per previous routine.
    - Avoid contact of shampoo and facial soap with body.
    - Shampoo and many soaps will inactivate CHG.
- Use CHG cloths after incontinence clean up.
- Do **NOT** rinse, wipe off, or dry with another cloth. Let air dry.
- CHG cloths have built-in moisturizers. Skin may feel sticky for a few minutes.
- If additional moisturizer is needed, use only CHG-compatible products.
- Certain lotions will inactivate CHG, ensure to check with manufacturer for compatibility.
- Dispose of leftover cloths.
- Do **NOT** save, reheat, or reuse.

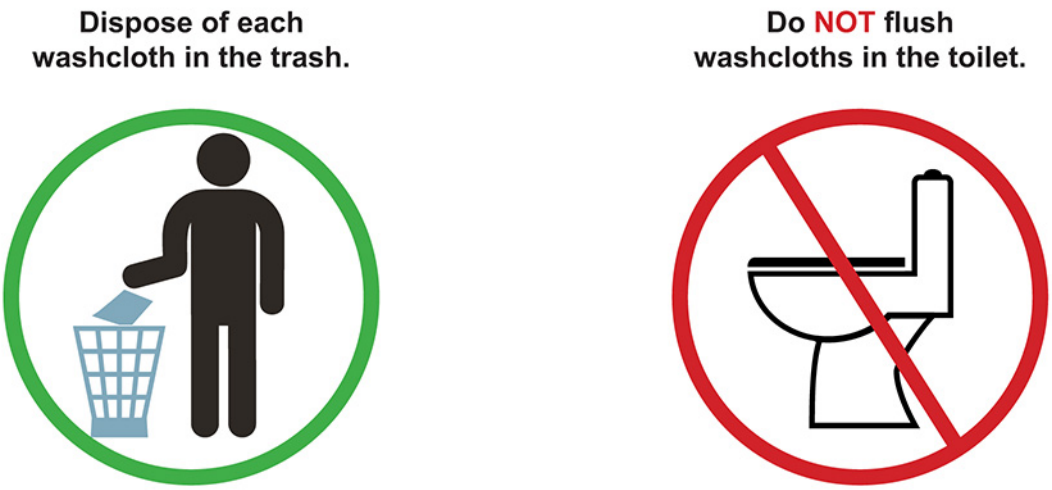
CHG Bathing Process – Bacteria Colonization on Skin

Stool spreads:



- Cleansing of Perineum/Vagina:
    - Critical area for cleaning.
    - CHG is safe to use on the perineum and external mucosa.
    - Use CHG cloths to remove bacteria and clean area.

CHG Bathing Process – Cleaning Up



Protocol Training
Part 3: Top 10 Special Circumstances

#1: Nasal Devices

- Nasal prongs.
    - Temporarily remove nasal prongs from nostrils.
    - Apply mupirocin per protocol, including massage.
    - Replace prongs.
- Endotracheal tube/NG tube.
    - Apply mupirocin around tube.
    - Gently massage nostrils for 60 seconds.

#2: Nasal Trauma

- Do **NOT** use mupirocin if nostril(s) are packed.
- If only one nostril is affected, apply mupirocin to other nostril.

#3: Central Line Care

- CHG cloth is normally used for catheter line skin prep.
- Bathe with CHG liberally around and over dressing.
    - Use CHG cloth on semipermeable dressing only.
    - Do **NOT** use CHG over gauze.
- Clean skin folds well (neck, groin).
- Clean tube (up to 6 inches) last and discard cloth.
- This applies to all line locations.

#4: Other Devices

- Drains, G tubes, rectal tubes, chest tubes, EKG leads, and Foley catheters.
- Clean tubing itself with CHG cloths.
    - Clean up to 6 in. of drains/tubing including point of connection.
- If dressing is to be changed, clean entire area well with CHG and allow to dry before replacing dressing.
- If dressing is in place, clean tube and skin up to dressing.
- CHG will not harm occlusive dressing or EKG leads.
- Be careful to avoid deep surgical wounds.

#5: Incontinence

- Remove urine/stool with usual chux/cloths and water.
- Do **NOT** use soap.
- Cleanse with CHG and allow to air dry (about a minute).
- Use as many CHG cloths as necessary.
- Apply CHG-compatible barrier product over affected area, as needed.
- During the day:
    - If additional barrier protection is needed during day, it is okay to use another CHG-compatible barrier product.
    - If additional bathing is required throughout the day, clean with CHG cloths, then reapply CHG-compatible barrier product, as needed.

#6: Decubitus Ulcers

- Stage 1 or 2 ulcers:
    - If dressing is to be changed, clean area well with CHG, allow to dry.
    - If dressing is to be left intact, cleanse over dressing.

- Stage 3 or 4 ulcers:
    - Bathe with CHG ***around*** dressing/wound.

#7: Friable Skin/Rash

- CHG is safe to use on superficial wounds, abrasions, and rashes.
- Using CHG, gently massage.
- CHG cloths have built-in moisturizers.
- If more moisturizer is needed, use only CHG-compatible products.

#8: Surgical Wounds

- If there is no dressing or dressing is changed, bathe with CHG up to healed or superficial wound.
- If dressing is to be left intact, bathe with CHG around dressing.
- CHG will not harm occlusive dressing (e.g., wound vacs).
- Do **NOT** use on large or deep wounds.
- Do **NOT** rinse or wipe dry.

#9: Obese Patients

- If one set of six cloths is not sufficient, use more.
- Make sure to clean between all skin folds.
- Discard any unused cloths.

#10: Burns

- 1st and 2nd degree:
    - If dressing is to be changed, clean area well with CHG, allow to dry.

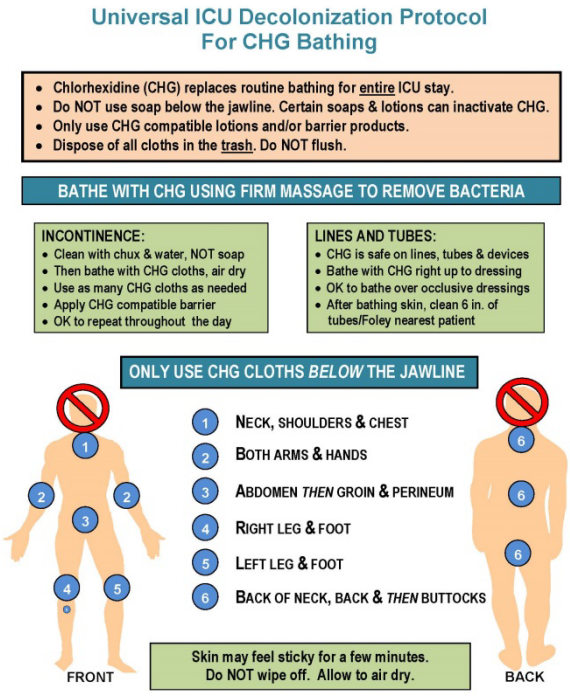
- If dressing is to be left intact, clean around dressing.

- Do **NOT** use on 3rd and 4th degree burns.

Universal ICU Decolonization

Just in Time Training

1. **STOP all admission MRSA screens unless screening is required by law or surgical protocol.**
2. **Continue to place patients known to be MRSA-positive in contact isolation.**
3. **Decolonization Protocol:**
   - Mupirocin ointment **twice a day for 5 days only.**
   - Chlorhexidine (CHG) bathing cloths for ALL bathing needs for **entire ICU stay.**
   - Decolonization stops when patient is discharged or transferred out of the ICU.
   - If readmitted or transferred to a participating ICU, protocol begins anew.
4. **How to Bathe:**
   - You should be assigned an RN trained on the universal decolonization protocol for bathing to oversee this process (buddy system).
   - A CHG bathing wall poster is posted in each ICU room (see image below).
   - Only use CHG cloths below the jawline.
   - Let air dry. Do NOT wipe or rinse off.
   - Do NOT flush cloths. Discard in trash.
   - Do NOT use soap (can inactivate CHG).
   - For incontinence, clean debris with chux (water if needed), cleanse with CHG cloth, and then use CHG-compatible barrier product.



_____ **Please return completed form to the Unit Charge Nurse**

Signature

_____ _____ _____/_____/_____

Print Last Name **Print First Name** **Date**

Appendix F. CHG Bathing Skills Assessment

Please record your observations when monitoring a patient being bathed with CHG.

Observed CHG Bathing Practices

Please circle your answer:

Y		**N**	**Cleanses entire neck area well including skin folds and around lines.**
Y		**N**	**Massages skin *firmly* with CHG cloth to ensure adequate cleansing .**
Y		**N**	**States rationale for not using soap below jaw line at any time.**
Y		**N**	**Uses all six cloths and more if needed.**
Y		**N**	**Cleans armpit and back of knee well.**
Y		**N**	**Cleans in between toes and fingers.**
Y		**N**	**Cleans between all folds in perineal and gluteal area.**
Y		**N**	**Wipes occlusive and semi-permeable dressing with CHG cloth.**
Y		**N**	**Cleans tubing, lines, and drains closest to body (after emptying drains).**
Y		**N**	**Bathing is completed with no skin below jaw line missed.**
Y	**N**	**N/A**	**Uses CHG on superficial wounds, rash, and stage 1 & 2 decubitus ulcers.**
Y	**N**	**N/A**	**Uses on closed surgical wounds.**
Y		**N**	**Allows to air dry/does not wipe off CHG.**
Y		**N**	**CHG bathing documented.**

Queries to Bathing Assistant/Nurse

1. Do you ever use soap in conjunction with a CHG bathing cloth? If so, when?

_____

2. Do you reapply CHG after an episode of incontinence?

_____

3. If a patient needs freshening up/second bath, do you use CHG cloths or a different product?

_____

4. Are you comfortable applying CHG to superficial wounds?

_____

5. Are you comfortable applying CHG to stage 1 & 2 decubitus ulcers?

_____

6. Are you comfortable applying CHG to closed surgical wounds?

_____

7. Do you ever wipe off the CHG after bathing?

_____

Appendix G. Product Safety and Adverse Events

Chlorhexidine (CHG) Risk

The risks associated with the use of chlorhexidine (CHG) include mild side effects of skin irritation, rash, and/or redness (unlikely) and severe allergic reactions of hives, itching. In rare case reports, anaphylaxis can occur (difficulty breathing; tightness in the chest; swelling of the mouth, face, lips, or tongue), but it has occurred so rarely that the actual risk cannot be calculated (too rare). It is important to keep the CHG out of eyes and ears. CHG can cause permanent injury if it comes in direct contact with nerves and is allowed to remain there. For example, this may occur if CHG enters the ear canal and the patient has a perforated (punctured) eardrum. If CHG enters the patient's eyes or ears, it is important to rinse promptly and thoroughly with water.

Nasal Mupirocin Risk

The risks associated with use of nasal mupirocin include mild side effects of burning, change in sense of taste, congestion, cough, headache, sore throat, stinging, and/or stuffy nose (unlikely).