

Decolonization to Address Antimicrobial Resistance in Skilled Nursing Facilities

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The High Risk of Infections in Nursing Homes

- 1.3 million persons receive care in U.S. nursing homes each year
- On average, each resident has at least 2 infections per year
- Every year, nursing home residents experience:
 - 2 to 3 million nursing home-associated infections
 - 150,000 infection-related hospitalizations
 - 380,000 infection-related deaths

The Rise of MultiDrug-Resistant Organisms (MDROs)

- Methicillin Resistant *Staphylococcus aureus* (MRSA)
- Vancomycin Resistant Enterococcus (VRE)
- MultiDrug-Resistant Pseudomonas
- Extended Spectrum Beta Lactamase Producers (ESBLs)
- Carbapenem Resistant Enterobacterales (CRE)
- Carbapenem Resistant Acinetobacter (CRAB)
- *Candida auris*

10-15% of hospital patients harbor at least one of the above

64% of nursing home residents harbor at least one of the above

Spread of MDROs in Nursing Homes

High prevalence in nursing homes may be related to:

- Imported MDROs
- Shared activities, rooms
- Longer lengths of stay
- More chronic illness and devices
- Less stringent hand hygiene, contact precautions vs hospitals
- Poor cleaning and bathing quality

Nguyen KP. ICHE 2023;44(9):1490-3.

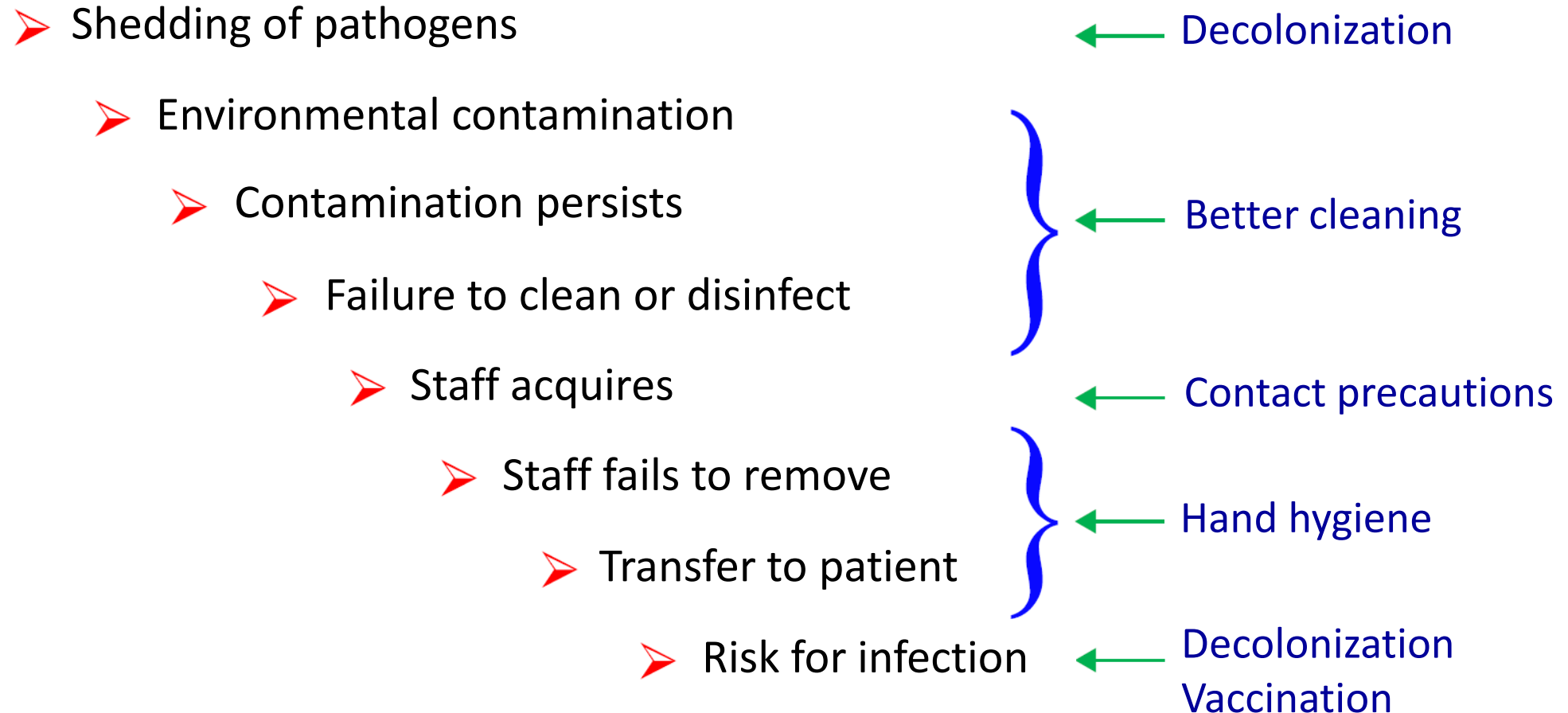
McKinnell JA et al. Clin Infect Dis. 2019;69(9):1566-73

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Murphy CR. BMC Infect Dis. 2012;12:269.

Murphy CR. J Am Geriatr Soc. 2012;60(6):1012-8.

Human Pathogen Transmission: Cascade of Unfortunate Events



Decolonization Prevents a Cascade of Unfortunate Events

➤ Shedding of pathogens



Prevents shedding

➤ Environmental contamination

➤ Contamination persists

➤ Failure to clean or disinfect

➤ Staff acquires

➤ Staff fails to remove

➤ Transfer to patient

Broad solution for all MDROs
Benefits carriers too

➤ Risk for infection

What is Topical Decolonization?

- Decolonization is the use of topical antiseptic or antibiotic agents to:
 - Remove or reduce body bacteria from the skin or nose
 - Reduce risk of infection
 - Reduce carriage of MDROs
- Most infections are due to our body's bacteria
- Decolonization is helpful during moments of vulnerability
 - After surgery
 - When medical devices are present
 - When skin is fragile with rashes, wounds, pressure ulcers
 - When self care and hygiene are limited

Why is it Better?

- Most common products:
 - Chlorhexidine gluconate (CHG) for bathing
 - Iodophor (povidone-iodine) or mupirocin for nose
 - Safely used in healthcare for decades
- Chlorhexidine works better than regular soap
 - Binds skin proteins and continues to kill germs for up to 24 hours

Use of Chlorhexidine

- Antiseptic uses in healthcare
 - Hand antisepsis at 2% and 4%
 - Dental hygiene
 - 1990s: Cleaning of skin prior to line insertion
 - 1990s: Pre-operative bathing
 - 2000s: Surgical prep
 - 2000s: Pre-op *S. aureus* carriers
 - 2010s: Universal ICU bathing
 - 2019: CHG for non-ICU bathing
 - 2019: Post-discharge CHG + mupirocin for MRSA carriers

Universal Decolonization Trials in Hospitals

| Trial | Setting | N | Intervention | Decolonization Impact |
|--|--|---------|----------------------------------|---|
| Climo et al. ICU Trial ¹ | 7 Academic Hospitals 9 Adult ICUs | 7700 | Daily CHG | 23% ↓ MRSA/VRE acquisition 28% ↓ Bloodstream infections |
| Pediatric Scrub Trial ² | 5 Academic Hospitals 10 Pediatric ICUs | 1500 | Daily CHG | 36% ↓ Bloodstream infections |
| REDUCE MRSA Trial ³ | 43 Community Hospitals 74 Adult ICUs | 74,000 | Daily CHG 5d bid mupirocin | 37% ↓ MRSA clinical cultures 44% ↓ Bloodstream infections |
| Mupirocin-Iodophor Swap Out Trial ⁴ | 137 Community Hospitals 233 Adult ICUs | 353,000 | Mupirocin-CHG vs Iodophor-CHG | Mupirocin superior to Iodophor by 18% for <i>S. aureus</i> ; 14% for MRSA |
| ABATE Infection Trial ⁵ | 53 Community Hospitals 194 Adult Non-ICUs | 340,000 | Daily CHG Mupirocin if MRSA+ | Subset effect in patients with devices: 37% ↓ MRSA/VRE clinical cultures 32% ↓ Bloodstream infections |
| CLEAR Trial ⁶ | Post Hospital Discharge | 2,100 | CHG, Mupirocin qowek x 6 mo | 30% ↓ MRSA Infection at 1y 17% ↓ All infection; 85% rehospitalized |

¹ Climo MW et al. NEJM 2013;368:533-542

² Milstone AM et al. Lancet 2013;381(9872):1099-1106

³ Huang SS et al. NEJM 2013;368:2255-2265

⁴ Huang SS et al. JAMA 2023;330(14):1337-1347

⁵ Huang SS et al. Lancet 2019;393(10177):1205-1215

⁶ Huang SS et al. NEJM 2019;380:638-650

The Protect Trial

The NEW ENGLAND JOURNAL of MEDICINE

ORIGINAL ARTICLE

Decolonization in Nursing Homes to Prevent Infection and Hospitalization

L.G. Miller, J.A. McKinnell, R.D. Singh, G.M. Gussin, K. Kleinman, R. Saavedra, J. Mendez, T.D. Catuna, J. Felix, J. Chang, L. Heim, R. Franco, T. Tjoa, N.D. Stone, K. Steinberg, N. Beecham, J. Montgomery, D.A. Walters, S. Park, S. Tam, S.K. Gohil, P.A. Robinson, M. Estevez, B. Lewis, J.A. Shimabukuro, G. Tchakalian, A. Miner, C. Torres, K.D. Evans, C.E. Bittencourt, J. He, E. Lee, C. Nedelcu, J. Lu, S. Agrawal, S.G. Sturdevant, E. Peterson, and S.S. Huang

Miller LG et al. NEJM 2023 (Nov 9); 389:1766-1777

The Protect Trial

Pragmatic Cluster-Randomized Trial

- 28 nursing homes
- Involved nearly 14,000 residents over 18-month intervention
- All activities performed by usual nursing home staff

Group 1: Routine Care

- Usual soap for showering/bathing

Group 2: Decolonization

- CHG for all bathing/showering
- Nasal iodophor for all residents, M-F twice daily, every other week

MDRO Prevalence Reductions

(Nares/Skin Only)

| | Trial Group | Baseline Prevalence | Intervention Prevalence | Adjusted Risk Ratio | P-value |
|----------|----------------|---------------------|-------------------------|---------------------|---------|
| Any MDRO | Routine Care | 48% | 47% | 0.70 (0.58-0.84) | <0.001 |
| | Decolonization | 49% | 32% | | |
| MRSA | Routine Care | 38% | 37% | 0.73 (0.59-0.92) | 0.004 |
| | Decolonization | 36% | 25% | | |
| VRE | Routine Care | 6% | 5% | 0.29 (0.14-0.62) | 0.004 |
| | Decolonization | 8% | 2% | | |
| ESBL | Routine Care | 16% | 18% | 0.50 (0.34-0.75) | <0.001 |
| | Decolonization | 17% | 9% | | |

Impact of Decolonization in Nursing Homes

Reduction in infection-related reasons for hospitalization

- 17% fewer infections as reasons for hospitalization
- 15% fewer hospitalizations as reasons for nursing home discharge

Reduction in rates of infection-related hospitalization

- 31% reduction in infection-related hospitalizations per 1,000 resident days
- 18% reduction in any hospitalization per 1,000 resident days

Impact of Decolonization in Nursing Homes

Overall, decolonization prevented 1.9 infection-related hospitalizations per month per 100-bed nursing home

Exceptionally low number needed to treat

- Treat 10 residents to prevent one infection-related hospitalization
- Treat 9 residents to prevent one hospitalization from any cause

Nursing Home Decolonization Toolkit

Step 1: Adopt SHIELD program as Quality Assurance Performance Improvement (QAPI)

1. QAPI Project Documentation Form ([PDF](#)) ([DOC](#))
2. Universal Plan of Care ([PDF](#)) ([DOC](#))
3. Resident Plan of Care ([PDF](#)) ([DOC](#))
4. Pre-Launch Checklist for the Infection Preventionist ([PDF](#)) ([DOC](#))

ucihealth.org/shield

Step 2: What to Expect? ([PDF](#)) ([DOC](#))

Step 3: Communication to Residents

1. Admission Packet Letter ([PDF](#)) ([DOC](#))
2. Resident/Ombudsman Information Sheet ([PDF](#)) ([DOC](#))

Step 4: Products & Protocols

1. Products ([PDF](#)) ([DOC](#))
2. CHG Compatibility ([PDF](#)) ([DOC](#))
3. Protocol: Bed Bath With CHG Cloths ([PDF](#)) ([DOC](#))
4. Protocol: Bed Bath With CHG Liquid ([PDF](#)) ([DOC](#))
5. Protocol: Showering With CHG ([PDF](#)) ([DOC](#))
6. Protocol: Nasal Iodophor ([PDF](#)) ([DOC](#))
7. Order Set Examples ([PDF](#))
8. Admission – SHIELD Checklist ([PDF](#)) ([DOC](#))

Step 5: Staff Education & Training

1. Paper or Computer Based Training ([PDF](#)) ([PPT](#))
2. Staff Post-Training Test and Answer Key: Basin Bed Bathing
3. Staff Post-Training Test and Answer Key: CHG Cloths ([PDF](#))
4. Physician and Staff Notification Flyer ([PDF](#)) ([DOC](#))
5. Staff Handouts for CHG Bathing/Showering ([PDF](#)) ([PUB](#))
6. Staff Handout for Basin Bed Bathing With CHG ([PDF](#)) ([PUB](#))
7. Staff Handout for Nasal Iodophor ([PDF](#)) ([PUB](#))
8. Staff Huddle Reminder Documents ([PDF](#)) ([DOC](#))
9. FAQ: General ([PDF](#)) ([DOC](#))
10. FAQ: Nasal Iodophor ([PDF](#)) ([DOC](#))
11. FAQ: CHG for Bathing ([PDF](#)) ([DOC](#))
12. FAQ: Wound Care ([PDF](#)) ([DOC](#))
13. FAQ: Do and Don't ([PDF](#)) ([DOC](#))

Step 6: Resident Education & Training

1. Resident Handout for CHG Bed Bath ([PDF](#)) ([PUB](#))
2. Resident Handout for CHG Shower ([PDF](#)) ([PUB](#))
3. Resident Handout for Nasal Iodophor ([PDF](#)) ([PUB](#))
4. Waterproof Shower Poster for Residents ([PDF](#)) ([DOC](#))
5. Resident Talking Points: CHG ([PDF](#)) ([DOC](#))
6. Resident Talking Points: Iodophor ([PDF](#)) ([DOC](#))

Step 7: Skills Assessments and Compliance Checks

1. CHG Cloth Skills Assessment Checklist ([PDF](#)) ([DOC](#))
2. CHG Liquid Bed Bath Skills Assessment Checklist ([PDF](#)) ([DOC](#))
3. Resident Self-Showering Assessment ([PDF](#)) ([DOC](#))
4. Resident Self-Bed Bath Assessment ([PDF](#)) ([DOC](#))

Step 8: Safety and Side Effects

1. Safety and Side Effects ([PDF](#)) ([DOC](#))
2. Side Effect Tracking Form ([PDF](#)) ([DOC](#))

Nursing Home Decolonization Toolkit

Prevent infections during each nursing home stay

BATHE or SHOWER with Chlorhexidine (CHG) soap

STAFF

Bathe with CHG to remove germs and prevent infection

CHG works better than soap and water

CHG is a protective bath

CHG cloths are less drying than soap

Apply as shown below

Avoid eyes, mouth, & ear canals

REMINDERS

- **Your enthusiasm** helps residents understand why CHG is important
- Bathing on admission removes germs to protect the resident and nursing home
- CHG works for 24 hours to kill germs
- **Firmly massage** CHG onto skin
- Clean **6 inches** of lines, drains, tubes
- Safe on surface wounds, rashes, burns
- Use only CHG-compatible lotions
- If barrier protection needed, apply CHG then apply barrier protection

Clean all skin areas with attention to:

- Neck
- All skin folds
- Skin around all devices (line/tube/drain)
- Wounds unless deep or large
- Armpit, groin, between fingers/toes

SHOWERING with CHG soap

1. Rinse body with warm water
2. Wash hair and face with CHG
3. Avoid getting into eyes and ears
4. Turn off water and lather mesh sponge with plenty of CHG
5. Massage CHG onto all skin areas
5. Leave CHG on for **2 minutes** then rinse

BATHING with CHG cloths

1. Tell residents these cloths are their protective bath
2. Use all 6 cloths. More, if needed.
3. **Firmly massage** skin with cloth
4. Clean over semi-permeable dressings
5. Clean 6 inches of lines, tubes, and drains
6. Air dry. Do not wipe off.
7. Put used cloths in trash. **Do not flush.**

Prevent infections during each nursing home stay

BASIN BED BATHING with Chlorhexidine (CHG) Liquid

STAFF

Bathe with CHG to remove germs and prevent infection

CHG works better than soap and water

CHG is a protective bath

Apply as shown below

Avoid eyes, mouth, & ear canals

BASIN BATH Instructions

1. Prepare 4% liquid CHG, a measuring cup, a bed basin, and 6 disposable wipes (more if needed).
2. Dispense 1/2 cup of 4% CHG liquid into basin.
3. Add 1/2 cup of water. **Do not dilute more than equal part of water to CHG.**

1/2 cup 4% CHG + 1/2 cup WATER = 1 cup of 2% CHG

DO NOT ADD EXTRA WATER

4. Soak wipes in basin and wring before use. Do not place back into basin after use.
5. **Firmly massage** skin with wipes.
6. Clean over semi-permeable dressings.
7. Clean 6 inches of lines, tubes, and drains.

REMINDERS

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Decolonization FAQs



**Shared
Healthcare
Intervention to
Eliminate
Life-threatening
Dissemination of MDROs**

Frequently Asked Questions Chlorhexidine for Bathing

What is chlorhexidine (CHG) and how safe is it?

CHG is an over-the-counter antiseptic agent that helps to reduce the amount of germs on your skin, including antibiotic-resistant germs such as MRSA. CHG is cleared for this purpose. CHG has an excellent safety profile and has been used in healthcare for over 60 years. Although allergic reactions to CHG are rare, they can occur. Most of them are limited to the site of application and include redness, rash or dryness, which resolves with discontinuation.

What if my resident refuses a bath?

Residents have the right to refuse any medical care. Staff need to assess the resident's refusal at this time (e.g. tired, in pain, irritable), or whether the resident is refusing all together and if the resident understands the value of the protective bath (e.g. to prevent infection due to MRSA or other bacteria). Of course, the resident does not wish to have this done, it is their right to refuse.

If the staff member believes that the resident is stating that it's not the bath, then the staff should offer and encourage a bath at a later time. Residents

Is it okay for my residents to shave and use deodorant?

Even though shaving cream and deodorant may inactivate CHG, we understand that residents will want to shave and use deodorant. If shaving is performed, ensure that shaving cream only contacts body area that is being shaved.

What if my resident has an incontinence episode or needs freshening up throughout the day?

CHG cloths should be used for all bathing purposes, including full-body bathing, cleaning after soiling, or any other reasons for additional cleaning such as freshening up. Do not use soap to cleanse incontinent residents because soap can inactivate CHG. First remove urine/stool with usual incontinence wipes or cloths and water. Next, clean with CHG and allow to air dry. Finally, apply CHG compatible barrier protection over the area. Repeat as often as needed throughout the day.

My resident reports that their skin feels sticky after the bath.

The sticky feeling is due to the moisturizing ingredients in the CHG cloths and it will go away as it dries. The cloths contain aloe vera.

Is it safe to use on the perineum?

Yes, CHG is safe to use on the perineum and external mucosa.

Is CHG safe to use on lines, tubes, and drains?

Yes, it is very important to clean lines, tubes, and drains in addition to the skin surrounding these devices in order to prevent infection. The 6 inches of any tube, drain, or line nearest the body should be cleaned. Non-absorbable (non-gauze) dressings should also be wiped over with the CHG cloth after the skin is cleaned.

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 residents. If gloves become soiled, they should be changed.



**Shared
Healthcare
Intervention to
Eliminate
Life-threatening
Dissemination of MDROs**

Frequently Asked Questions Wound Care

The majority of our nurses and certified nursing assistants (CNAs) feel comfortable using chlorhexidine (CHG) cloths on superficial wounds, but some do not. How would you suggest easing their concerns?

Remind all nursing staff that CHG cloths are safe to use on superficial wounds and stage 1 & 2 decubitus ulcers. Using the buddy system, in which nursing staff who are comfortable using CHG on superficial wounds buddy up with staff who are less comfortable, can also help.

Should I be concerned about CHG having a stinging effect on 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 vera which are moisturizers and actually have a soothing effect on the superficial wound area.

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 get rid of bacteria in an open wound and prevent infection.

For what types of wounds is CHG safe?

CHG can be gently applied to any superficial wound, including stage 1 and 2 decubitus ulcers, friable skin/rash, and superficial burns. We do not recommend



**Shared
Healthcare
Intervention to
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Life-threatening
Dissemination of MDROs**

Frequently Asked Questions Nasal Iodophor

What is iodophor and how safe is it?

Iodophor is another name for "povidone-iodine," which is an over-the-counter product that is most known for its use in cleaning scrapes, cuts, and wounds and preventing infections. It is also FDA cleared for use in the nose. Povidone-iodine is an over-the-counter antiseptic product. It has been used in healthcare for over 60 years. Iodophor has been used in thousands and thousands of patients prior to, in ICUs, and in nursing homes as a way to prevent MRSA and other infections. Side effects from iodophor are uncommon, mild and resolve with discontinuation. They may include nasal irritation, runny nose, and sneezing. As with any product, rare serious allergic reactions can occur.

What is the purpose of putting it in the nose?

Iodophor removes germs that commonly live in the nose, including methicillin-resistant *Staphylococcus aureus*, or MRSA. Many studies have shown that nursing home residents are much more likely to harbor MRSA than people in the community or patients in hospitals. In fact, recent data across many nursing



CHG Cloth Observation Checklist

Please complete for THREE different staff per unit

Individual Giving CHG Bath

Please indicate who performed the CHG bath.

☐ Nursing Assistant (CNA) ☐ Nurse ☐ Other: _____

Observed CHG Bathing Practices

Please check the appropriate response for each observation.

- ☐ Y ☐ N Patient received CHG cloth bathing handout
- ☐ Y ☐ N Patient told that bath is a no rinse cloth that provides protection from germs
- ☐ Y ☐ N Provided rationale to the patient for not using soap at any time while in unit
- ☐ Y ☐ N Massaged skin *firmly* with CHG cloth to ensure adequate cleansing
- ☐ Y ☐ N Cleaned face and neck well
- ☐ Y ☐ N Cleaned between fingers and toes
- ☐ Y ☐ N Cleaned between all folds in perineal and gluteal area
- ☐ Y ☐ N ☐ N/A Cleaned occlusive and semi-permeable dressings with CHG cloth
- ☐ Y ☐ N ☐ N/A Cleaned 6 inches of all tubes, central lines, and drains closest to body
- ☐ Y ☐ N ☐ N/A Used CHG on superficial wounds, rash, and stage 1 & 2 decubitus ulcers
- ☐ Y ☐ N ☐ N/A Used CHG on surgical wounds (unless primary dressing or packed)
- ☐ Y ☐ N Used all 6 cloths (more if needed)
- ☐ Y ☐ N Allowed CHG to air-dry / does not wipe off CHG
- ☐ Y ☐ N Disposed of used cloths in trash / does not flush

Query 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 has been cleaned up?

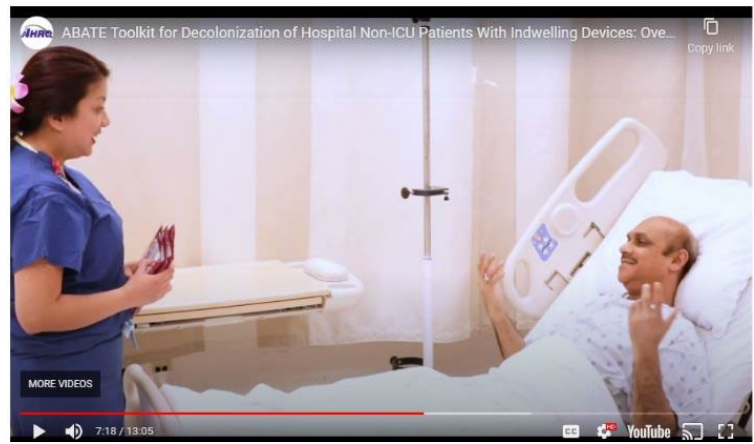
3. Are you comfortable applying CHG to superficial wounds, including surgical wounds?

4. Are you comfortable applying CHG to lines, tubes, drains and non-gauze dressings?

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

Training Video for CHG Bathing

- CHG bathing and showering instructions
- Scenarios for how to encourage patients to accept bath
- Commonly missed and important protocol details (i.e., cleaning lines, tubes, drains, superficial wounds)
- Instructions for patients wishing to self-bathe



<https://www.ahrq.gov/hai/tools/abate/index.html>

Decolonization to Reduce AMR in Nursing Homes

- Nursing homes are a major reservoir of MDROs
- Residents are high risk for infection and hospitalization
- Decolonization is an effective strategy
 - Applied in the usual process of bathing and showering
 - Reduces MDRO prevalence by 30-70%
 - Prevents 2 hospitalizations/month/100-bed nursing home

