

Methicillin and Vancomycin Resistant *Staphylococcus Aureus* (MRSA/VRSA) Infection



Case Definition

- Laboratory confirmation by isolation of organisms by culture from any site, but primarily the nose, throat, rectum, blood, tissue, pleural fluid, bone or lesions.

Reporting Requirements

- Cases are reportable by laboratory for surveillance purposes only.

Clinical Presentation/Natural History

The common bacterial skin lesions are impetigo, folliculitis, furuncles, carbuncles, abscesses and infected lacerations. Constitutional symptoms are unusual; if lesions extend or are widespread, fever, malaise, headache and anorexia may develop. Lesions are usually uncomplicated, but when organisms are invasive then pneumonia, lung abscess, osteomyelitis, sepsis, endocarditis, pyarthrosis, meningitis or brain abscess may occur. In addition to primary lesions of the skin, staphylococcal conjunctivitis occurs in newborns and the elderly. Staphylococcal endocarditis and other complications of staphylococcal bacteremia may result from parenteral use of illicit drugs or be acquired nosocomially through the use of intravascular catheters and other devices. Embolic skin lesions are frequent complications of endocarditis and/or bacteremia.

Colonized: A person is colonized with MRSA/VRSA when they test culture positive and have no signs and symptoms of infection caused by the organism.

Infected: A person is infected with MRSA/VRSA when they are culture positive and show signs and symptoms of infection caused by the organism.

Etiology

The majority of clinical isolates of *S. aureus*, both community- and hospital-acquired, are resistant to penicillin but susceptible to cloxacillin (or

methicillin). Methicillin was the first anti-staphylococcal penicillin derivative. Strains of *S. aureus* that have become resistant to methicillin and related drugs (cloxacillin, etc.) are known as methicillin-resistant *Staphylococcus aureus*, or MRSA. Some strains of MRSA have also become vancomycin resistant with repeated vancomycin use. This makes infections caused by this organism more difficult and expensive to treat. It is important to note that MRSA/VRSA do not cause illness more often than other kinds of *S. aureus*.

Endemic strains

Endemic strains are resident strains in an institution, province or country, which do not appear to be easily transmissible among patients. In Manitoba, this refers to all strains that are ciprofloxacin sensitive. However, some ciprofloxacin-resistant endemic strains have been recognized.

Epidemic strains

MRSA, which is easily transmitted in an institutional setting. These strains are generally associated with increased morbidity and mortality. In Manitoba, epidemic strains are considered ciprofloxacin resistant until further characterization is done by pulse-field gel electrophoresis or other molecular typing.

Epidemiology

Reservoir: Humans

Transmission: Through contact with a person who has a purulent lesion or is an asymptomatic (usually nasal) carrier of a pathogenic strain. Persons with a draining lesion or any purulent discharge are the most common sources of epidemic spread. Some carriers are more effective disseminators of infection than others. Some strains, particularly epidemic strains, are transmitted more easily than other strains. Unwashed hands are an important instrument for transmitting infection. Nasal carriage may be acquired by contact (inoculation) of the anterior nares. Community clusters or

outbreaks of MRSA have only occasionally been identified. Discharged MRSA colonized patients are currently thought to pose little risk for transmission to healthy household contacts.

Occurrence:

General: Worldwide. Due to the susceptibility of patient populations, occurrence in hospital settings has become common in the United States and increasingly common in Canada. An MRSA isolate with intermediate resistance to vancomycin was first reported in Japan in 1997. Such strains have since been found in the United States and Slovakia, but not yet from elsewhere in Europe.

Manitoba: MRSA strains have been common in northern populations since the early 1990s. Outbreaks of epidemic strains have become increasingly common in urban hospitals since 1993. In 1997, a cluster of community-acquired MRSA infections was identified in a small community in southern Manitoba. This outbreak differed from other community outbreaks in three ways: 1) it occurred under circumstances of close contact between healthy persons without the usual risk factors for infection; 2) the endemic strain causing this outbreak demonstrated greater transmissibility than usual; and 3) most persons were infected and not simply colonized. It is noteworthy that the infections were generally of a mild nature such as boils and furuncles. Since reporting was officially initiated in January 1999, 211 cases of MRSA have been reported (to July 2000), although reporting is known to be incomplete. There have been no reported cases of VRSA.

Incubation Period: Variable and indefinite; commonly four to 10 days.

Susceptibility and Resistance: Immune mechanisms are not well understood in the pathogenesis of *S. aureus* infection. Susceptibility to *S. aureus* infection in general is greatest amongst newborn and the chronically ill. Elderly and debilitated people, drug abusers and those with diabetes mellitus, cystic fibrosis, chronic renal failure, agammaglobulinemia, any disorder of

neutrophil function (such as agranulocytosis, chronic granulomatous disease), neoplastic disease and burns are particularly susceptible to colonization and infection within a hospital setting. Use of invasive devices, steroids, antibiotics, antimetabolites and prior hospitalization also increases susceptibility.

The general public living in the community, with normal, healthy immune systems, are not known to be at increased risk for illness from this organism.

Period of Communicability: As long as purulent lesions continue to drain or, to a lesser extent, as long as the carrier state persists.

Diagnosis

Diagnosis is confirmed by isolation of the organism from nose, throat, rectum, blood, open wounds, pleural fluid, bone or catheter exit sites. Antimicrobial susceptibility tests of isolates should be performed.

Key Investigations

- Community outbreaks may be investigated by public health staff.

Control

Management of Cases:

- Guidelines have been established to provide a framework for managing persons with MRSA in acute and long term care facilities. The importance of controlling spread in the community is less clear.
- The management of cases within an acute or long-term care facility is described in the document *Methicillin-Resistant Staphylococcus Aureus Infection Control Guidelines for Manitoba*. Cases occurring in home-care settings should be managed using routine infection-control practices as described in the document *Infection Control Guidelines for Health Care Workers in the Community*. Both are available from the Public Health Branch, Manitoba Health (see **Additional Resources**).

Communicable Disease Management Protocol

- Cases within the community setting need not be followed up by public health, except in outbreak situations.

Management of Contacts:

- A contact is a person who is exposed to an MRSA/VRSA case in a manner in which transmission can occur.
- The management of cases within an acute or long-term care facility is described in the document *Methicillin-Resistant Staphylococcus Aureus Infection Control Guidelines for Manitoba*.
- Contacts within the community setting need not be followed up by public health except in outbreak situations.

Management of Outbreaks:

- A search for cases, the source of infection and investigation of contacts should occur in outbreak situations.
- Institute appropriate precautions with emphasis on meticulous handwashing.
- Investigate any unusual or abrupt increase in prevalence of staphylococcal infections in the community for a possible common source, such as an unrecognized hospital epidemic.
- When clusters of infections occur, examination of antimicrobial susceptibility and pulse-field gel electrophoresis (PFGE) of the isolated strains may help determine the extent and source of the outbreak.

Preventive Measures:

- Public education in personal hygiene, especially handwashing.
- In the community setting, the following measures should be taken when a person has, or lives with, someone who is colonized with MRSA:

Handwashing:

A 10 to 15 second handwash with soap and running water is the most effective method of preventing the spread of infective microorganisms. Paper towels or a clean towel

must be used to dry hands and turn off faucets. Use only liquid soap or bar soap that is well drained. Liquid soap containers should be washed before refilling.

Caregivers should wash hands before and after direct care; after removing gloves; after handling body substances, contaminated equipment, articles and surfaces, linen, garbage and dishes; and before leaving the clients' home.

Cleaning:

Regular cleaning with household disinfectants or bleach (one part bleach to nine parts water) is indicated.

Personal hygiene:

Persons with MRSA must use proper hygiene.

Laundry and waste disposal:

The bacteria are destroyed during the normal laundering process. Garbage can be disposed of in the usual fashion.

Activities of daily living:

Persons with MRSA should not be restricted from moving freely throughout their home and community. However, as with other illnesses, infected persons who are ill should not generally visit hospitals or personal care homes.

Additional Resources

For health care professionals:

- *Methicillin-Resistant Staphylococcus Aureus (MRSA) Infection Control Guidelines for Manitoba*.
- *Infection Control Guidelines for Health Care Workers in the Community*.
- *VISA/VRSA Infection Control Guidelines for Manitoba*.

For the Public:

- Fact sheet: *What you should know about Methicillin Resistant Staphylococcus aureus (MRSA)*.

All resources available from Audiovisual and Publications Department, Manitoba Health, telephone (204) 786-7112, fax (204) 772-7213.