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Methicillin-resistant Staphylococcus aureus (MRSA) infections in patients with cystic fibrosis — Frequently Asked Questions

What is MRSA?

MRSA is a specific strain of the organism *Staphylococcus aureus (S. aureus)*. *S. aureus* is frequently found on the skin of many individuals. If it gets inside the body, for instance under the skin or into the lungs, it can cause infections such as boils or pneumonia. Individuals who carry this organism are usually totally healthy and are considered simply to be carriers of the organism.

Individuals can become carriers of *Staphylococcus aureus* by physical contact with the organism. If the organism is on the skin then it can be passed around by physical contact. If the organism is in the nose or is associated with the lungs rather than the skin then it may be passed around by droplet spread from the mouth and nose. We can find out if and where Staphylococcus aureus is located on a patient by taking various samples, sending them to the laboratory and growing the organism.

The term MRSA or methicillin-resistant Staphylococcus aureus is used to describe those strains of this organism that are resistant to commonly used antibiotics. “Resistant” means that the organism is not killed by the antibiotic. Methicillin was an antibiotic used many years ago to treat patients with *Staphylococcus aureus* infections. It is now no longer used except as a means of identifying this particular type of antibiotic resistance. MRSA strains are not only resistant to the antibiotic called methicillin, but also to many other types of antibiotics.

Where is MRSA found and how is it spread?

MRSA can be present in carriers in the nose, throat or on the skin such as in moist areas like armpits and groins. It can cause also infections in the blood, lungs or urine, for example.

MRSA is usually spread through physical contact. It is usually spread in hospitals on people’s hands. Health care workers’ hands may become contaminated by contact with patients, or surfaces in the workplace, or medical devices that are

contaminated with body fluids containing MRSA. It can also be spread in the community mainly through physical contact.

Factors that have been associated with the spread of MRSA include: close contact, contaminated items and surfaces, crowded living conditions, and poor hygiene.

Are individuals with CF more likely to spread MRSA than individuals without CF?

It is felt that the risk of transmission of MRSA is high in individuals with cystic fibrosis (CF) due to two main factors. First, individuals with CF carry MRSA in their lungs and sputum, as opposed to individuals who do not have CF who carry MRSA in their nose, and on their skin. They can therefore spread MRSA not only with their hands but also by droplets produced when they cough. Second, the amount of MRSA in individuals with CF is exponentially higher than in individuals without CF. Therefore it is more likely for a person with CF to spread MRSA to his or her hands when coughing and to transmit MRSA, than it is for someone without CF who carries MRSA.

Who gets MRSA infections?

Anyone can potentially be infected with MRSA. Usually, MRSA affects individuals who are very ill with weakened immune systems that cannot fight off the infection. Healthcare-associated MRSA infections occur most frequently among persons (with or without CF) in hospitals and health care facilities (such as nursing homes and dialysis centres) who have weakened immune systems. These healthcare-associated MRSA infections include surgical wound infections, urinary tract infections, bloodstream infections, and pneumonia. MRSA infections acquired in the community are most likely to cause boils and skin infections.

How common are MRSA infections in CF?

There are no accurate figures relating to the number of CF patients colonized or infected with MRSA in Canada. In the United States, more than 14% of individuals with CF are colonized with MRSA. In general, MRSA is more common in the USA than in Canada.

How is the transmission of MRSA prevented?

Measures to prevent the spread of organisms from one person to another are called infection control measures. The most important type of infection control measure required for MRSA is what is called **Contact Isolation.** This type of isolation requires everyone in contact with the patient to be very careful about hand washing after touching either the patient or anything in contact with the patient. Gloves and gowns are worn for patient care. The person with MRSA is in

a private room to prevent spread to other patients. Because dust and surfaces can become contaminated with the organism, cleaning of surfaces is also important. This usually occurs after the patient leaves the hospital.

On occasion, for the sake of other patients, it may be necessary to move carriers of MRSA to an isolation unit, which specializes in isolating all types of infections, to protect other persons. The medical care of such patients will continue in an isolation unit which is well used to caring for all types of medical problems associated with infections.

What do hospital visitors need to do?

Provided relatives and friends of patients with MRSA are healthy, there is no restriction on visiting, and a hospital visit to an individual who tests positive for MRSA carries little risk. Visitors are sometimes required to wear special clothing (gown, mask and gloves) and are advised always to wash their hands thoroughly with soap and water or with an alcohol-based hand sanitizer whenever leaving the room.

What about MRSA at home?

In patients who are otherwise well, the organisms often disappear once the patient leaves the hospital. Sometimes MRSA does not disappear, and this may mean that when a patient has to go back into hospital the isolation precautions need to be used again. Provided everyone at home is healthy, special precautions are not required at home.

What are the clinical implications of MRSA?

Many individuals with CF are labelled as colonized with MRSA (that is, there are no signs of infection associated with its isolation) rather than *infected*. Although a number of body sites can harbour MRSA, most MRSA-positive individuals with CF are found to carry the organism in their nose, throats and sputum, rather than on the skin. Colonization status may also vary over time without any specific therapeutic interventions.

Until recently, the isolation of MRSA in the sputum of patients with CF had questionable significance; in many instances, it was considered to be related to colonization rather than being directly related to deterioration in the course of lung disease. More recently, it has been suggested that MRSA could potentially be associated with morbidity among patients with CF, especially infants and young children.

An increase in the incidence of CF exacerbations related to MRSA has been reported recently in the United Kingdom. The investigators found that the annual incidence of infection with this organism consistently increased between 1995

and 2000. In their study sample, the median age at acquisition of MRSA was 73 months. Another recent study in the United Kingdom evaluated the impact of MRSA among children with CF. MRSA infection was shown to be related to significant deterioration in height compared with controls. Chest radiographs revealed worsening signs after one year among patients who had test results positive for MRSA.

Once colonized with MRSA, will a patient continue to test positive?

About half of patients testing positive for MRSA will eventually lose their MRSA for good, a quarter will be colonized continuously, and another quarter will be colonized intermittently.

What are the transplant implications of MRSA?

Some centers will not transplant individuals with CF who test positive for MRSA on screening. Although there is little direct evidence relating to organ transplantation, it has been shown that MRSA-positive individuals are less likely to survive other major surgical procedures, such as coronary artery bypass grafting, than MRSA-negative individuals. Transplant centres have also been concerned about the potential for cross-infection with MRSA on the intensive care unit. However, some MRSA-positive individuals have been transplanted successfully. Each transplant centre will have its own approach to assessing the suitability of MRSA-positive individuals for transplantation, and treatment may be offered in an attempt to eradicate MRSA colonization.

What should I do if I think I have a MRSA infection?

See your health care provider.

Can MRSA be treated?

Most of the time. While MRSA is resistant to many antibiotics and can be difficult to treat, there are a few antibiotics that can treat MRSA infections.

How is person-to-person transmission of MRSA different than transmission of *Pseudomonas aeruginosa*?

There are still many unanswered questions regarding the transmission of *Pseudomonas aeruginosa*. There is increasing evidence that some strains of *Pseudomonas* can be transmitted; however, it seems that most transmission requires close, prolonged contact (as between siblings, not as per brief contact at a meeting).

How does colonization with MRSA differ from colonization with *B. cepacia* complex?

Acquisition of MRSA represents a different clinical situation with different potential outcomes than colonization with *B. cepacia complex*.

- MRSA can cause infections in healthy individuals (with and without CF). In contrast, *B. cepacia* complex rarely causes infection in healthy individuals; *B. cepacia* complex can be a problem for persons with cystic fibrosis, and certain other individuals who cannot fight infections properly.
- While colonization with MRSA has sometimes been associated with an increase in the incidence of CF exacerbations, some people who culture positive for B. cepacia complex may develop "*cepacia* syndrome". "*Cepacia* syndrome" results from the invasion of *B. cepacia* complex into a person's bloodstream, and can cause severe chest problems, accompanied by a fever and a rapid decline in health.

It is agreed that both *B. cepacia* complex and MRSA require observance of infection control policies.

How does the CCFF's infection control policy apply to individuals with and without CF, who are colonized with MRSA?

- individuals with CF who are known to be colonized with MRSA, regardless of whether or not they are actively sick, shall not attend CCFF-sponsored meetings and events;
- Individuals without CF who are known to be colonized with MRSA, and are actively sick and/or are coughing/sneezing shall not attend CCFF-sponsored meetings and events; and,
- Individuals without CF who are known to be colonized with MRSA, and are NOT actively sick and/or are NOT coughing/sneezing shall be permitted to attend CCFF-sponsored meetings and events, on the understanding that, like all meeting participants, they will observe diligent hand hygiene.

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