Infection Prevention Webinar Series:
*Methicillin-resistant Staphylococcus aureus (MRSA) Bacteremia*
October 29, 2019
Agenda

- Welcome & FHA Mission to Care HIIN Update
- Upcoming HIIN Events and Opportunities
  - Cheryl Love, RN, BSN, BS-HCA, MBA, LHRM, CPHRM, Director of Quality and Patient Safety and Improvement Advisor, FHA
- Infection Prevention Series: Strategies to Prevent Hospital-onset MRSA Bloodstream Infections
  - Linda R. Greene, RN, MPS, CIC, FAPIC, Manager of Infection Prevention, UR Highland Hospital, Rochester, NY
- Q&A
- Evaluation Survey & Continuing Nursing Education
HIIN Core Topics – Aim is 20% reduction

- Adverse Drug Events (ADE)
- Catheter-associated Urinary Tract Infections (CAUTI)
- Clostridium Difficile Infection (CDI)
- Central line-associated Blood Stream Infections (CLABSI)
- Hospital-onset MRSA Bacteremia
- Injuries from Falls and Immobility
- Pressure Ulcers (PrU)
- Sepsis
- Surgical Site Infections (SSI) – Abdominal Hysterectomy
- Venous Thromboembolisms (VTE)
- Ventilator-Associated Events (VAE/IVAC/PVAP)
- Readmissions (12% reduction)
- Worker Safety
Resources, Trainings and Tools

Mission to Care Website
HRET HIIN Website

MDRO prevention resources:
- MDRO Change Package
- MDRO Checklist
- MDRO Discovery & Direction 5-part Series
- Acute Care Facility MDROs Control Activity Tool
- CDC MRSA Infections Presentation
- FHA Event Archives
- HRET HIIN Resource Library
- SOAP UP

Hospital-Acquired Infections (HAIs)

Multi-Drug Resistant Organisms (MDRO)

Multi-drug resistant organisms (MDROs) are microorganisms, predominantly bacteria, that create infections which are resistant to one or more antimicrobial agents. Common MDROs include:

- Methicillin-resistant Staphylococcus aureus (MRSA)
- Staphylococcus aureus with resistance to vancomycin (VISA/VRSA)
- Vancomycin-resistant Enterococci (VRE)
- Extended spectrum beta-lactamase-producing gram-negative bacilli (ESBLs)
- Multidrug-resistant Streptococcus pneumoniae (MDRSP)
- Carbapenem-resistant enterobacteriaceae (CRE)
- Multidrug-resistant Acinetobacter
Designed to reduce multiple forms of harm with simple, easy-to-accomplish activities that cut across several topics to decrease harm.

Focused on four components:

- **SOAP UP**: Hardwire Hand Hygiene
- **GET UP**: Mobilize Patients
- **WAKE UP**: Prevent Over-sedation
- **SCRIPT UP**: Optimize Inpatient Medications
### Our Progress

**FHA HIIN Hospital Performance Report**

**Effective Date:** September 25, 2019

All measures calculated per 1,000 unless noted.
* Rate calculated per 100

#### Summary of Progress Meeting 20/12 Goal:

<table>
<thead>
<tr>
<th>Project</th>
<th>Baseline</th>
<th>Project-to-Date: October 2016 to Present</th>
<th>Most Recent 3 Months</th>
<th>Hospital Target</th>
<th>Top 25th Percentile Project to Date</th>
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</thead>
<tbody>
<tr>
<td>CAUTI - all except NICUs</td>
<td>0.975</td>
<td>1.558 / 1.906,544 / 0.805</td>
<td>112 / 152,333 / 0.725</td>
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<td>CAUTI - ICUs except NICUs</td>
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<td>717 / 878,966 / 0.816</td>
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<tr>
<td>C. diff Rate Facility-wide-all except NICUs (per 10,000)</td>
<td>7.453</td>
<td>5,554 / 13,663,842 / 3.977</td>
<td>551 / 1,145,148 / 3.065</td>
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<tr>
<td>CLABSI - All</td>
<td>0.924</td>
<td>1,252 / 2,016,290 / 0.621</td>
<td>74 / 193,010 / 0.438</td>
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<td>CLABSI Rate - ICUs</td>
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<td>Hospital-onset MRSA bactereemic events</td>
<td>0.070</td>
<td>912 / 34,197,844 / 0.064</td>
<td>70 / 2,037,475 / 0.058</td>
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<td>0.752</td>
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<td>SSI, hip surgeries*</td>
<td>1.421</td>
<td>402 / 41,270 / 0.974</td>
<td>33 / 3,953 / 0.825</td>
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<td>VAE, Ventilator-associated condition rate</td>
<td>5.600</td>
<td>2,756 / 488,995 / 5.635</td>
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<td>VAE, Infection-related ventilator-associated condition rate</td>
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<td>654 / 480,934 / 1.847</td>
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<td>253 / 352,761 / 0.760</td>
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**Mission to Care. Vision to Lead.**
FHA Mission to Care Update: MRSA Bacteremia Events

Source: HRET Comprehensive Data System, September 26, 2019

<table>
<thead>
<tr>
<th></th>
<th>Rate</th>
<th>Improvement</th>
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<tr>
<td>Baseline Rate</td>
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<td>Project to Date</td>
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<td>Most Recent 3 Months</td>
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## FHA Results to Date

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<tr>
<th>Harm Measure</th>
<th>Baseline Rate per 1000</th>
<th>Target Rate</th>
<th>Project To Date Rate per 1000</th>
<th>Harms Prevented</th>
<th>Costs Avoided</th>
<th>Lives Saved</th>
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<td>CAUTI Rate - All Settings</td>
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<td>0.58</td>
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<td>CLABSI Rate - All Settings</td>
<td>0.70</td>
<td>0.56</td>
<td>0.47</td>
<td>563</td>
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<td>MRSA Rate</td>
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<td>SSI Rate, Colon</td>
<td>0.43</td>
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<td>0.42</td>
<td>17</td>
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<td>SSI Rate, Abd</td>
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<td>SSI Rate, Knee</td>
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<td>SSI Rate, Hip</td>
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<td>Clostridiodes difficile rate</td>
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<td>VAC</td>
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<td>1.06</td>
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Source: HRET Improvement Calculator, effective date September 25, 2019
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<thead>
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<th>Date</th>
<th>Topic</th>
<th>Register Online</th>
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<tr>
<td>Oct. 23, 2018</td>
<td>NHSN: SSI Surveillance Identification and Analysis</td>
<td>Event archive*</td>
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<tr>
<td>Nov. 20, 2018</td>
<td>SSI-Colon: How to Assess Root Cause and Prevention Strategies</td>
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<td>Dec. 18, 2018</td>
<td>NHSN: VAE Surveillance Identification and Analysis</td>
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<td>Jan. 22, 2019</td>
<td>VAE: How to Assess Root Cause and Prevention Strategies</td>
<td>Event archive*</td>
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<td>Feb. 19, 2019</td>
<td>NHSN: MRSA Bacteremia Surveillance Identification and Analysis</td>
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<td>Mar. 26, 2019</td>
<td>MRSA Bacteremia : How to Assess Root Cause and Prevention Strategies</td>
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<tr>
<td>Jul. 24, 2019</td>
<td>Implementation of Best Practices for VAE Prevention</td>
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*Access Event Archives ([Recordings](#) | [Slides](#)) on the Mission to Care HIIN Website*
<table>
<thead>
<tr>
<th>Date</th>
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<td>Implementation of Strategies for the Prevention of IVAC/PVAP</td>
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<td>Sep. 27, 2019</td>
<td>SSI: Abdominal Hysterectomy</td>
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<tr>
<td>Oct. 29, 2019</td>
<td>MRSA Bacteremia</td>
<td>Event archive (to be posted within 24 hours)*</td>
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<tr>
<td>Nov. 21, 2019</td>
<td>SSI: Colon</td>
<td>Register Online</td>
</tr>
<tr>
<td>Dec. 18, 2019</td>
<td>Non-Ventilator Pneumonia</td>
<td>Register Online</td>
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*Access Event Archives ([Recordings](#) | [Slides](#) on the Mission to Care HIIN Website*
<table>
<thead>
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<th>Register Online</th>
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<td>SIP Webinar Series #1: Pre-operative Strategies for Prevention of SSI</td>
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<td>May 22, 2019</td>
<td>SIP Webinar Series #2: Intra-operative Strategies for Prevention of SSI</td>
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<td>Jun. 25, 2019</td>
<td>SIP Webinar Series #3: Post-operative Strategies for Prevention of SSI</td>
<td>Event archive*</td>
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</table>

**Preventing Post-Surgical Harm Resource Guide** (Jun. 5, 2019)

*Access Event Archives ([Recordings](#) | [Slides](#)) on the Mission to Care HIIN Website*
Other Upcoming Virtual Events

November 1  | Critical Care Collaborative Informational Webinar

November 6  | Quality Hot Topics Virtual Event #12
https://cc.readytalk.com/r/brlxqrr46yqx&eom

Check your HIIN Mission to Care Newsletter Weekly Email for more event details and registration
Training Workshops

• Infection Prevention Bootcamp | Next Level Nov. 7-8, 2019 in Orlando, FL
  Register Online:  https://www.surveymonkey.com/r/IPbootcampII
• Infection Prevention Bootcamp – Jan 2020
• Quality 101 – Feb 2020
The Critical Care Collaborative (C³) focuses on care of the ventilated patient, as well as prevention of infection and injury of the critically ill/injured patient. The format will be based on the A2F bundle which is an evidence-based guide for clinicians to approach the organizational changes needed for optimizing ICU patient recovery and outcomes.

- Preassessment Survey
- Chart Review of Ten Cases
- Instructional and peer sharing webinars
- Opportunity for small test of change
- In-person meeting in Orlando featuring Wes Ely, MD, Vanderbilt University
2019 - 2020 Critical Care Collaborative

Introduction with link to assessment. Chart audit tool and “playbook” sent to those who complete assessment.

- Details of A, B and C bundle elements discussed
- Hospitals share barriers and successes
- VAE
- CAUTI/CLABSI

Hospitals return audits to SHA.

- Details of D, E and F bundle elements discussed
- Hospitals share barriers and successes
- HAPI, VTE and Falls
- Intro to test of change and AIM

Hospitals share test of change and start implementation.

- 2-3 Hospitals report out
- Initial progress & challenges
- Sharing of ideas
- Next steps/long-term strategies

ICU Collaborative Meeting in Orlando featuring Wes Ely, MD

November 1
Webinar #1

November 13
Webinar #2

November 20
Webinar #3

December 5
Webinar #4

January 9
In-person Meeting

January 15
Webinar #5

February 13
In-person Meeting

February 20
Wrap up meeting
• Oct 2019-March 2020
• Five focused virtual events
• Coaching from national experts to enhance QI skills, implementing tests of change and addressing challenges
• Latest evidence-based practices
• Peer learning/sharing
Hospital Roles and Responsibilities

- **Select** hospital lead/multidisciplinary team
- **Register** and attend/watch the PI Collaborative sessions
- **Complete** the pre-assessment and post-assessment
- **Review** hospital harm rates and PI process
- **Complete** PI Collaborative deliverables
- **Submit** completed deliverables to HRET
To Join the PI Collaborative

• Register at
  https://www.surveymonkey.com/r/Plcollaborative

• HRET Virtual Event:
  – Nov. 19, 12:00 p.m. to 1:00 p.m. ET
Strategies to Prevent Hospital-onset 
*Staphylococcus aureus* (MRSA) 
Bloodstream Infections

Linda R. Greene, RN, MPS, CIC, FAPIC 
Manager, Infection Prevention 
UR Highland Hospital 
Rochester, NY 
linda_greene@urmc.rochester.edu
Objectives

- Describe the epidemiology of MRSA
- Discuss current CDC definitions and guidelines
- Identify Strategies to prevent MRSA Bloodstream infections
Polling Question 1

What is your background?

1. Infection Prevention
2. Quality or patient safety
3. Management
4. Staff nurse
5. Other
Definitions

Colonization

Growth and Multiplication without Disease

Infection

Clinical or subclinical response
MRSA

- *Staphylococcus aureus*- Resistant to Antibiotics Normally used to treat staph infections

- Microbiology – Gr+ cocci with many virulent factors
- Frequent nosocomial- and community-acquired pathogen
- Mode of transmission – contact
- Clinical manifestations:
  - Skin and soft tissue infections
  - Pneumonia
  - Osteomyelitis / Arthritis
  - Bacteremia / Sepsis
  - Endocarditis
  - Toxin-mediated disease
Where does MRSA reside?

- Epidemiologic niche:
  - Nasal carriage (anterior nares)
  - GI tract (rectal)
  - Perineal
  - Throat

- Nasal carriage – 30% of adults
  - 20% Persistent carriers
  - 60% Transient carriers
  - 20% Never carriers

- Nosocomial transmission – transient hand carriage
Pathogenesis

- *S. aureus* is both a commensal organism and a pathogen.
- The anterior nares are the main ecological niche for *S. aureus*.
- Approximately 20% of individuals are persistently nasally colonized with *S. aureus*, and 30% are intermittently colonized.
- Numerous other sites may be colonized, including the axillae, groin, and gastrointestinal tract.
- Colonization provides a reservoir from which bacteria can be introduced when host defenses are breached, whether by shaving, aspiration, insertion of an indwelling catheter, or surgery.
- Colonization clearly increases the risk for subsequent infection.
- Those with *S. aureus* infections are generally infected with their colonizing strain.
What about the Immune System?

- Neutrophils – Most prevalent WBC. Secreted in response to a pathogen. Acts by phagocytosis
- Upon arriving at the infection site, neutrophils unleash a battery of antimicrobial substances, including antimicrobial peptides, reactive oxygen species (ROS), reactive nitrogen species (RNS), proteases, and lysozyme
- Staph *aureus* counters by secreting specific toxins, which lyse neutrophils.
How does resistance develop?

- Beta-lactams are antibiotics that prevent SA (and other bacteria) from producing cell walls. That's generally bad news for the bacteria. (i.e. penicillin, cephalosporins, monobactams, carbapenems)

- Some SA have a gene, however, that allows them to form an enzyme called beta-lactamase. The enzyme destroys beta-lactams before the beta-lactams can destroy the bacterium.
MRSA BSI Definition

Definition: MRSA isolated from a blood culture collected more than three days after admission to the facility, with no previous blood cultures prior to day four positive for MRSA, is considered a facility-onset MRSA BSI. MRSA isolated from a blood culture collected within the first three days of admission is considered a community-onset MRSA BSI.

Note: Reporting definitions are based solely on date(s) of admission and date(s) of blood culture collection. Clinical data (e.g., signs and symptoms) not considered. Cause of bloodstream infection (e.g., CLABSI, SSI, pneumonia, etc.) not assessed/identified.
Why MRSA is Important

- MRSA HAIs may reflect deficiencies in our infection prevention practices
- MRSA risk assessment may include:
  - Assessment of adherence with existing infection prevention policies and protocols
  - Case review of individual MRSA HAIs
  - Patient specific risk factors
MRSA Bacteremia

*S. aureus* cultured from the blood that is oxacillin-resistant, cefoxitin-resistant or methicillin-resistant or a FDA-approved laboratory test detects MRSA

- Most cases of MRSA bacteremia develop secondary to a another site of infection
  - However, in up to 25% of cases, no initial site of infection is identified

- Primary/initial site of infection can include:
  - Vascular catheter-related infection
  - Skin and soft tissue infection
  - Pneumonia
  - Surgical site infection
  - Endocarditis

Risk Factors

• Historical Risk Factors
• Prolonged hospitalization
• Prolonged antimicrobial use
• Stay in an intensive care or burn unit
• Exposure to a colonized/infected person
• Residence in a nursing home
• Age >65
• Common infections include surgical wound infections, urinary tract infections, bloodstream infections, and pneumonia
Where to Start?

Core competencies:

- Ongoing competency based training
- Monitoring adherence to hand hygiene
- Environmental cleaning
- Monitor and provide feedback
Decreasing Hospital Onset

To develop a *HO SA BSI prevention strategy*, facilities should first review recent episodes of HO SA BSI to identify common risk factors and underlying syndromes that might help identify the populations and interventions which might be most important to target.

Elements that should be reviewed include associated syndromes (e.g., wound infections or pneumonia) that may have led to the BSI, unit types, presence of indwelling devices such as central venous catheters (CVCs), and prior invasive procedures or surgeries.

<table>
<thead>
<tr>
<th>MR#</th>
<th>Organism</th>
<th>UNIT</th>
<th>Prev Pos onset</th>
<th>Admit date</th>
<th>Specimen date</th>
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<td>Cellulitis</td>
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Admitting diagnosis - IV drug abuse, cellulitis, osteomyelitis
“If a patient develops new-onset MRSA bloodstream infection in the hospital, it is probably either from lines/devices, invasive procedures, or from skin breakdown”

“We need to ensure we are following best practices here”
High Risk Patients

**MRSA: A Threat to People Who Inject Drugs**

**Injecting Drugs Increases Infections**

People who inject drugs are 16 times more likely to develop invasive MRSA infections.

**Invasive MRSA from Injecting Drugs**

Infections have increased from 4.1% to 9.2%.

**Reduce the Risk from Drug Injections**

- Prevent misuse of drugs and injection drug use.
- Educate on safer injection practices.
- Teach about wound care and early signs of MRSA.
MRSA Risk Assessment

- Complete MRSA Risk Assessment
  - Primary source of infection, risk factors, etc.

- Have prospective monitoring and reporting of cases

- Provide detailed review of cases
  - Consider using the Team STEPPS learned from defects tool

- Promote and monitor hand hygiene adherence

- Use Contact Precautions for both infected and colonized patients

- Assess quality and thoroughness of cleaning and disinfection of environment of care

Assess Your Patient Population

- Drug Abuse
- Dialysis
- Nursing Home
- Long Term Antibiotic Use
Special Note

- **Cleaning and Disinfection**
- Methicillin-resistant *Staphylococcus aureus* (MRSA) can survive on some surfaces, like towels, razors, furniture, and athletic equipment for hours, days, or even weeks.
- It can spread to people who touch a contaminated surface.
- MRSA can cause infections if it gets into a cut, scrape, or open wound.
Prevent Bacterial & Fungal Infections In Patients Who Inject Drugs

Injection drug use can cause serious infections that can be hard to treat and can disable or kill your patients. Be on alert for infections associated with drug injection.

A GROWING PROBLEM

Among people who inject drugs, infections from pathogens like *Staphylococcus aureus* (staph), *Streptococcus* (strep), and *Candida* are a growing problem.

- **Invasive staph**: People who inject drugs are 16 times more likely to develop an invasive methicillin-resistant staph (MRSA) infection than those who do not.

- **Endocarditis**: In North Carolina, endocarditis rates associated with drug use disorder increased 12-fold from 2007-2017.²

- **Costly**: In one hospital in Miami-Dade County, treating infections related to injection drug use cost $11.4 million in one year.³

- **Strep**: In New Mexico, 1 in 5 invasive group A strep infections in 2017 were among persons who injected drugs.⁴

- **Candidemia**: In 2017, 1 in 10 patients with Candidemia had a history of injecting drugs, a previously under-recognized risk factor.⁵

RISK FACTORS

What puts my patients at risk for bacterial and fungal infections?

- Injecting drugs without a prescription or not as prescribed
- Pathogens on the injection site or on soiled hands
- Contaminated drugs
- Contaminated equipment (e.g., from licking the needle, using non-sterile water or cotton balls), sharing supplies, or re-using supplies
- Improper care of central lines, including after discharge from health care
- Poor personal hygiene
- Skin wounds
- Experiencing homelessness, and lack of access to hygiene facilities

In addition to viral hepatitis and HIV, drug injection can cause:

- Abscesses
- Bacteremia and fungemia
- Botulism
- Cellulitis
- Empyema
- Endocarditis
- Epidural abscess and other central nervous system infections
- Osteomyelitis, especially of the spine
- Septic arthritis
# TAKE ACTION

How can I help treat or prevent these infections in my patients?

| Be on alert for infections among patients who inject drugs | • In patients known to inject drugs, consider bacterial or fungal infection as of symptoms. Infections can present with symptoms similar to withdrawal (e.g., fever, myalgias).
• Assess for the presence of infections, especially in the case of a drug over
• In patients with cranial nerve weakness, descending paralysis, or who fail to respond to naloxone, consider wound botulism.
• Be aware of the risk of bloodstream infections from central lines in both inpatients and outpatients.
• In patients presenting with fungal and bacterial infections, consider whether injection drug use could be the cause. |
|---|---|
| Address substance use disorder while also treating the infection | • Connect patients to harm reduction services, including substance use disorder treatment programs and, where available, syringe service programs (e.g., through a case manager or consult service).
• Offer naloxone and training on its use to the patient, family, friends, and others. Educate them that timely administration of naloxone can reverse the effects of an opioid overdose.
• Simultaneously treat comorbidities (e.g., anxiety, depression, nicotine addiction) that may keep the patient from completing treatment for their infection.
• Avoid behaviors and words that may make the patient feel stigmatized or judged. |
| Educate patients who continue to inject drugs | • How infections occur (even with clean needles), wound care, and early signs of infection.
• The best way to prevent an infection—stopping injecting.
• Safer injection practices, such as cleaning the injection site and using clean needles and equipment.
• How drugs can be contaminated with microorganisms that can cause infections or botulism.
• The importance of good hygiene and good wound care. |

Provide recommended vaccinations, and screen for viral hepatitis and HIV.
Hospital Onset

- Biggest Risk Factor – presence of intravascular catheter
- 847 cases of SAB in a multicenter cohort, most patients had predisposing conditions including diabetes (33 percent)
- Malignancy (26 percent)
- Chronic kidney disease (22 percent)
- Immunosuppressive therapy (21 percent)
- Among patients who acquire health care-associated, hospital-onset S. aureus bacteremia, approximately 20 percent develop metastatic complications, including endocarditis. The mortality rate is 20 to 30 percent
Community onset — Health care-associated

Health care-associated Examples:

- Hospitalization in an acute care hospital for ≥2 days within the prior 90 days
- Receipt of dialysis or intravenous therapy (including chemotherapy) within the prior 30 days
- Receipt of intravenous therapy, wound care, or specialized nursing care at home
- Residence in a nursing home or other long-term care facility

Skin or soft tissue lesions such as decubitus ulcers, diabetic foot ulcers, and wounds are common risk factors for bacteremia among these individuals.
Community Onset

Patients with onset of *S. aureus* bacteremia acquired in the community are likely to present with complicated infection.

In one study, more than 40 percent of patients with community-acquired SAB had metastatic infection, including infective endocarditis.
Community Acquired
Look at Antibiogram

(Data Collected 7/1/2017 - 6/30/2018)

Percent of Isolates Susceptible to Achievable Serum Levels

Isolates from Inpatients and ED Patients

| ORGANISM               | No. of Non-Duplicate Isolates | Amoxicillin | Gentamicin | Tetracycline | Ampicillin | Amoxicillin-Clavulanate | Sulbactam | Pencillin | Penicillin-Procain | Imipenem | Ciprofloxacin | Cefazolin | Ceftriaxone | Cefotaxime | Vancomycin | Linezolid | Erythromycin | Clarithromycin | TMP-SMZ | Trimethoprim | Nitrofurantoin | Nitrofurantoin* | Nitrofurantoin** | Nitrofurantoin*** |
|------------------------|-------------------------------|------------|------------|--------------|------------|--------------------------|-----------|-----------|------------------|----------|---------------|-----------|-------------|------------|------------|------------|-------------|-------------|------------|--------------|----------------|-----------------|----------------|
| E. coli                | 848                           | 100        | 92         | 97           | 57         | 75                        | 98        | 99        | 100              | 99       | 100           | 94        | 89          | 97         | 93          | 81        | 81          | 85          | 97          | 100         |
| Citrobacter diversus   | 17                            | 100        | 100        | 100           | 0          | 100                       | 100       | 100       | 100              | 100      | 100           | 100       | 100         | 100       | 100         | 100       | 100         | 100         | 100         | 100         |
| Klebsiella pneumoniae  | 238                           | 100        | 94         | 95           | 0          | 84                        | 97        | 99        | 100              | 92       | 91           | 98        | 92          | 92         | 91          | 96        | 96          | 95          | 87          | 100         |
| Enterobacter cloacae   | 62                            | 100        | 98         | 99           | 0          | 73                        | 97        | 98        | 87               | 96       | 100           | 87        | 96          | 94        | 87          | 100       | 100         | 100         | 100         | 100         |
| Serratia marcescens    | 25                            | 96         | 88         | 99           | 0          | 100                       | 100       | 100       | 100              | 88       | 0            | 100       | 100         | 100       | 100         | 100         | 100         | 100         |
| Proteus mirabilis      | 119                           | 100        | 92         | 92           | 74         | 2                        | 97        | 100       | 100              | 99       | 96           | 100       | 98          | 99         | 98          | 77        | 86          | 86          | 0           | 100         |
| P. aeruginosa          | 184                           | 98         | 93         | 96           | 91         | 86                        | 81        | 83        | 93               | 93       | 82           |           |             |            |             |           |             |             |             |            |
| S. maltophilia         | 18                            | 100        | 94         | 94           | 0          | 100                       | 100       | 100       | 100              | 100      | 100           | 100       | 100         | 100       | 100         | 100       | 100         | 100         | 100         | 100         |
| Alcaligenes faecalis   | 11                            | 100        | 100        | 100           | 0          | 100                       | 98        | 98        | 100              | 100      | 100           | 100       | 100         | 100       | 100         | 100       | 100         | 100         | 100         | 100         |
| Staph aureus           | 368                           | 98         | 98         | 98           | 98         | 98                        | 98        | 98        | 98               | 98       | 98           | 98        | 98          | 98         | 98          | 98        | 98          | 98          | 98          | 98          |
| Staph Coag Neg         | 13                            | 100        | 100        | 100           | 0          | 100                       | 100       | 100       | 100              | 100      | 100           | 100       | 100         | 100       | 100         | 100       | 100         | 100         | 100         | 100         |
| Strept pneumoniae      | 10                            | 100        | 100        | 98           | 0          | 100                       | 100       | 100       | 100              | 100      | 100           | 100       | 100         | 100       | 100         | 100       | 100         | 100         | 100         | 100         |
| Enterococcus faecalis  | 37                            | 100        | 100        | 100           | 0          | 100                       | 100       | 100       | 100              | 100      | 100           | 100       | 100         | 100       | 100         | 100       | 100         | 100         | 100         | 100         |
| Neisseria gonorrhoeae   | 10                            | 100        | 100        | 100           | 0          | 100                       | 100       | 100       | 100              | 100      | 100           | 100       | 100         | 100       | 100         | 100       | 100         | 100         | 100         | 100         |

* Susceptible to levels achievable in urine only

** Based on Interpretive Criteria for Meningitis

*** Based on Interpretive Criteria for Non-Meningitis

Data from Strong Memorial Hospital

Prepared by Dwight J. Hardy, Ph.D.
Director, Clinical Microbiology Labs
URMC
August 8, 2018
# Antibiogram: Isolates from ICU Patients

Highland Hospital Antibiotic Susceptibility Profile  
(Data Collected 7/1/2017 - 6/30/2018)  
Percent of isolates susceptible to achievable serum levels 
isolates from ICU Patients

<table>
<thead>
<tr>
<th>ORGANISM</th>
<th>E. coli</th>
<th>K. pneumoniae</th>
<th>Ps. aeruginosa</th>
<th>Staph aureus</th>
<th>Enterococcus faecalis</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Amoxicillin</td>
<td>Gentamicin</td>
<td>Tobramycin</td>
<td>Amoxicillin</td>
<td>Amoxicillin Glucuronate</td>
</tr>
<tr>
<td>No. of Non-Resistant isolates</td>
<td>30</td>
<td>100</td>
<td>87</td>
<td>96</td>
<td>64</td>
</tr>
<tr>
<td></td>
<td>Amoxicillin</td>
<td>100</td>
<td>90</td>
<td>90</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>Ps. aeruginosa</td>
<td>15</td>
<td>100</td>
<td>86</td>
<td>93</td>
</tr>
<tr>
<td></td>
<td>Staph aureus</td>
<td>36</td>
<td>94</td>
<td>44</td>
<td>19</td>
</tr>
<tr>
<td></td>
<td>Enterococcus faecalis</td>
<td>10</td>
<td>100$^b$</td>
<td>100</td>
<td>100</td>
</tr>
</tbody>
</table>

$^a$Susceptible to levels achievable in urine only.  
$^b$Susceptible to high level gentamicin.
Prevention Strategies

The Nose:
Surgical Strategies

- For all patients undergoing high risk surgeries (e.g. cardiothoracic (CT), orthopedic, and neurosurgery), unless known to be S. aureus negative, use an intranasal antistaphylocccal antibiotic/antiseptic (e.g. mupirocin or iodophor) and chlorhexidine wash or wipes prior to surgery.

  - **Possible Regimens**
    - Intranasal antistaphylocccal antibiotic/antiseptic
      - Mupirocin twice daily to each nare for the 5 days prior to day of surgery
      - 2 applications of nasal Iodophor (at least 5%) to each nare within 2 hours prior to surgery
    - Chlorhexidine
      - Daily chlorhexidine wash or wipes for up to 5 days prior to surgery

- **Supplement Strategy**
  - Consider chlorhexidine bathing or wipes for up to 5 days prior to surgery for all surgical patients, not just those undergoing high risk

[https://www.cdc.gov/vitalsigns/staph/index.html](https://www.cdc.gov/vitalsigns/staph/index.html)
Polling Question 2

My organization decolonizes the nares prior to high risk surgeries

1. Yes, if MRSA positive
2. No
3. All patients in identified high risk surgery
## CDC Approach to BSI Prevention in Dialysis Facilities

### (i.e., the Core Interventions for Dialysis Bloodstream Infection (BSI) Prevention)

1. **Surveillance and feedback using NHSN**
   - Conduct monthly surveillance for BSIs and other dialysis events using CDC’s National Healthcare Safety Network (NHSN). Calculate facility rates and compare to rates in other NHSN facilities. Actively share results with front-line clinical staff.

2. **Hand hygiene observations**
   - Perform observations of hand hygiene opportunities monthly and share results with clinical staff.

3. **Catheter/vascular access care observations**
   - Perform observations of vascular access care and catheter accessing quarterly. Assess staff adherence to aseptic technique when connecting and disconnecting catheters and during dressing changes. Share results with clinical staff.

4. **Staff education and competency**
   - Train staff on infection control topics, including access care and aseptic technique. Perform competency evaluation for skills such as catheter care and accessing every 6-12 months and upon hire.

5. **Patient education/engagement**
   - Provide standardized education to all patients on infection prevention topics including vascular access care, hand hygiene, risks related to catheter use, recognizing signs of infection, and instructions for access management when away from the dialysis unit.

6. **Catheter reduction**
   - Incorporate efforts (e.g., through patient education, vascular access coordinator) to reduce catheters by identifying and addressing barriers to permanent vascular access placement and catheter removal.

7. **Chlorhexidine for skin antisepsis**
   - Use an alcohol-based chlorhexidine (≥0.5%) solution as the first line skin antisectic agent for central line insertion and during dressing changes.*

8. **Catheter hub disinfection**
   - Scrub catheter hubs with an appropriate antiseptic after cap is removed and before accessing. Perform every time catheter is accessed or disconnected.**

9. **Antimicrobial ointment**
   - Apply antibiotic ointment or povidone-iodine ointment to catheter exit sites during dressing change.***

---

* Povidone-iodine (preferably with alcohol) or 70% alcohol are alternatives for patients with chlorhexidine intolerance.
** If closed needleless connector device is used, disinfect device per manufacturer’s instructions.
*** See information on selecting an antimicrobial ointment for hemodialysis catheter exit sites on CDC’s Dialysis Safety website (http://www.cdc.gov/dialysis/prevention-tools/core-interventions.html#sites). Use of chlorhexidine impregnated sponge dressing might be an alternative.
Dialysis Case

Inpatient Dialysis patient
Temporary line
Sudden temp spike – day 6
MRSA grew 4/4 bottles
Not accessed or cared for by nursing unit
Opportunities?
High Risk Patients

2. IMPLEMENT SOURCE CONTROL STRATEGIES FOR HIGH RISK PATIENTS DURING HIGH RISK PERIODS

- Core Strategy:
  - Pursue a strategy to reduce carriage of *S. aureus* among all patients admitted to intensive care units (ICUs) (see table for summary of source control strategies) including:
    - Apply intranasal mupirocin twice a day to each nare for 5 days in conjunction with daily chlorhexidine bathing for duration of ICU admission
    - Intranasal iodophor could be considered as an alternative to intranasal mupirocin
    - For more information see: Universal ICU Decolonization: An Enhanced Protocol. Agency for Healthcare Research and Quality (AHRQ)

- Supplemental Strategy
  - Pursue a strategy to reduce carriage of *S. aureus* for patients hospitalized with CVCs or midline catheters outside the ICU
    - Apply intranasal mupirocin twice a day to each nare for 5 days in conjunction with daily chlorhexidine bathing while CVC or midline catheter is present
    - Intranasal iodophor could be considered as an alternative to intranasal mupirocin
3. IMPLEMENT INTERVENTIONS TO PREVENT TRANSMISSION OF METHICILLIN-RESISTANT STAPHYLOCOCCUS AUREUS (MRSA) IN ACUTE CARE

● Core Strategies
  ▪ The Centers for Disease Control and Prevention (CDC) continues to recommend placing patients colonized or infected with MRSA in private rooms and on Contact Precautions in inpatient acute care settings
  ▪ Use dedicated patient-care equipment (e.g. blood pressure cuffs, stethoscopes), and single use disposable items (e.g. single patient digital thermometer) whenever possible
  ▪ If common use of equipment for multiple patients is unavoidable, clean and disinfect such equipment before use on another patient
  ▪ Provide regular competency-based training on use of PPE and monitor adherence
  ▪ Place patients with excessive wound drainage (i.e. suggests an increased potential for extensive environmental contamination and risk of transmission) on Contact Precautions and in a private room regardless of Multi-drug resistant organisms (MDRO) carriage status

● Supplemental Strategy
  ▪ Consider active surveillance testing (screening) for MRSA on admission to acute care facilities. Screening could be limited to high risk patients (e.g., prior healthcare exposure) or admission to high risk settings (e.g., intensive care unit)
  ▪ Those found to be colonized with MRSA should be placed in private rooms and on Contact Precautions
  ▪ Active surveillance testing could be combined with source control strategies as described above for high risk patients (i.e. ICU patients and those outside the ICU with CVCs or Midline Catheters)
Additional Strategies

- Decolonize all high risk patients
- CHG baths with or without a line
Polling Question 3

Have you implemented the strategies identified in the previous slide for high risk patients?

1. Yes
2. No
3. Partially
# Core Strategies

Table 1: Summary of Source Control Strategies by Central Venous Catheter (CVC) or Midline Catheter Presence and Unit Type

<table>
<thead>
<tr>
<th>Patient Type</th>
<th>Intensive Care Unit</th>
<th>non-Intensive Care Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>CVC or Midline Catheter Present</td>
<td>Topical chlorhexidine gluconate (at least 2%) + Intranasal antistaphyloccal antibiotic/antiseptic (e.g. mupirocin or iodophor) <strong>(core strategy)</strong></td>
<td>Topical chlorhexidine gluconate (at least 2%) + Intranasal antistaphyloccal antibiotic/antiseptic (e.g. mupirocin or iodophor) <strong>(supplemental strategy)</strong></td>
</tr>
<tr>
<td>No CVC or Midline Catheter present</td>
<td>Topical chlorhexidine gluconate (at least 2%) + Intranasal antistaphyloccal antibiotic/antiseptic (i.e. mupirocin or iodophor) <strong>(core strategy)</strong></td>
<td>None (note that source control strategies may apply to pre-operative surgical patients outside the intensive care unit - see section 1 on SSI prevention)</td>
</tr>
</tbody>
</table>
Polling Question 4

Do you decolonize ICU patients?

1. Yes
2. No
3. Some, not all
## Tiers of Interventions to Prevent MRSA

### Tier 1: Standardize Supplies, Procedures and Processes

<table>
<thead>
<tr>
<th>Activity</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Conduct basic MRSA Risk Assessment for facility infection burden and transmission risk.</td>
<td>Conduct case reviews of NHSN HO MRSA bacteremia LabID events (cases) to guide source-specific interventions.</td>
</tr>
<tr>
<td>Monitor and alert staff of patients with MRSA.</td>
<td>Promote and monitor hand hygiene compliance.</td>
</tr>
<tr>
<td>Initiate Contact Precautions for both colonized and infected patients and monitor adherence.</td>
<td>Assess effectiveness of cleaning and disinfection of environment of care and reusable patient care equipment.</td>
</tr>
</tbody>
</table>

### Tier 2: Enhanced Practices

*If MRSA bacteremia rates remain elevated, start with MRSA Guide to Patient Safety (GPS) and then proceed with additional interventions*  

<table>
<thead>
<tr>
<th>Activity</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Perform HO MRSA bacteremia needs assessment with Guide to Patient Safety (GPS).</td>
<td>Implement daily chlorhexidine bathing for populations at risk for developing MRSA bacteremia.</td>
</tr>
<tr>
<td>Consider decolonization for those patients colonized with MRSA and at high risk of infection.</td>
<td>Active Surveillance Testing (AST) for high-risk patient populations.</td>
</tr>
<tr>
<td>Consider gowning and gloving for all intensive care unit (ICU) patients.</td>
<td></td>
</tr>
</tbody>
</table>
Prevention Strategies

The Core Elements of Hospital Antibiotic Stewardship Programs
Strategies

To develop a *HO SA BSI prevention strategy*, facilities should first review recent episodes of HO SA BSI to identify common risk factors and underlying syndromes that might help identify the populations and interventions which might be most important to target.

Elements that should be reviewed include associated syndromes (wound infections or pneumonia) that may have led to the BSI, unit types, presence of indwelling devices such as central venous catheters (CVCs)

Prior invasive procedures or surgeries.

Based on this review of facility-level data, each facility should select core and supplemental strategies for implementation that are most likely to have an impact on facility rates.
## Sample Case Review

### Infection Prevention MRSA Case Review

<table>
<thead>
<tr>
<th>Patient Name /MR#, DOB:</th>
<th>Date of Admission:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Reason for Admission:</td>
</tr>
<tr>
<td></td>
<td>Unit Admit Date:</td>
</tr>
<tr>
<td></td>
<td>Room location of patient at S/S onset:</td>
</tr>
<tr>
<td></td>
<td>Date of Blood Culture collection</td>
</tr>
<tr>
<td></td>
<td>Reason for collection</td>
</tr>
</tbody>
</table>

**New S/S**
- Not obtained on admission
- Follow up culture > 14 days
- Other infection
- Does the patient meet criteria for HAI at another site?
- Lines, UC, Drains in place?
- Recent surgery?

### Patient Risk Factors / Comorbidities

**Age**

**NH resident**

**Previous MRSA**

**Hx of drug abuse**

**Prolonged antimicrobial use**

**Other:**

**Were all protocols followed?**

**CHG baths documented?**

**Surgery protocols followed**
Conclusion

1. MRSA BSIs represent an important concern

2. CDC has suggested core strategies for prevention of MRSA colonization and infection

3. Healthcare organizations should evaluate their compliance to hand hygiene and other processes and evaluate if further strategies are necessary
Questions
Eligibility for Nursing CEU requires submission of an evaluation survey for each participant requesting continuing education:

https://www.surveymonkey.com/r/IP10292019

Share this link with all of your participants if viewing today’s webinar as a group (Survey closes Nov. 8, 2019)

Be sure to include your contact information and Florida nursing license number

FHA will report 1.0 credit hour to CE Broker and a certificate will be sent via e-mail (Please allow at least 2 weeks after the survey closes)
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