



# Methicillin-resistant *Staphylococcus aureus* (MRSA)

*Staphylococcus aureus*, often referred to simply as "staph," are bacteria commonly carried on the skin or in the nose of healthy people. **Methicillin-resistant *Staphylococcus aureus* (MRSA)**, often pronounced "mersa", is the resistant variant of this bacteria which is resistant to  $\beta$ -lactam antibiotics such as methicillin, oxacillin, penicillin, and amoxicillin. Risk of infection is greater for patients in hospitals, nursing homes, and other healthcare facilities who have open wounds and/or weakened immune systems.

Infection typically presents as skin infections that resemble pimples, boils, and spider bites which may be red, swollen, painful and may have pus or other drainage associated. They can very quickly develop into deep, painful abscesses which require surgical incision and drainage. More serious infection may also involve surgical wounds, the bloodstream, bones, joints, heart valves, and lungs.

Colonization can unknowingly occur in the anterior nares, skin, open wounds, and urinary tracts of otherwise healthy people. A swab collected from the nasopharyngeal area of an asymptomatic person can be used by healthcare facilities who have instituted measures to control the spread of MRSA by screening patients. Rising colonization rates lead to increased infection rates in both the communities and in hospitals. Rapid detection of MRSA-colonized patients has the potential to limit the spread of this organism thereby decreasing the MRSA disease burden in healthcare facilities.

Although Staph infections, including MRSA, occur most frequently among persons in hospitals and healthcare facilities who have weakened immune systems; Staph and MRSA can also cause illness in persons outside of these facilities. MRSA infections that are acquired by persons who have not been hospitalized within the previous year or who had a medical procedure are known as community acquired MRSA (CA-MRSA) infections. Staph or MRSA infections in the community occur in otherwise healthy people. CA-MRSA strains were first reported in the late 1990s and were defined by a lack of exposure to the health care setting. In the next several years, it became clear that CA-MRSA infections were caused by strains of MRSA that have different genetic characteristics than other strains. Panton-Valentine leukocidin (PVL) is a cytotoxin which

is associated with increased virulence of certain strains of *Staphylococcus aureus*. It is present in the majority of CA-MRSA isolates studied and is the cause of necrotic ("flesh-eating") lesions involving the skin or mucosa, including necrotic hemorrhagic pneumonia. The new CA-MRSA strains have rapidly spread in the United States to become the most common cause of cultured skin infections among individuals seeking medical care for these infections at emergency rooms in cities. These strains also commonly cause skin infections in athletes, jail and prison detainees, and soldiers.

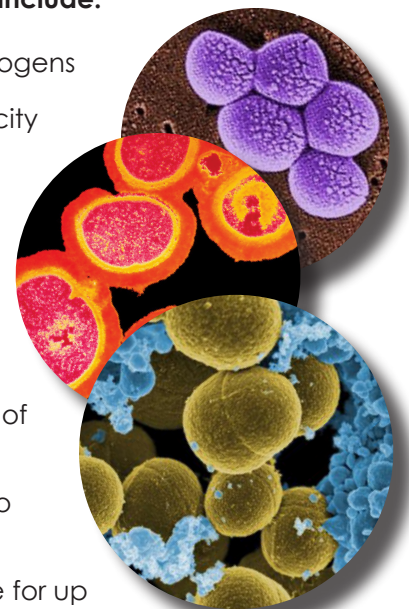
MDL has developed two highly sensitive and specific PCR-based assays utilizing the **OneSwab<sup>®</sup>** and **NasoSwab<sup>®</sup>** platforms for the detection of MRSA and CA-MRSA from a single specimen.

**1118 MRSA: Methicillin Resistant and Methicillin Susceptible (MSSA) *Staphylococcus aureus* by Conventional PCR**

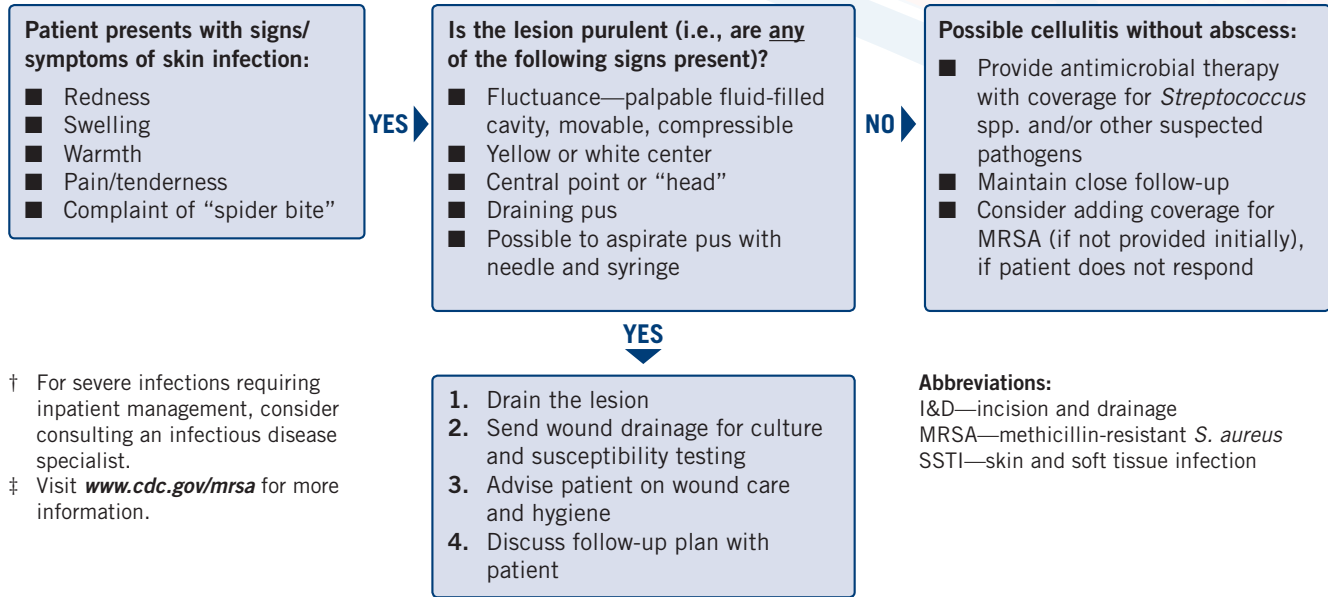
**1119: CA-MRSA: Community-Associated MRSA. Panton-Valentine Leukocidin (PVL) DNA\*\*\* (Type IV MRSA + #1118 Req.) [Community Associated MRSA = Type IV MRSA+ and PVL+]**

## Benefits of these platforms include:

- One vial, multiple pathogens
- High diagnostic specificity and sensitivity
- High precision robotic accuracy
- No refrigeration required before or after collection
- Rapid turnaround time of only 24-48 hours
- Specimen viability up to five (5) days
- Test additions available for up to 30 days



# Outpatient<sup>†</sup> management of skin and soft tissue infections in the era of community-associated MRSA<sup>‡</sup>



† For severe infections requiring inpatient management, consider consulting an infectious disease specialist.  
 ‡ Visit [www.cdc.gov/mrsa](http://www.cdc.gov/mrsa) for more information.

**If systemic symptoms, severe local symptoms, immunosuppression, or failure to respond to I&D, consider antimicrobial therapy with coverage for MRSA in addition to I&D. (See below for options)**

## Options for empiric outpatient antimicrobial treatment of SSTIs when MRSA is a consideration\*

Drug name	Considerations	Precautions**
<b>Clindamycin</b>	<ul style="list-style-type: none"> <li>■ FDA-approved to treat serious infections due to <i>S. aureus</i></li> <li>■ D-zone test should be performed to identify inducible clindamycin resistance in erythromycin-resistant isolates</li> </ul>	<ul style="list-style-type: none"> <li>■ <i>Clostridium difficile</i>-associated disease, while uncommon, may occur more frequently in association with clindamycin compared to other agents.</li> </ul>
<b>Tetracyclines</b> <ul style="list-style-type: none"> <li>■ Doxycycline</li> <li>■ Minocycline</li> </ul>	<ul style="list-style-type: none"> <li>■ Doxycycline is FDA-approved to treat <i>S. aureus</i> skin infections.</li> </ul>	<ul style="list-style-type: none"> <li>■ Not recommended during pregnancy.</li> <li>■ Not recommended for children under the age of 8.</li> <li>■ Activity against group A streptococcus, a common cause of cellulitis, unknown.</li> </ul>
<b>Trimethoprim-Sulfamethoxazole</b>	<ul style="list-style-type: none"> <li>■ Not FDA-approved to treat any staphylococcal infection</li> </ul>	<ul style="list-style-type: none"> <li>■ May not provide coverage for group A streptococcus, a common cause of cellulitis</li> <li>■ Not recommended for women in the third trimester of pregnancy.</li> <li>■ Not recommended for infants less than 2 months.</li> </ul>
<b>Rifampin</b>	<ul style="list-style-type: none"> <li>■ Use only in combination with other agents.</li> </ul>	<ul style="list-style-type: none"> <li>■ Drug-drug interactions are common.</li> </ul>
<b>Linezolid</b>	<ul style="list-style-type: none"> <li>■ Consultation with an infectious disease specialist is suggested.</li> <li>■ FDA-approved to treat complicated skin infections, including those caused by MRSA.</li> </ul>	<ul style="list-style-type: none"> <li>■ Has been associated with myelosuppression, neuropathy and lactic acidosis during prolonged therapy.</li> </ul>
<ul style="list-style-type: none"> <li>■ MRSA is resistant to all currently available beta-lactam agents (penicillins and cephalosporins)</li> <li>■ Fluoroquinolones (e.g., ciprofloxacin, levofloxacin) and macrolides (erythromycin, clarithromycin, azithromycin) are not optimal for treatment of MRSA SSTIs because resistance is common or may develop rapidly.</li> </ul>		
<p>* Data from controlled clinical trials are needed to establish the comparative efficacy of these agents in treating MRSA SSTIs. Patients with signs and symptoms of severe illness should be treated as inpatients.</p> <p>** Consult product labeling for a complete list of potential adverse effects associated with each agent.</p>		
<p><b>Role of decolonization</b></p> <p>Regimens intended to eliminate MRSA colonization should not be used in patients with active infections. Decolonization regimens may have a role in preventing recurrent infections, but more data are needed to establish their efficacy and to identify optimal regimens for use in community settings. <i>After treating active infections and reinforcing hygiene and appropriate wound care</i>, consider consultation with an infectious disease specialist regarding use of decolonization when there are recurrent infections in an individual patient or members of a household.</p>		

Published September 2007



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