

Methicillin-Resistant Staphylococcus aureus (MRSA)

A new challenge for a new century

Laura L. Radke, MD

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History

- Initially appeared in hospitals in the 1960's – Healthcare associated (HA MRSA)
- Highly resistant to commonly used antibiotics
- Risk factors included:
 - Hospitalization
 - Nursing Home residence
 - Chronic dialysis
 - Antibiotic use
 - Use of invasive devices and/or procedures

History

- Associated with increased morbidity and mortality
- Also associated with increased healthcare costs related to prolonged hospital stays, courses of intravenous antibiotics for treatment and lost productivity
- Capable of colonizing nares of healthcare workers and causing hospital outbreaks

History

- In the 1990's, infections with MRSA began to emerge in persons without risk factors for HA MRSA
- New type of MRSA identified – Community associated MRSA (CA MRSA)
- Defined as infection in a person with no prior history of health care exposure, i.e. hospitalization, surgery, permanent devices or hemodialysis

Characteristics of CA MRSA

- Genetically different from HA MRSA
 - Contains mec IV resistance chromosome
 - Less resistant, more susceptible to more classes of antibiotics
 - Carries the Panton Valentine Leukocidin (PVL) gene
 - Allows production of necrotizing cytotoxin
 - May be responsible for increased invasiveness of the organism

Characteristics of CA MRSA

- Typically causes skin and soft tissue infections
 - Early lesions look like spider bites
 - Often present with boils, abscesses or cellulitis
- Can cause more serious infections such as bacteremia, pneumonia, wound and surgical site infections

Comparison of HA MRSA and CA MRSA

	HA-MRSA	CA-MRSA
Health care contact	Yes	No
Mean age at infection	Older	Younger
Skin and soft tissue infections	35%	75%
Antibiotic resistance	Many agents	Some agents
Resistance gene	SCC <i>mec</i> Types I, II,III	SCC <i>mec</i> Type IV, V
Strain type	USA 100 and 200	USA 300 and 400
PVL toxin gene	Rare (5%)	Frequent (almost 100%)

"Community Associated Methicillin Resistant StaphyococcusAureus (CA MRSA) –Guidelines for Management and Control of Transmission", PPH 42160, October 2005, Wisconsin DFHS

Epidemiology of CA MRSA

- Wide geographic variation in infection rates
- Incidence in Wisconsin is unknown
- Generally, < 1% of population
- Based on personal experience, appears to be increasingly more frequent
- Native Americans, Pacific Islanders and Alaskan natives appear to be more susceptible

Epidemiology of CA MRSA

- Transmission is primarily person-to-person
- Can occur through indirect contact with contaminated surfaces and items
- Outbreaks have occurred among sports team members, prisoners, military recruits, men having sex with men and IVDU's
- Transmission has also occurred in hospitals among postpartum women and orthopaedic surgery patients

Epidemiology of CA MRSA

- Nasal carriage not as common as with HA MRSA
- Recent nasal colonization associated with 10-fold risk of developing skin and soft tissue infection
- Previous colonization may confer some immunity and decrease risk for development of invasive disease

Risk Factors for CA MRSA Infection

- History of MRSA infection or colonization of pt. or close contact
- High prevalence of CA MRSA in local community
- Recurrent skin disease, i.e. eczema, dermatitis
- Crowded living conditions, i.e. military barracks, homeless shelter

Risk Factors for CA MRSA Infection

- History of or current incarceration
- Participation in contact sports
- Skin/soft tissue infection with poor response to B-lactam antibiotics
- Recent/frequent antibiotic use
- IVDU
- Native American, Pacific Island or Alaskan Native ethnicity

Risk Factors for CA MRSA Infection

- Child under the age of 2
- Male with history of having sex with men
- Shaving of body hair, especially extensive shaving of arms and/or legs related to sports participation

Presentation of CA MRSA Infection

- Skin and soft tissue infection
 - Abscesses
 - Pustular lesions
 - Boils
 - Lesions resembling “spider bites”
- More severe disease compatible with Staph infection
 - Osteomyelitis
 - Necrotizing pneumonia
 - Septic arthritis
 - Necrotizing fasciitis

Management of CA MRSA

- Incision and drainage of abscesses
 - Should be the primary treatment
 - Often the only treatment necessary
- Material sent for culture
- Instruct patients to return for:
 - worsening local symptoms
 - no improvement in 48-72 hours
 - signs/symptoms of systemic illness

Management of CA MRSA

- Outpatient antibiotic therapy
 - Based on local prevalence of MRSA
 - Severity of illness
 - Patient comorbidity
- Antibiotic choices
 - Topical mupirocin 2% or bacitracin for local infection
 - Trimethoprim/Sulfamethoxazole
 - Most frequent antibiotic with sensitivity in vitro
 - May penetrate abscesses poorly, i.e. less effective for undrained abscesses

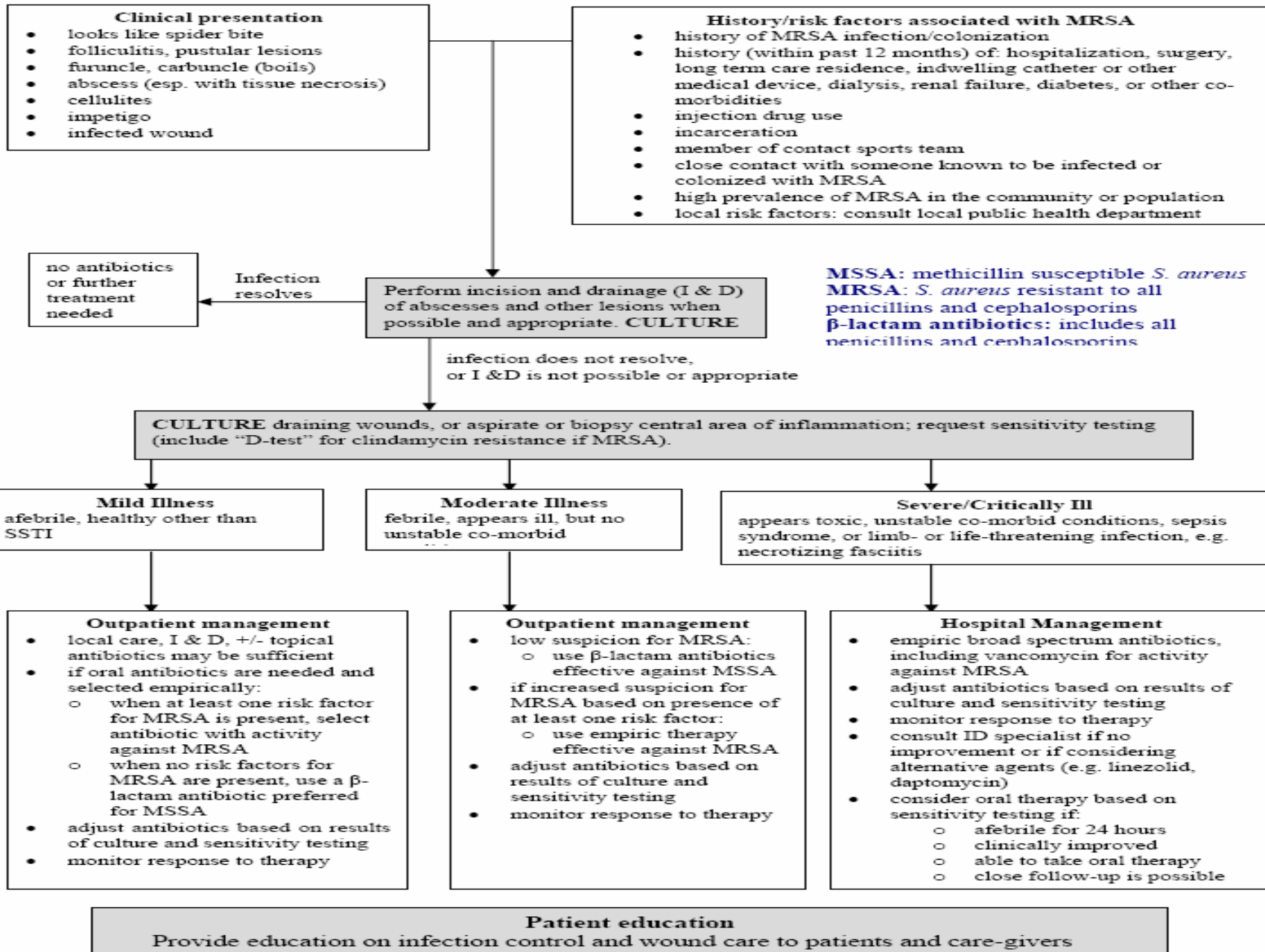
Management of CA MRSA

- Antibiotic choices, cont.
 - Clindamycin for sensitive organisms
 - Must be sensitive to both erythromycin and clindamycin – requires D test (St. Joe's lab performing regularly)
 - Inducible resistance appears to be increasing
 - Tetracycline/Doxycycline for sensitive organisms
 - Less intrinsic antistaphylococcal activity

Management of CA MRSA

- Antibiotic choices, cont.
 - Macrolides and Fluoroquinolones are not appropriate treatment for CA MRSA
 - Even if susceptible in vitro, may be ineffective in vivo
 - Rapid development of resistance can occur
- Patient education is essential!
 - Review wound care, hand washing and hygiene at home

Guidelines for management of suspected *Staphylococcus aureus* skin and soft tissue infections (SSTI)⁵



Management of CA MRSA

- Decolonization

- Routine use of mupirocin intranasally is not recommended
- Resistance to mupirocin has begun to emerge
- Can be considered in patients with recurrent infections or in household where several members have had skin/soft tissue infections
- Family contacts should not be routinely screened

Management of CA MRSA

- Decolonization
 - Patients with nasal colonization can be treated with 2% intranasal mupirocin for 5 days
 - Daily bathing/showering using chlorhexidine gluconate and/or tea tree oil is recommended along with mupirocin treatment

Management of CA MRSA

- Decolonization
 - Oral or IV antibiotics should not be routinely administered
 - Short courses of po antibiotics may assist in decolonization; repeated courses should not be given
 - Follow-up cultures are not recommended unless recurrent infections are noted

Prevention of Transmission of CA MRSA

- Healthcare settings
 - Contact precautions should be used for all patients with known MRSA infections
 - Contact precautions should also be used for all patients with skin/soft tissue infections compatible with a diagnosis of Staph infection and for all patients with uncontained secretions/wound drainage

Prevention of Transmission of CA MRSA

- Community settings
 - More studies needed to determine best methods
 - Increased awareness by healthcare providers
 - Early detection, including screening of inmates, military recruits, sports participants, shelter residents, close contacts of known MRSA cases
 - Appropriate treatment when risk factors are present/suspicion is high

Prevention of Transmission of CA MRSA

- Community settings
 - Improved personal hygiene
 - Environmental cleanliness in gyms, spas, health clubs
 - Improved hygiene amongst participants in contact sports
 - Improved hand hygiene in schools and work settings