Methicillin-Resistant *Staphylococcus aureus* (MRSA) infections the NICU setting

Thomas K. Shimotake, MD

Medical Director, Intensive Care Nursery

UCSF Benioff Children's Hospital-Mission Bay

San Francisco, CA

Marin General Hospital Perinatal-Neonatal Outreach
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Staph aureus and MRSA in the Neonates: background

- First *S. aureus* infections in infants reported in 1889
  - Kilham EB. Epidemic of pemphigus neonatorum. *Am J OB Dis Women Childr,* 1889
- *S. aureus* most common Healthcare-Assoc Infec (HAI) in U.S. NICUs
  - *S. aureus* infections up to 45/10,000 NICU patients
- First adult cases of **MRSA** in 1960s; First neonatal cases in 1980s
- **MRSA** now ubiquitous pathogen
  - *Community-Associated MRSA* (**CA-MRSA**)- as high as 30–70% gen pop
    - more virulent but less resistant to antibiotics than HA-MRSA
  - *Healthcare-Associated MRSA* (**HA-MRSA**)- rates in neonates **0.6% – 8.4%** (reported)
    - MRSA carriage rates in HCW **2–3x** higher than gen pop.

MRSA in the NICU: financial impact

- Although no diff b/t MRSA and MSSA in bacterial pathogenicity, once a neonate is infected with MRSA it can be associated with higher readmit rates and longer infection course than MSSA cases.

- MRSA colonized neonates had much longer lengths of hospital stay vs controls with excess cost of **$6,901,180**.

- MRSA infect assoc => **+40-day** LOS and **+$164,301** cost/patient.

MRSA in the NICU: Incidence in neonates

- Neonates, esp Preterm/ELBW, vulnerable to MRSA colonization & infection
- Neonates acquire MRSA in median= **9 days** (1–91 days) after NICU admit
- **1 in 5** MRSA colonized neonates may develop infection
- Median onset time from MRSA colonization to infection = **4 to 9 days**
- Prematurity principal risk factor for MRSA colonization and infection
- Up to **80%** neonatal MRSA infections occurs in BWt <1500gm babies
- Incidence of MRSA infections in neonates:
  - **BW ≤1,000g** reported incidence **53.4** /10,000 infants
  - **BW 1,001–1,500g** reported incidence **23.2** /10,000 infants
  - **BW 1,501–2,500g** reported incidence **7.9** /10,000 infants
  - **BW > 2,500 g** reported incidence **5.0** /10,000 infants

MRSA in the NICU: Vertical/Horizontal Transmission

- Vertical transmission of MRSA from mothers to their infants
  - Vaginal colonization rate of MRSA in pregnant women est ~2.8%
- MRSA can spread via contact with HCW or hospital environment.
- Reported cases of transmission:
  - MRSA+ **chorioamnionitis** assoc with case of neonatal MRSA sepsis.
  - Mom **colonized** +MRSA in nares transmitted MRSA to 3 of 4 quadruplets.
  - MRSA transmission via **breast milk** reported.
  - MRSA spread by **fathers** through direct contact with neonates
  - Transmission from **siblings** and other contacts
  - **Multiple gestation** assoc w/ incr risk MRSA colonization in neonates.

MRSA in the NICU: colonization sites and risk factors

- Anterior nares predominant site of (initial) MRSA colonization.
- Other sites: umbilicus, nasopharynx, axilla, groin, perineum and GI tract
- Additional factors assoc with healthcare-associated MRSA outbreaks:
  - ***Hand Hygiene***
  - ***Prolonged hospitalization***
  - ***Long-term resp support***
  - ***IV catheters/CVC***
  - ***Abtx***
  - ***TPN***
  - ***Surgical procedures***
  - ***Overcrowding***
  - ***Understaffing***

MRSA in the NICU: Clinical manifestations

- Range of Infectious symptoms: Mild to severe
  - **Mild focal** (most common)**:** e.g., skin and soft tissue infections, conjunctivitis.
  - **Severe:** Late onset sepsis (LOS), necrotizing pneumonia, meningitis, endocarditis, osteomyelitis, liver abscesses, toxic shock syndrome, and UTI
    - *Late-onset sepsis* (LOS) - most common invasive MRSA infection
    - *Early-onset sepsis* (EOS) – rare but reported in industrialized countries
- Mortality varies widely between institutions
  - Range: 2.9% to 28%
  - No difference between MRSA and MSSA in clinical presentation.
- In ELBW infants, Gram-positive infections had higher risk of **BPD** and **CP**
- Severe **NEC** and **ROP** in ELBW infants with gram-positive infections nearly **3x higher**
- vancomycin-resistant *S. aureus* have been reported

MRSA in NICU: Prevention strategies

- Strict hand hygiene and screening patients for MRSA at admission are most effective strategies to reduce rates of MRSA transmission among hospitalized patients.
- Each day exposed to colonized infants increases accquisition risk by 6%.
- Decolonization may prevents MRSA spread by eliminating bacterial reservoir
- **86% of NICUs** (from 58 countries) adopted active surveillance cultures plus MRSA decolonization strategies with nasal mupirocin +/- antiseptic baths.
- 50% of MRSA+ neonates may be persistently colonized or recolonized and may still develop subsequent infection despite decolonization
- NICU in Japan reported eradications after **hand hygiene** and use of disposable **rubber gloves** and **gowns** for patient care as well as patient **decolonization** with intranasal application of mupirocin ointment, bathing in diluted povidone iodine solution, and intraoral application of methylrosaniline chloride
- NICU in New York adopted **surveillance cultures** of patients, staff, and environment, **strict contact precautions**, **cohorting of patients** and nurses, **molecular typing of strains**, and **decolonization of patients with mupirocin** and staff members with **mupirocin and hexachlorophene showers.**
- NICU in St. Louis reported successful containment of MRSA outbreak after **active surveillance** of patients and staff, **improved hyge practices**, **contact isolation**, **cohorting**, **decolonization** of affected patients with **mupirocin ointment**, and **decolonization of affected staff with hexachlorophene showers** as well as administration of **rifampin, trimethoprim-sulfamethoxazole, and mupirocin**.

Hopkins protocol

Skin Antisepsis for CVAD Insertion and Dressing Change, MRSA Decolonization, & CHG Baths for Patients with a CVAD

NO CHG will be used for any newborn for the first 72 hours of life.
Never use CHG for a lumbar puncture or any contact with the meninges.

< 36 weeks gestational age AND < 4 weeks chronologic age	< 36 weeks gestational age AND 4 weeks - 8 weeks chronologic age	≥36 weeks gestational age AND < 2 months chronologic age	≥ 2 months chronologic age (all gestational ages)
No CHG antisepsis or baths CVAD insertion/dressing change antisepsis: Povidone-iodine	CVAD insertion/dressing change antisepsis: CHG MRSA decolonization: CHG bath x2, 48 hrs apart CVAD in place: CHG baths Monday & Thursday	CVAD insertion/dressing change antisepsis: CHG MRSA decolonization: CHG bath x2, 48 hrs apart CVAD in place: CHG baths Monday & Thursday	CVAD insertion/dressing change antisepsis: CHG MRSA decolonization: CHG bath daily x 5 CVAD in place: CHG baths daily

UC Irvine protocol

Criteria	Bathing Frequency
Gestational age at birth ≤24 weeks AND greater than 6 weeks of age	Bathe, using CHG cloths (see below for bathing procedure) ONCE every 48 hours X 2
Gestational age at birth ≥25-36 weeks AND ≥4 weeks of age	Bathe, using CHG cloths (see below for bathing procedure) ONCE every 48 hours X 2
Gestational age at birth ≥36 weeks AND ≥ 3 days of age	Bathe, using CHG cloths (see below for bathing procedure) ONCE every 48 hours X 2
All gestational ages ≥ 2 months of age (all gestational ages)	Bathe, using CHG cloths (see below for bathing procedure) ONCE DAILY, x 5 days

Chlorhexidine(CHG) vs Betadine in neonates (UCLA)

CHLORHEXIDINE GLUCONATE (CHG) USE IN NEONATES

Scrub the hub and line changes down to the hub use CHG swabs ON ALL PATIENTS

Skin Antisepsis use CHG applicator based on gestational age

≤36 weeks gestational age

> 4weeks chronological age?

- **Yes** → **CHG**
- **No** → **Betadine**

Use CHG

- Venipunctures/Arterial sticks/Blood Cultures
- CVC line placements (except UVC/UAC)
- PIV insertions
- Arterial line placements
- Dressing Changes

Do not use CHG

Use 1% Povidone-iodine instead:

- For lumbar puncture/contact with meninges
- On open wounds or as a general skin cleanser
- If skin is not intact, do not use for any CVC placement
- For UVC/UAC insertions
- Near eyes, ears, and mouth
- For Foley insertions
- For chest tube placement

≥36 1/7 weeks gestational age

>72 hours of life?

- **Yes** → **CHG**
- **No** → **Betadine**

***CAUTION: CHG may cause burns or irritation**

MRSA in NICU: Systemic treatment

- Per AAP Comm on ID recs:
  - Antibiotic recommendation for non life-threatening *S. aureus* infections in communities with high rates of MRSA colonization and infection include **clindamycin** or **vancomycin**
  - Empiric antibiotic Rx for life-threatening infection due to *S. aureus* infection of unknown susceptibility include **IV vancomycin** plus **nafcillin** or **oxacillin** plus **gentamicin**
  - If the patient has recently received courses of vanco (i.e., risk of vanco-resistant MRSA), then **linezolid** could be substituted for vancomycin.
- Cochrane review (Shah et al) of safety and efficacy of **anti-staphylococcal immunoglobulins** for the prevention of *S. aureus* infections in very low birth weight (VLBW) neonates. 2,700 neonates showed **no significant difference in the prevention of *S. aureus* infections in VLBW** infants after administration of anti-staphylococcal IVIG.

Decolonization protocol: Mupirocin

- Mupirocin effective at intranasal decolonization in the short term
- Pediatrics RCT from 2019 of **5 days of mupirocin q8hr** (intranasal, perianal, periumbilical) showed high efficacy on **day 8** after Rx: **94% vs 4.7%** in controls.
- But at **day 22:** 45% were persistently decolonized (**55% became recolonized**).
- Popoola 2014 used **intranasal mupirocin for 5 days twice daily** (and CHG if eligible) and showed some limited success; **38% of babies with received decolonization became recolonized** during their hospitalization and of these 16% developed an MRSA infection.
- MRSA resistant to mupirocin & antiseptics reported, so tx should be verified.
- potential adverse effects of antiseptic baths
  - skin irritation and toxicity
- a consensus for guidelines is lacking.

Decolonization protocol: Chlorhexidine (CHG)

- Studies of intranasal mupirocin +/- topical CHG show short term benefit of decolonization.
- These have mostly studies intranasal mupirocin +/- topical CHG showed short term benefit with risk of recolonizing weeks after decolonizing.
- Not FDA approved in <2month of age
- Risks: skin irritation/burns, systemic absorption and unknown long-term FX.

- https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3950943/
- https://pubmed.ncbi.nlm.nih.gov/30226122/

INFECTION CONTROL AND HOSPITAL EPIDEMIOLOGY FEBRUARY 2006, VOL. 27, NO. 2

Management of Outbreaks of Methicillin-Resistant *Staphylococcus aureus* Infection in the Neonatal Intensive Care Unit: A Consensus Statement

- ID and infection control experts from Chicago NICU's created a set of **standard guidelines** for effectiveness of various MRSA control methods.

- Recommendations included:
  - improved hand hygiene practices
  - cohorting and isolation of patient and staff
  - neonatal surveillance cultures
  - screening of healthcare workers during outbreaks
  - decolonization practices
  - environmental cultures
  - molecular analysis of strains during outbreaks
  - open-communication between NICUs
  - collaboration with hospitals and public health institutions
  - upholding regulations and standards for staffing and unit censuses

Susan J Gerber, et. al., Chicago DPH Neonatal MRSA Working Group. Mgmt MRSA Infect NICU: Consensus Statement, *Infect Ctl and Hosp Epi* 2006

Recommendations for Prevention and Control of Infections in Neonatal Intensive Care Unit Patients: *Staphylococcus aureus*

September 2020

- Provides new, evidence-based recommendations specific to prevention and control of S. aureus, including MRSA and MSSA, in NICU patients.
- Recommendations based on a systematic review of best available literature through August 2019.
- A MRSA “outbreak” is defined as 2 or more infections with same antibiotic resistance pattern in the same NICU.
- Where evidence was insufficient to formulate evidence-based recommendations, interim guidance is available: *SHEA neonatal intensive care unit (NICU) white paper series: Practical approaches to Staphylococcus aureus disease prevention* (https://www.cambridge.org/core/journals/infection-control-and-hospital-epidemiology/article/shea-neonatal-intensive-care-unit-nicu-white-paper-series-practical-approaches-to-staphylococcus-aureus-disease-prevention/B54E657100142EEE0FD4AEE4CC5D824E)

Recs Prevention And Control of Infections in NICU Patients: Staph aureus, Sept 2020: https://www.cdc.gov/infectioncontrol/guidelines/NICU-saureus/

Summary of Recommendations

#	Recommendation	Category
1.a	Perform active surveillance testing for S. aureus colonization in neonatal intensive care unit patients when there is an increased incidence of S. aureus infection or in an outbreak setting. Recommendation 1.a. details.	Recommendation
1.b	Perform active surveillance testing for methicillin-resistant *S. aureus* (MRSA) colonization in neonatal intensive care unit patients when there is evidence of ongoing healthcare-associated transmission within the unit. Recommendation 1.b. details.	Recommendation

Recommendations for Prevention and Control of Infections in Neonatal Intensive Care Unit Patients: *Staphylococcus aureus*

Centers for Disease Control and Prevention
National Center for Emerging and Zoonotic Infectious Diseases
Division of Healthcare Quality Promotion

Date: September 2020

Recs Prevention And Control of Infections in NICU Patients: Staph aureus, Sept 2020: https://www.cdc.gov/infectioncontrol/guidelines/NICU-saureus/

1.d	If active surveillance testing for S. aureus colonization is implemented for neonatal intensive care unit patients, test at regular intervals to promptly identify newly colonized patients. Recommendation 1.d. details.	Recommendation
1.f	If active surveillance for S. aureus colonization in neonatal intensive care unit patients is performed, either culture-based or polymerase chain reaction detection methods are acceptable. See Implementation Considerations (Laboratory Assays). Recommendation 1.f. details.	Recommendation
1.g	If active surveillance for S. aureus colonization of neonatal intensive care unit patients is performed, collect samples from at least the anterior nares of neonatal intensive care unit patients. See Implementation Considerations (Anatomic Sampling Site). Recommendation 1.g. details.	Recommendation

Recommendations for Prevention and Control of Infections in Neonatal Intensive Care Unit Patients: *Staphylococcus aureus*

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Recs Prevention And Control of Infections in NICU Patients: Staph aureus, Sept 2020: https://www.cdc.gov/infectioncontrol/guidelines/NICU-saureus/

1.e.	If active surveillance testing for *S. aureus* colonization in neonatal intensive care unit patients is implemented, consider testing outborn infants or infants transferred from other newborn care units on admission to promptly identify newly admitted colonized patients. Recommendation 1.e. details.	Conditional Recommendation
2.a.	Consider targeted decolonization for *S. aureus*-colonized neonatal intensive care unit patients in addition to the implementation of, and adherence to, appropriate infection prevention and control measures in an outbreak setting, or when there is ongoing healthcare-associated transmission, or an increase in the incidence of infection. Recommendation 2.a. details.	Conditional Recommendation

Recommendations for Prevention and Control of Infections in Neonatal Intensive Care Unit Patients: *Staphylococcus aureus*

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Recs Prevention And Control of Infections in NICU Patients: Staph aureus, Sept 2020: https://www.cdc.gov/infectioncontrol/guidelines/NICU-saureus/

1.c	The use of active surveillance testing for methicillin-sensitive *S. aureus* (MSSA) colonization in neonatal intensive care unit patients to detect ongoing healthcare-associated MSSA transmission is an unresolved issue. Recommendation 1.c. details.	No Recommendation
2.b.	The use of universal decolonization for *S. aureus*-colonized neonatal intensive care unit patients is an unresolved issue. Recommendation 2.b. details.	No Recommendation

Recommendations for Prevention and Control of Infections in Neonatal Intensive Care Unit Patients: *Staphylococcus aureus*

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2.c.	The optimal decolonization agent or combination of agents remains an unresolved issue. Recommendation 2.c. details.	No Recommendation
3	Appropriate procedures to allow discontinuation of Contact Precautions for individual neonatal intensive care unit patients who have a history of colonization or infection with methicillin-resistant *S. aureus* (MRSA) is an unresolved issue. Recommendation 3. details.	No Recommendation

Recommendations for Prevention and Control of Infections in Neonatal Intensive Care Unit Patients: *Staphylococcus aureus*

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Routine Surveillance

Question: Should healthcare personnel consider active surveillance cultures of hospitalized neonates for S. aureus and if so, what are the best strategies?

- No specific standard protocol exists for frequency of S. aureus surveillance testing, specific population(s) to test, or duration of active surveillance.
- Consider **routine active surveillance** when results can inform infection prevention and/or decolonization.
- Units should use culture-based or PCR testing, with **anterior nares** preferred sample site or **composite swab** from multiple sites.
- Units should institute **contact precautions** for infants with positive MRSA test results.
- Healthcare personnel **should not** routinely perform S. aureus testing of equipment and/or other environmental surfaces.

Recs Prevention And Control of Infections in NICU Patients: Staph aureus, Sept 2020: https://www.cdc.gov/infectioncontrol/guidelines/NICU-saureus/

Contact Precautions

Question: How long should units maintain contact precautions for MRSA-colonized neonates? What are reasonable criteria for discontinuation of contact precautions?

- Units should strongly consider continuing contact precautions for duration of hospitalization because of high rates of persistent and/or recurrent colonization.

- Especially in high-risk groups likely to remain MRSA-colonized (e.g., infants on invasive (ETT) or noninvasive (CPAP/HFNC) ventilation, tracheostomy, or drain/ wound.

- Units should perform serial surveillance testing to document continued clearance of MRSA colonization if contact precautions are removed.

Recs Prevention And Control of Infections in NICU Patients: Staph aureus, Sept 2020: https://www.cdc.gov/infectioncontrol/guidelines/NICU-saureus/

Decolonization

Question: What are potential methods and indications for decolonizing NICU infants colonized with S. aureus?

- Optimal decolonization regimen for infants has not been determined.
- **Intranasal mupirocin** bid for 5–7 days is an acceptable method for infants.
- Units **should not use systemic antimicrobials** because not studied in this population and may lead to abtx resistance and adverse drug events.
- Consider targeted **decolonization** to reduce risk of infection in colonized infants:
  - when an outbreak has been identified
  - when colonized patient may be at higher risk for infection (e.g, LBW, indwelling devices, or prior to high-risk surgeries).
- No literature to definitively determine effectiveness of universal decolonization (Rx all infants regardless of *S. aureus* colonization status) to prevent *S. aureus* infections in NICUs

Recs Prevention And Control of Infections in NICU Patients: Staph aureus, Sept 2020: https://www.cdc.gov/infectioncontrol/guidelines/NICU-saureus/

BCH-San Francisco
MRSA Surveillance Swabs and Decolonization Regimens

Surveillance MRSA Swabs every Monday
Do not do the intranasal swabbing for patients with contraindications such as recent ENT surgery. Exclude patients undergoing decolonization or with an active MRSA infection.

Order	Procedure	What to do if a baby tests MRSA positive?
1) Enter "Staph Aureus culture" Lab code 234 2) Free text specific site: 'anterior nares, axilla, umbilical, perirectal' 3) Write in the Text Box: "For MRSA only with susceptibilities"	1) Using a *single* charcoal swab, swab both anterior nares, then both axilla, then umbilicus, and last peri-rectal area	1) Place MRSA+ babies in Yellow Zone as able 2) Start decolonization regimen if eligible* 3) Offer parents MRSA decolonization (under construction)

Patient MRSA Decolonization Regimen
Exclude patients with allergies to CHG or mupirocin or active *S.aureus* infection. Please review list of additional exclusions.*

If the patient develops *S.aureus* infection during decolonization, stop the decolonization until the infection resolves; restart the decolonization once the infection resolves.

Intranasal	**2% mupirocin ointment to each nare twice daily for 5 days**		
	Patient >72 hours of life		
	Birth gestation <36 weeks AND < 4 weeks chronologic age e.g. Infant born at 23 weeks and is now 2 weeks old	**Birth gestation >36 weeks OR > 4 weeks chronologic age** e.g. Infant born at 23 weeks and is now 5 weeks old	**ANY birth gestation AND > 2 months chronological age** e.g. Infant born at 23 weeks and is now 3 months old
Topical	For the first decolonization only use 2% mupirocin cream: Apply BID to periumbilical region if stump has fallen off and healed, no catheter in place, and no other contraindication, **and** apply BID to perirectal region for 5 days; do not use this periumbilical and perirectal mupirocin treatment if the baby needs additional rounds of decolonization.	CHG Sage wipes** once every 48 hours x 2 (see below for procedure)	CHG Sage wipes** once daily for 5 days (see below for procedure)

***Additional Exclusion:**
NO mupirocin will be used on these infants:
1. History of allergy or rash over area where mupirocin will be administered

UCSF decolonization guidelines (page 1 of 1)

2. For nasal administration- choanal atresia, history of nasal intubation, or other contraindications to intranasal treatment
3. For other body sites-- congenital skin disorder such as epidermolysis bullosa, neural tube defect, abdominal wall defect, abdominal wound such as drain or ostomy

NO CHG bathing will be used in these infants:

1. History of allergy
2. 72 hours of age or less, regardless of gestational age at birth
3. Unstable medical condition in which handling is contraindicated and/or may result in destabilization (unstable infants on iNO, pressors, etc.); evaluate every shift if infant may tolerate decolonization bathing
4. Infants with epidermolysis bullosa, or other significant skin disease/wounds or gastroschisis, oomphalocele, myelomeningocele, reservoirs/VP shunts (consult with medical team)

**Do not use the Medline CHG wipes which contain alcohol and other ingredients which can be more irritating to the baby's skin

Intranasal Mupirocin Procedure:

Mupirocin 2% ointment
Apply a small amount to coat nasal mucosa of anterior nares with cotton-tipped or low-absorption swab. Use one swab per nostril.

Ointment supplied in either a 1 mL syringe (single dose) or multi-dose tube. If supplied in a 1 mL syringe, please discard after each application (for BID applications, use 2 syringes per day). If supplied in a multi-dose tube, please dispense amount needed for both nares onto a clean gauze before application; use tube for duration of therapy (5 days) for individual patient and then discard.

Topical Decolonization Mupirocin Procedure:

Mupirocin 2% cream
Apply only to intact skin and review exclusion criteria listed above.

Apply a small amount of cream with a clean gloved finger in a circular motion to the immediate periumbilical area. Gently rub cream into skin.

Prior to application to perirectal area, wipe away any visible stool and barrier creams/ointments. Remove gloves and perform hand hygiene.
Don new gloves. Then apply small amount of cream with a clean gloved
finger in a circular motion to the immediate perirectal area. Gently rub into skin. If infant stools during application, do not reapply mupirocin until next dose is due.

Topical Decolonization Bathing Procedure:

Eligible patients will be bathed using Sage CHG cloths (see below for bathing procedure)

DO NOT use CHG wipes on face, eyes, ears, scalp, mucous membranes, or perineal area.
Avoid getting CHG in skin folds; allowing CHG to sit in skin folds without drying can cause irritation/burns.
DO: wipe the back, groin, axilla, arms, legs, torso, neck

No rinsing after CHG bathing; infant may be bathed first as per ICN protocol then CHG bathing follows

1. Immediately prior to bathing, carefully inspect skin for rashes and document carefully

UCSF decolonization guidelines (page 2 of 2)

2. Only 2 cloths are needed for infants WITHOUT a CENTRAL LINE. For those infants with a central line, use a separate cloth (cloth #3) to clean the extremity with the central line
    1. Using cloth #1, wipe the neck, chest, abdomen, both arms, and back
    2. Using cloth #2, wipe both legs, buttocks and genital/anal area
    3. If using cloth #3 (for infants with a central line only), wipe the arm/leg, or chest area in which the central line is located with cloth #3, avoiding the dressing.
3. Dispose of each cloth in the regular trash

UCSF Benioff Children's Hospitals

Do I have Methicillin resistant *Staphylococcus aureus* (MRSA)?

We have not checked you for MRSA. But, we can provide you treatment because your baby has MRSA.

Some people can have MRSA without having symptoms of infection; this is called "colonized." Some people can have MRSA with symptoms such as skin infections (such as abscesses and infected insect bites).

MRSA can be spread in many different ways, such as having close contact with your baby. Doing frequent hand hygiene and keeping your skin healthy are very important to stop the spread of MRSA. Please let your baby's team know if you have a skin infection or have red, sore, weepy, skin.

Because we are treating your baby for MRSA, we will provide you treatment in case you also have MRSA. Your treatment may give your baby a better chance of getting rid of the MRSA.

What is the treatment for MRSA?

We can give you treatment for your skin and inside your nose for 5 days:

1) Once a day skin treatment when you take a shower with 4% chlorhexidine gluconate (CHG)
2) Twice a day treatment in each nostril with 10% povidone iodine (iodophor)

More information about the treatment is below.

What are reasons that you should not do this MRSA treatment?

MRSA treatment is optional. Here are some reasons why this MRSA treatment may not be safe for you.
If you have any of the following, do not do the treatment:

CHG (Hibiclens®): you have had an allergic reaction to this product, have skin inflammation, have open wounds, or are getting chemotherapy or radiation therapy.

Povidone iodine (iodophor): you have had an allergic reaction to iodine, you have a medical condition for which you should not put medications into your nose (such as having nasal packing), or have a skull fracture, cerebrospinal fluid (CSF) leak, or recent nasal or mid-face surgery.

If you have any questions about having MRSA treatment, talk to your doctor.

This treatment is for you only; do not use this treatment for babies or other children.

What if I cannot do the MRSA treatment?

Frequent hand hygiene and keeping your skin healthy are very important to stop the spread of MRSA. Even if you do not show signs of MRSA, do frequent hand hygiene and keep your skin healthy.

WHAT IS CHLORHEXIDINE GLUCONATE (CHG, HIBICLENS®)?

Chlorhexidine gluconate (CHG) is a special liquid soap. It kills germs on skin for 24 hours after you put it on.

Shower with CHG soap once per day for 5 days.

UCSF Parent CHG and nasal Povidine tip sheet (page 1 of 2)

UCSF Benioff Children's Hospitals

Follow these steps daily for 5 days:

1. Rinse your body with warm water.
2. Wash your hair with regular shampoo if you would have otherwise done so. DO NOT USE CHG ON YOUR HEAD. Rinse your hair with water.
3. Wash your face with regular soap and water only. DO NOT USE CHG ON YOUR FACE OR EARS.
4. Wet a clean washcloth and put CHG on it. Turn off the water.
1. **Put the CHG on your skin with the washcloth by massaging it on all areas below the jaw**: neck, arms, chest, back, abdomen, hips, groin, genitals (external only) buttocks, legs, feet and between your fingers and toes.
5. Lather again before rinsing. Turn on the water and rinse CHG off your body. Keep CHG out of eyes, ears and mouth.
6. Dry off with a clean towel each day.
7. Do not put on lotion, cream, powder, or deodorant.
8. Use clean clothes and bed linens.

Caution

-Do not use CHG if you have an allergy to this product, or if you are getting chemotherapy or radiation therapy.
-**When using CHG, do not let it touch eyes, nose, ear canals, mouth or open wounds.**
-Do not use any other soap or body wash when using CHG. Other soaps can stop CHG from killing germs.
-CHG is safe to use on minor wounds, rashes, burns. If you have a wound or red, sore skin and are not sure if you should use CHG, talk to your doctor.
-Allergic reactions are rare but may occur. If you have an allergic reaction such as red, sore skin, stop using CHG and talk to your doctor. The CHG may cause some skin dryness which is normal.
-If you are allergic to CHG, please follow the showering instructions above using regular soap.
-If you are using other topical medications talk to your doctor about using CHG.

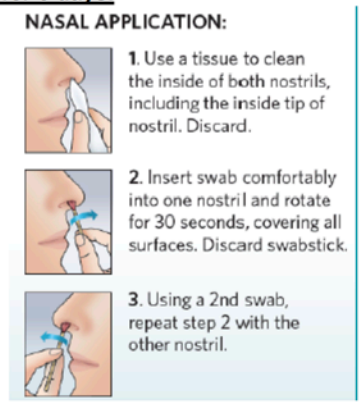
WHAT IS 10% NASAL POVIDONE IODINE (IODOPHOR)?

Iodophor clears germs like MRSA, that live in the nose that can cause infection.

Use the iodophor once in the morning and once in the evening for 5 days.

How to apply 10% iodophor

- Insert swab into one nostril and rotate for 30 seconds to cover the surfaces inside your nose. Throw away the swab.
- Insert second swab into the other nostril and rotate for 30 seconds to cover the surfaces inside your nose. Throw away the swab.
- Use a tissue to wipe excess iodophor on outside of nostrils
- Every time, you will use 2 swabs (4 swabs total per day)



Caution

-Do not use if you have an allergy to iodine, have nasal packing, skull fractures, cerebrospinal leak, or recent nose or mid-face surgery.
- Allergic reactions are rare but may occur. If you have an allergic reaction such as red, sore skin in your nose, talk to your doctor.
-Iodophor may stain your clothes.

UCSF Parent CHG and nasal Povidine tip sheet

(page 2 of 2)

UC HEALTH

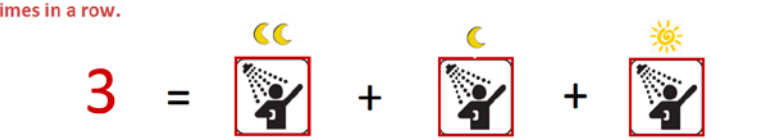
Preparing for your surgery

Shower with Chlorhexidine (CHG) soap to prevent infection

Instructions:

You should shower with CHG soap a minimum of three times before your surgery, or more often as directed by your surgeon. In the event that your surgery date is moved to an earlier date, complete as many showers as you can manage. Emergency cases are excluded from these bathing instructions.

Showering several times before surgery blocks germ growth and provides the best protection when used at least 3 times in a row.



How to shower with CHG soap:

1. Rinse your body with warm water.
2. Wash your hair with regular shampoo. Rinse your hair with water. If you are having neck surgery, use CHG soap instead of your regular shampoo to wash your hair. Rinse your hair with water.
3. Wet a clean sponge. Turn off the water. Apply CHG liberally.
4. Firmly massage all areas: neck, arms, chest, *back, abdomen, hips, groin, genitals* (external only) and buttocks. Clean your legs and feet and between your fingers and toes. Pay special attention to the site of your surgery and all surrounding skin. Ask for help to clean your back if you have a spinal surgery.
5. Lather again before rinsing.
6. Turn on the water and rinse CHG off your body.
7. Dry off with a clean towel.
8. Don't apply lotions or powders.
9. Use clean clothes and freshly laundered bed linens.

Repeat steps 1-9 each time you shower.

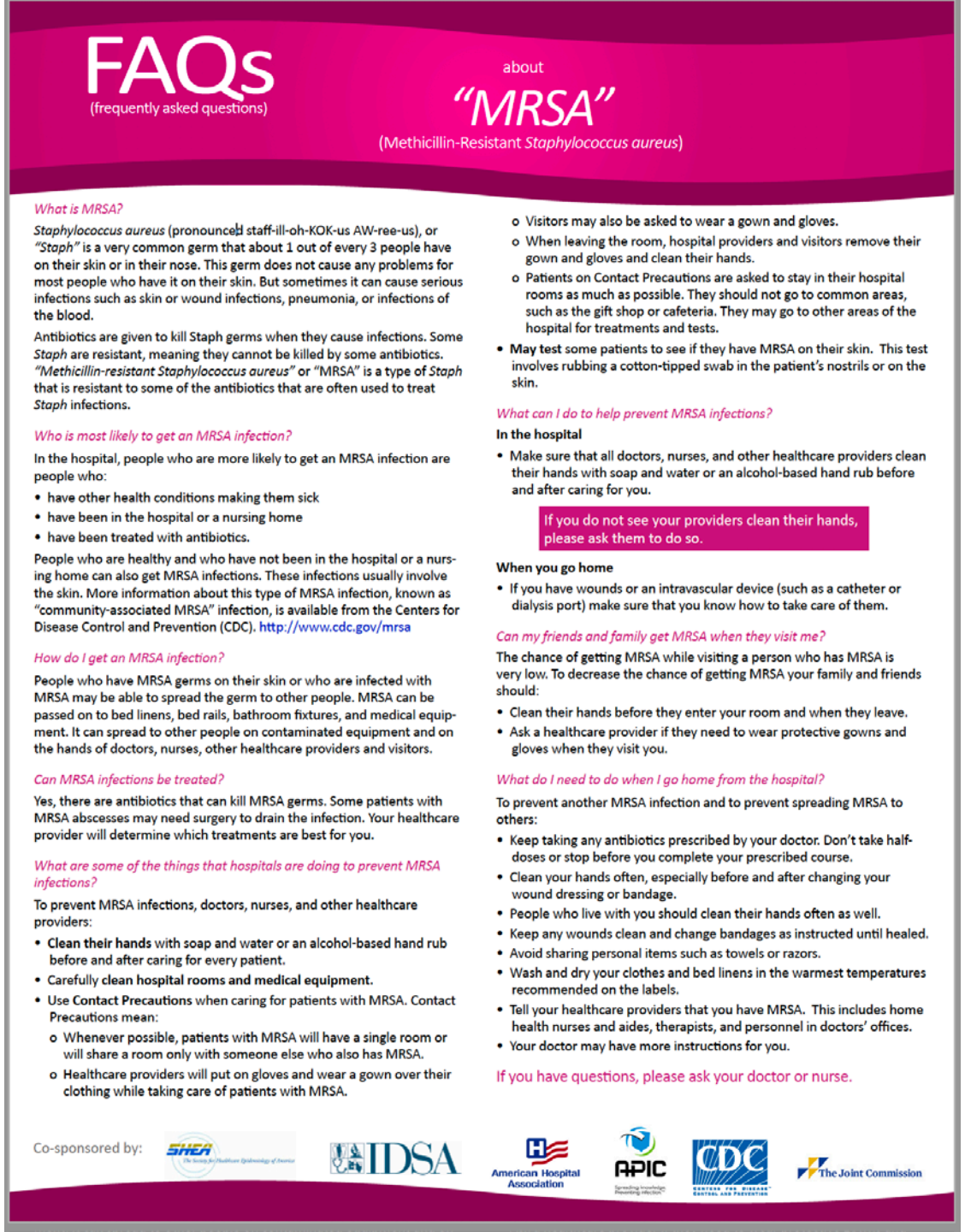
⚠ **Caution: When using CHG soap, avoid contact with eyes, nose, ear canals and mouth.**

Important reminders:

- Do not use any other soaps or body wash when using CHG. Other soaps can block the CHG benefits.
- After showering, do not apply lotion, cream, powder, deodorant, or hair conditioner.
- Do not shave or remove body hair. Facial shaving is permitted. If you are having head surgery, ask your doctor whether you can shave.
- CHG is safe to use on minor wounds, rashes, burns, and over staples and stitches.
- Allergic reactions are rare but may occur. If you have an allergic reaction, stop using CHG and call your doctor if you have a skin irritation.
- If you are allergic to CHG, please follow the bathing instructions above using an over-the-counter regular soap instead of CHG.

UC DAVIS MEDICAL CENTER · UC Irvine Health · UCLA Health · UC San Diego Health System · UCSF Medical Center

UCSF Chlorhexidine (CHG) showering guidelines



FAQs
(frequently asked questions)

about

"MRSA"
(Methicillin-Resistant *Staphylococcus aureus*)

What is MRSA?

Staphylococcus aureus (pronounced staff-ill-oh-KOK-us AW-ree-us), or *"Staph"* is a very common germ that about 1 out of every 3 people have on their skin or in their nose. This germ does not cause any problems for most people who have it on their skin. But sometimes it can cause serious infections such as skin or wound infections, pneumonia, or infections of the blood.

Antibiotics are given to kill Staph germs when they cause infections. Some *Staph* are resistant, meaning they cannot be killed by some antibiotics. *"Methicillin-resistant Staphylococcus aureus"* or "MRSA" is a type of *Staph* that is resistant to some of the antibiotics that are often used to treat *Staph* infections.

Who is most likely to get an MRSA infection?

In the hospital, people who are more likely to get an MRSA infection are people who:

- have other health conditions making them sick
- have been in the hospital or a nursing home
- have been treated with antibiotics.

People who are healthy and who have not been in the hospital or a nursing home can also get MRSA infections. These infections usually involve the skin. More information about this type of MRSA infection, known as "community-associated MRSA" infection, is available from the Centers for Disease Control and Prevention (CDC). http://www.cdc.gov/mrsa

How do I get an MRSA infection?

People who have MRSA germs on their skin or who are infected with MRSA may be able to spread the germ to other people. MRSA can be passed on to bed linens, bed rails, bathroom fixtures, and medical equipment. It can spread to other people on contaminated equipment and on the hands of doctors, nurses, other healthcare providers and visitors.

Can MRSA infections be treated?

Yes, there are antibiotics that can kill MRSA germs. Some patients with MRSA abscesses may need surgery to drain the infection. Your healthcare provider will determine which treatments are best for you.

What are some of the things that hospitals are doing to prevent MRSA infections?

To prevent MRSA infections, doctors, nurses, and other healthcare providers:

- **Clean their hands** with soap and water or an alcohol-based hand rub before and after caring for every patient.
- Carefully **clean hospital rooms and medical equipment.**
- Use **Contact Precautions** when caring for patients with MRSA. Contact Precautions mean:
  - Whenever possible, patients with MRSA will have a single room or will share a room only with someone else who also has MRSA.
  - Healthcare providers will put on gloves and wear a gown over their clothing while taking care of patients with MRSA.
  - Visitors may also be asked to wear a gown and gloves.
  - When leaving the room, hospital providers and visitors remove their gown and gloves and clean their hands.
  - Patients on Contact Precautions are asked to stay in their hospital rooms as much as possible. They should not go to common areas, such as the gift shop or cafeteria. They may go to other areas of the hospital for treatments and tests.
- **May test** some patients to see if they have MRSA on their skin. This test involves rubbing a cotton-tipped swab in the patient's nostrils or on the skin.

What can I do to help prevent MRSA infections?

In the hospital

- Make sure that all doctors, nurses, and other healthcare providers clean their hands with soap and water or an alcohol-based hand rub before and after caring for you.

If you do not see your providers clean their hands, please ask them to do so.

When you go home

- If you have wounds or an intravascular device (such as a catheter or dialysis port) make sure that you know how to take care of them.

Can my friends and family get MRSA when they visit me?

The chance of getting MRSA while visiting a person who has MRSA is very low. To decrease the chance of getting MRSA your family and friends should:

- Clean their hands before they enter your room and when they leave.
- Ask a healthcare provider if they need to wear protective gowns and gloves when they visit you.

What do I need to do when I go home from the hospital?

To prevent another MRSA infection and to prevent spreading MRSA to others:

- Keep taking any antibiotics prescribed by your doctor. Don't take half-doses or stop before you complete your prescribed course.
- Clean your hands often, especially before and after changing your wound dressing or bandage.
- People who live with you should clean their hands often as well.
- Keep any wounds clean and change bandages as instructed until healed.
- Avoid sharing personal items such as towels or razors.
- Wash and dry your clothes and bed linens in the warmest temperatures recommended on the labels.
- Tell your healthcare providers that you have MRSA. This includes home health nurses and aides, therapists, and personnel in doctors' offices.
- Your doctor may have more instructions for you.

If you have questions, please ask your doctor or nurse.

Co-sponsored by: SHEA, IDSA, American Hospital Association, APIC, CDC, The Joint Commission

*SHEA "MRSA" fact sheet

(Society for Healthcare Epidemiology)

Key References

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Thank you

Contact me with any questions or requests for resources.
We are happy to share it all.

Tom.Shimotake@ucsf.edu
UCSF ICN: 415-353-1565