Exposing Methicillin-Resistant *Staphylococcus aureus*

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There has been much interest surrounding methicillin-resistant *Staphylococcus aureus* (MRSA) as it is responsible for the colonization of, and infection in, hospitalized patients. Recently, a new variant of MRSA, referred to as community-acquired MRSA, has been associated with skin and soft tissue infections, necrotizing fasciitis and necrotizing pneumonitis. Because of its increasing hospital and community presence, MRSA is July's Bug of the Month.

What is MRSA?

Methicillin is a beta-lactam antibiotic very similar to cloxacillin. Cloxacillin is the usual drug of choice for treating *Staphylococcus aureus* infections. Some strains of *S. aureus* undergo changes within their penicillin-binding proteins, which confer resistance to methicillin (or cloxacillin), therefore, these antibiotics are no longer active against *S. aureus* and are designated as "methicillin-resistant *S. aureus*" (MRSA).

During the past 20 years, hospital-based surveillance programs have revealed the number of patients either colonized or infected with MRSA has increased. Although, traditionally associated with health-care environments, there have been reports in the past three years of community-onset MRSA.

Colonization versus infection

A person is "colonized" with MRSA if this bacterium is cultured from the anterior nares, throat, skin or urinary catheter sites, but there is no clinical evidence of an infection.

Infection with MRSA, however, manifests with local signs and symptoms, such as pain, induration, erythema and the development of frank suppuration. Systemic symptoms, such as fevers, chills and signs of sepsis, may also manifest with more invasive infections.

What is *Staphylococcus aureus*?

Staphylococcus aureus is a gram-positive bacteria routinely found on the skin and on the mucous membranes of approximately one-third of humans, without causing any problems. *S. aureus* can cause a variety of medical ailments, including skin and soft tissue infections (abscesses, cellulitis) bloodstream infections, endocarditis, food poisoning, osteomyelitis and, in the 1980s, it was responsible for the tampon-associated toxic shock syndrome.

The most frequent routes by which this organism causes invasive infection, however, is by means of an abrasion, cut or minor trauma or by an infected vascular access device.

Who is at risk?

Colonization or infection with MRSA in Canada has traditionally been described in individuals in hospitals or other institutional-care settings who have one or more of the following characteristics:

- serious medical or surgical conditions or weakened immunity;
- prolonged hospitalization;
- invasive medical devices, such as central venous or urinary catheters and/or
- antibiotic receipt.

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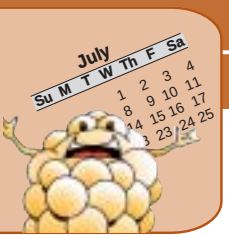

Members of the general public who reside in the community, who are healthy and who have normal immunity, are not routinely considered at risk of acquiring MRSA. MRSA does not usually affect hospital staff or family members, therefore, healthy persons are usually at low risk of becoming colonized or infected with MRSA.

How is it transmitted?

MRSA is most frequently spread from person to person by direct contact with someone who is either colonized or infected with MRSA. This most commonly occurs by the unwashed hands of caregivers, from equipment and occasionally from the environment. It is, therefore, imperative that health-care workers and visitors to persons who are hospitalized, wash their hands before and after contact with a patient or with the patient's immediate environment.

What measures can limit the spread of MRSA?

General principles to limit the spread of MRSA are as follows:

In-hospital

1. Patients will be isolated and all entering their room will use gowns, gloves and masks as barrier precautions.
2. All persons interacting with the patient must wash their hands before and after entering the room.
3. Equipment must be designated for the isolated patient.

In the office

The management of persons infected or colonized with MRSA in a community-based practice is more difficult than in hospital as, many times, the patient status is not known. It is, therefore, imperative that basic hygienic principles are adhered at all times:

1. Wash or sanitize hands prior to and after contact with patients.
2. Promptly change the sheet or paper on the examination table.
3. If the patient identifies themselves as having MRSA, wipe all surfaces touched by this person with an appropriate disinfectant.

What is CA-MRSA?

Community-acquired infections with MRSA (CA-MRSA) occurs in at-risk populations in the community (*i.e.*, drug users, homeless persons, prisons and First Nations peoples) and in populations of healthy individuals without recognized risk factors for MRSA (*i.e.*, previous hospitalization, surgical procedures or antibiotic therapy). These patients have not had contact with acute or long-term care facilities. In addition, there have been numerous reports among individuals belonging to sporting teams. These strains are characterized by possessing the gene for the production of the Panton-Valentine leukocidin, otherwise known as dermonecrotic factor infection, caused by CA-MRSA and manifests as furuncles (so-called "spider-bite lesions," deep soft tissue abscesses or pneumonia with early abscess formation, which fail to respond to conventional anti-staphylococcal agents, such as cloxacillin and cephalexin). Many of these strains are also resistant to the quinolones (*i.e.*, ciprofloxacin and levofloxacin), which are poor choices for staphylococcal infections. These strains are almost all uniformly susceptible to trimethoprim sulfamethoxazole, doxycycline and variably susceptible to clindamycin.

When should community-acquired infection with MRSA be suspected?

If a patient has been treated for a skin and soft tissue infection, or abscess, which has not responded to beta-lactam therapy (cloxacillin, cefazolin/cephalexin), or presents within any of the aforementioned risk populations, a specimen of pus for culture and susceptibility testing should be obtained. Abscesses must be drained and antibiotic therapy modified to an agent to which the microorganism is susceptible. Trimethoprim-sulfamethoxazole or doxycycline are appropriate choices as oral agents and vancomycin is an appropriate parenteral agent.