



A CLINICIAN'S ROADMAP TO MRSA MANAGEMENT

Stewardship for Optimal Care

E-NEWSLETTER #3

Infection Control Strategies to Prevent MRSA Transmission

FROM THE EDITOR'S DESK

The first two E-Newsletters in this series discussed appropriate, evidence-based strategies to treat methicillin-resistant *Staphylococcus aureus* (MRSA) infections with antimicrobial agents. This issue discusses the most effective way to manage MRSA infections, and that is to actually prevent the infection from occurring. In response to rising MRSA prevalence in hospitals and increasing numbers of infections, institutions are strengthening infection control efforts to prevent the spread of MRSA. There is a growing collection of reports in the medical literature demonstrating the effectiveness of various infection control strategies in reducing MRSA colonization and infection, including surveillance, improved hand hygiene, contact isolation, and decolonization.

In response to a growing need to provide guidance on effective strategies for hospitals to prevent MRSA infections, the Society for Healthcare Epidemiology of America (SHEA) along with the Infectious Diseases Society of America (IDSA) developed evidence-based guidelines on preventing the transmission of MRSA in acute care hospitals.¹ These guidelines provide a valuable resource that can act as a foundation for improving infection control efforts at institutions. This E-Newsletter offers a summary of the guidelines along with some of the evidence used to base the recommendations. Though strategies should be tailored based on the circumstances of each institution, I hope you find the information contained in this issue useful in furthering infection control efforts at your institution.

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TARGET AUDIENCE

This activity is designed for physicians, pharmacists, and other healthcare professionals on the frontline of managing patients with serious MRSA infections.

LEARNING OBJECTIVE

Healthcare professionals participating in this educational activity will be able at its conclusion to:

- Identify infection control strategies to prevent the transmission of MRSA within the hospital setting

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MRSA Colonization and Infection

Patients colonized or infected with MRSA are largely the source for MRSA transmission in the hospitals. These patients readily contaminate the environment (clothing and medical equipment) and healthcare personnel (hands) who come into their contact.

Patients colonized with MRSA are also likely to develop an MRSA infection. One study of 209 adult patients newly identified as harboring MRSA found that 29% developed an MRSA infection—often severe (bacteremia and pneumonia)—in the following 18 months (**Table 1**).² Identifying patients colonized with MRSA is, therefore, potentially important to prevent MRSA transmission.

Table 1. Types of Subsequent MRSA Infections in Patients Colonized with MRSA²

Type of Infection*	Patients (%) (n=60)
Pneumonia	23%
Soft Tissue	27%
Bone/Joint	18%
Catheter-associated Infection	8%
Blood	38%
Other	13%

*Some patients had multiple sources of infection.

*MRSA Colonization: Risk Factors*¹

- Severe underlying illness or comorbid condition
- Prolonged hospital stay
- Exposure to broad-spectrum antimicrobials
- Presence of foreign bodies, such as central venous catheters
- Frequent contact with the healthcare system or healthcare personnel

Recommended Practices to Prevent MRSA Transmission

Guidelines from the SHEA and IDSA recommend several strategies that acute care hospitals can implement to reduce MRSA transmission.¹

I

CONDUCT AN MRSA RISK ASSESSMENT

Conducting an MRSA risk assessment provides a baseline for subsequent assessments on the effectiveness of implemented infection control strategies. This includes data such as:

- Proportion of *S. aureus* isolates that are methicillin resistant
- Number of new cases of MRSA colonization or infection over a given time period (incidence)
- Number of new cases of 1 or more specific types of MRSA infection (eg, bacteremia, pneumonia) over a given period of time
- Point prevalence surveys of MRSA colonization or infection

II

IMPLEMENT AN MRSA MONITORING PROGRAM

Implementing an MRSA monitoring program helps identify and track patients from whom MRSA has been isolated.

- Common detection strategy: daily review of laboratory results to identify new patients
- Common method of tracking MRSA: line list or case count
 - Line list should include: first MRSA isolate (classified as either hospital- or community-onset MRSA) per patient regardless of clinical culture or surveillance testing
 - Additional information: patient identification, date of specimen collection, site from which specimen was collected, and hospital location at the time of specimen collection

III

COMPLY WITH HAND HYGIENE RECOMMENDATIONS

Patient-to-patient MRSA transmission commonly occurs through transient colonization of the hands of healthcare personnel. Furthermore, implementation of improved hand hygiene practices is associated with reduced MRSA rates among hospital patients.^{3,4} In one large university teaching hospital, the introduction of a hand hygiene program that included promoting the use of an alcohol/chlorhexidine hand hygiene solution resulted in a 40% reduction in total MRSA clinical isolates and 57% reduction in patient-episodes of MRSA bacteremia.³

A hand hygiene compliance program should be implemented following guidelines from the Centers for Disease Control and Prevention (CDC)⁵ and the World Health Organization.⁶

IV

USE CONTACT PRECAUTIONS FOR PATIENTS COLONIZED OR INFECTED WITH MRSA

Healthcare personnel should be educated about isolation precautions, including benefits and potential adverse effects. Patients in isolation tend to be examined less frequently and for shorter durations, and may be more prone to depression, anxiety, pressure ulcers, falls, and electrolyte imbalances.⁷⁻⁹ Healthcare personnel should ensure that patients under contact precautions receive adequate care to prevent or minimize the risk of these adverse effects.

- Place patient in a single or private room when available.
- Wear a gown and gloves on entry into the patient's room.
- Remove the gown and gloves before exiting the room.
- Use appropriate hand hygiene on entering and exiting the room (wearing gloves does not eliminate the need for hand hygiene).

V

ENSURE CLEANING AND DISINFECTION OF EQUIPMENT AND THE ENVIRONMENT

- Use appropriate cleaning and disinfecting agents (eg, quaternary ammonium compounds, sodium hypochlorite, iodophors, and phenolics) and follow guidelines developed by the CDC and Healthcare Infection Control Practices Advisory Committee (HICPAC) on disinfection protocols.¹⁰
- Develop and implement protocols for cleaning and disinfecting environmental surfaces.
- Pay close attention to cleaning and disinfection of frequently touched surfaces in patient care areas (eg, bed rails, carts, bedside commodes, doorknobs, and faucet handles).
- Dedicate noncritical patient care items, such as blood pressure cuffs and stethoscopes, to a single patient when they are known to be colonized or infected with MRSA.
- Provide appropriate training for personnel responsible for cleaning and disinfecting the environment and patient care equipment.

VI

EDUCATE HEALTHCARE PERSONNEL ABOUT MRSA

- Aim: to modify healthcare personnel behavior.
- Provide an educational program to foster desired behavior change.
- Target educational programs on the basis of healthcare personnel needs.
- Consider including opinion leaders in the educational and behavioral modification program.
- Education about MRSA should include risk factors, routes of transmission, outcomes associated with an infection, prevention measures, and local epidemiology.
- Education will be needed for healthcare personnel spanning a broad range of backgrounds. Therefore, consider multiple programs to provide the necessary information at the appropriate level for all relevant personnel.

VII

IMPLEMENT A LABORATORY-BASED ALERT SYSTEM

- Aim: to notify infection prevention and control personnel and clinical personnel of new patients colonized or infected with MRSA.
- The alert system will hasten the need for contact precautions.

VIII

IMPLEMENT AN ALERT SYSTEM THAT IDENTIFIES READMITTED OR TRANSFERRED PATIENTS COLONIZED OR INFECTED WITH MRSA

- Aim: to provide information regarding MRSA status of the patient (ie, colonized, infected) at the time of admission.
- Alerts should remain in effect until MRSA clearance has been documented.
- Likewise, implement a system for communicating the patient's MRSA status when transferring to another hospital.

IX

PROVIDE MRSA DATA AND OUTCOMES MEASURES TO KEY STAKEHOLDERS

- Data should be provided on a regular basis to key personnel such as senior leadership, physicians, and nursing staff.
- Data can be included in routine quality assessment and performance improvement reports.
- Important outcomes measures for hospitals:
 - Methicillin resistance among *S. aureus* isolates
 - Incidence of hospital-onset MRSA bacteremia
 - Incidence of hospital-onset MRSA

X

EDUCATE PATIENTS AND THEIR FAMILIES ABOUT MRSA

- Aim: to help alleviate patient fears regarding being placed under contact precautions.
- Include information about anticipated questions and general information about MRSA
 - Colonization versus infection
 - Hospital's transmission prevention program
 - Contact precaution protocols
 - Risk of MRSA transmission to family and visitors while in the hospital and after discharge



Supplemental Approaches to Prevent MRSA Transmission

The following supplemental approaches, tailored for each healthcare facility, may be needed for certain locations or patient populations where MRSA rates are unacceptably high despite implementing the basic strategies.

ACTIVE SURVEILLANCE TESTING

Screening Patients for MRSA

The practice of screening patients at admission for MRSA remains controversial and its effectiveness in preventing MRSA transmission is largely inconclusive.

In a large, prospective, interventional cohort study of 21,754 surgical patients at a Swiss teaching hospital, nosocomial MRSA infection rates were compared for the 9-month period before (control period) and 9-month period after (intervention period) a universal screening protocol was implemented.¹¹ The intervention involved screening all patients admitted to the hospital for more than 24 hours. Patients identified as colonized with MRSA underwent contact precautions and topical decolonization, among other measures. This intervention was not associated with any significant difference in nosocomial MRSA infection rates (**Table 2**).

Table 2. Rates of Nosocomial MRSA Infection Before and After Implementing a Universal Screening Program¹¹

Characteristics	Control Period (n=10,910)	Intervention Period (n=10,844)
Patients with Any Type of Nosocomial MRSA Infection, n (%)	76 (0.7)	93 (0.9)
Total Incidence per 1000 Patient-days	0.91	1.11
Total Number of MRSA Infections*	88	103
Rate of Surgical Site Infections due to MRSA/Surgical Interventions × 100	0.99	1.14
Patients with Nosocomial MRSA Acquisition	132	142

* Patients may have multiple sites of infection.

However, a separate observational cohort study that included 3 institutions reported a significant decrease in hospital-associated MRSA infections following implementation of active surveillance testing of all patients and decolonization of MRSA carriers.¹² These differences may be attributed to several factors, including methodology, patient populations, and adherence to protocols. Nonetheless, active surveillance testing is likely to be most effective when part of a multifaceted approach to prevent MRSA transmission.

Implementing Active MRSA Surveillance: Steps and Considerations

1. Convene a multidisciplinary team to review the MRSA risk assessment and to plan and oversee the active surveillance testing program.
2. Select and identify the patient populations to be screened (eg, all patients versus high-risk patients or patients in high-risk units).
3. Determine when to perform screening tests.
4. Determine the anatomic sites to include in the screening program. (Testing of any single site will not detect all MRSA-colonized patients.)
5. Determine the laboratory methods and assess resource requirements (eg, molecular tests).
6. Clarify how to manage patients while waiting for the results of screening tests. Two common approaches are: 1) await test result and implement precautions if positive, and 2) empirical contact precautions pending result of test.
7. Assess the availability of single rooms and, if needed, plan for cohorting colonized or infected patients.
8. Assess the availability of personal protective equipment and other supplies.
9. Assess compliance with the screening protocol.

Screening Healthcare Personnel for MRSA

Healthcare personnel can become transiently or persistently colonized with MRSA, and there have been reports of outbreaks in hospitals linked to MRSA transmission by healthcare personnel.^{13,14} However, in the absence of an outbreak, it is not routinely recommended to conduct active surveillance of healthcare personnel.

ROUTINE BATHING WITH CHLORHEXIDINE

Bathing with chlorhexidine will likely result in a decreased number of pathogenic organisms on the skin of colonized or infected patients. This in turn reduces the potential for contamination of the environment and healthcare personnel.

A recent report demonstrated the benefits of daily chlorhexidine bathing in reducing hospital-acquired infections (HAIs) in a non-ICU setting.¹⁵

In the pre-intervention period, 7,102 patients were bathed daily with soap and water, and during

the intervention period, 7,699 patients were bathed using chlorhexidine-impregnated cloths. Daily bathing with chlorhexidine was associated with a 64% reduction in the incidence of MRSA and HAIs due to vancomycin-resistant enterococci (Hazard ratio, 0.36 [95% CI, 0.2–0.8]; $P=.01$).

Routinely Bathing Patients with Chlorhexidine: General Guidelines

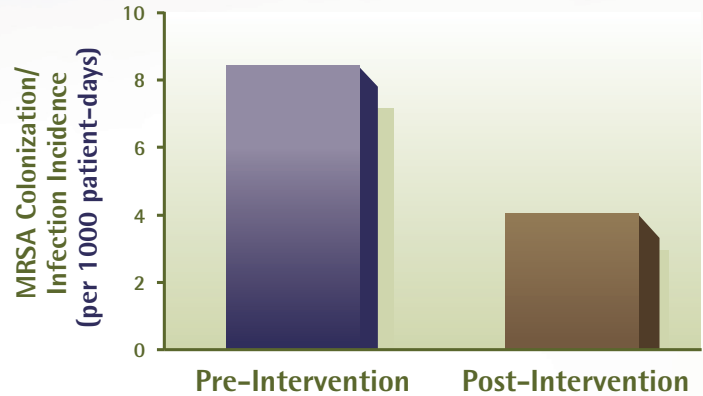
1. Use chlorhexidine rather than regular soap and water or other non-medicated cleansing regimen.
2. Various chlorhexidine products are available and healthcare personnel should be aware of potential adverse skin effects when using these products.
3. Follow the manufacturer's directions when using these products and avoid contact with the eyes and middle ear.

MRSA DECOLONIZATION THERAPY

Use topical antimicrobial or antiseptic agents either with or without systemic antimicrobials in patients colonized with MRSA in an effort to eradicate or suppress colonization. Several studies have demonstrated the effectiveness of such decolonization therapy to reduce MRSA infections and control MRSA outbreaks.¹⁶⁻¹⁸

In one study, the effectiveness of decolonization was studied among ICU patients at an institution.¹⁶ The incidence of MRSA colonization or infection was compared before and after implementation of a decolonization program that included intranasal mupirocin and daily chlorhexidine bathing. In the period following implementation of the decolonization program, MRSA colonization and infection decreased by 52% ($P=.048$, **Figure**).

Figure. Impact of a Decolonization Program on the Incidence of MRSA Colonization and Infection¹⁶



Providing Decolonization Therapy for MRSA-colonized Patients: Considerations

1. The optimal decolonization therapy regimen has not yet been determined. A common approach is the use of 2% mupirocin administered intranasally with or without chlorhexidine bathing.
2. Though complications due to decolonization therapy are uncommon, healthcare personnel should be aware of potential adverse effects.

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POST TEST Please select the most appropriate response.

1. In a study of 209 adult patients newly identified as harboring MRSA, what percentage developed an MRSA infection in the following 18 months?
 10% 19% 29% 54%

2. Which of the following are risk factors for MRSA colonization?
 Severe underlying illness Exposure to broad-spectrum antimicrobials
 Prolonged hospital stay All of these

3. Patients placed in isolation may be more prone to depression, anxiety, and pressure ulcers.
 True False

4. At one large university teaching hospital, implementation of a hand hygiene program reduced patient-episodes of MRSA bacteremia by what percentage?
 25% 40% 57% 90%

5. An effective method for decolonization is routine bathing with which compound?
 Chlorhexidine Isopropyl alcohol Soap and water None of these

COMMITMENT TO CHANGE

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Do you wish to make commitments to change in your practice?

Yes No

As a result of what I learned participating in this activity, I intend to make the following practice changes:

OVERALL EVALUATION

	Yes	Somewhat	No
1. The following learning objective was achieved. • Identify infection control strategies to prevent the transmission of MRSA within the hospital setting	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2. The content was relevant to my practice and educational needs.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
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If you answered "No" to any of the above, please explain.

5. Quality of Guest Editor. Excellent Good Fair Poor

6. Do you have (1) any suggestions for improving this activity or (2) any additional comments?

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