

Control and treatment of methicillin-resistant *Staphylococcus aureus* in Canadian paediatric health care institutions



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ABSTRACT

Rates of methicillin-resistant *Staphylococcus aureus* (MRSA) infection and colonization in hospitalized patients in Canada have increased 10-fold since 1995. Nosocomial acquisition occurs frequently in adults but remains unusual in children. Community strains of MRSA, unrelated to hospital strains, have emerged in recent years. These are characterized by distinct antibiotic resistance and virulence genes and, unlike hospital strains, occur more frequently in young children than in adults.

When there is an increased prevalence of MRSA in a community, specimens for microbiology culture should be obtained from suspected *S aureus* infections whenever possible to determine antimicrobial sensitivity and to guide therapy. If more than 10% of *S aureus* isolates from the community are resistant to methicillin, empiric therapy for suspected *S aureus* infections should include treatment for MRSA. Serious infections should be treated with vancomycin and a beta-lactam antibiotic pending results of sensitivity tests. Abscesses should be drained promptly. Clindamycin or linezolid may be used if sensitivity has

been documented and a bacteriostatic antibiotic is sufficient. For less severe infections, options for empiric therapy include clindamycin, trimethoprim-sulfamethoxazole, or a tetracycline, macrolide or quinolone. Local sensitivity patterns must be considered. For minor superficial infections, incision and drainage may suffice.

MRSA is usually introduced into an institution by an infected or colonized patient, and transferred between patients on the hands of personnel or on shared equipment. The most frequently colonized site is the anterior nares. Aggressive infection control measures, including surveillance cultures of at-risk patients, contact precautions and reduction of overcrowding, have been shown to decrease MRSA transmission in hospitals. Screening at-risk patients will not identify all colonized patients, especially with the increasing prevalence of community strains. It is imperative that appropriate routine practices to prevent transmission of microorganisms be observed for all patients. In addition, the measures listed in Table 1 are recommended.

For more information, refer to the full text of this statement at <www.cps.ca/english/publications/InfectiousDiseases.htm>.

TABLE 1

Summary of recommendations to control methicillin-resistant *Staphylococcus aureus* (MRSA) transmission in health care facilities

Routine Practices and Additional Precautions	<ul style="list-style-type: none"> • Reinforce Routine Practices for care of all patients. • Implement Additional Precautions based on clinical presentation, regardless of MRSA status. This includes contact precautions for children with draining wounds or skin lesions that cannot be kept covered, and droplet precautions for those with respiratory infections.
Identification of cases	
Selective screening of patients	<ul style="list-style-type: none"> • Screen patients if <ul style="list-style-type: none"> - they were hospitalized outside of Canada within the past year. - they were transferred from a centre with endemic MRSA or a current or recent outbreak of MRSA. - there is known contact with a person colonized with MRSA, in hospital or another institution, or a colonized family member. - they are known to have been previously colonized or infected with MRSA.
Sporadic cases	<ul style="list-style-type: none"> • For sporadic cases identified by isolation of MRSA from clinical specimens, arrange for microbiology laboratories to promptly inform the infection control practitioner and attending physician so that appropriate measures may be taken.
Previously known cases	<ul style="list-style-type: none"> • Identify using a flagging system.
Screening procedure	<ul style="list-style-type: none"> • Culture both anterior nares (one swab). • Culture wounds, skin lesions and ostomy sites; endotracheal aspirate if intubated; and urine if indwelling catheter is in place. • Culture umbilicus if patient is a neonate.

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TABLE 1 (continued)**Summary of recommendations to control methicillin-resistant *Staphylococcus aureus* (MRSA) transmission in health care facilities**

Patient placement	
Inpatients with known MRSA	<ul style="list-style-type: none"> Place in a single room if possible. If it is not possible to place in a single room, prioritize single rooms for patients more likely to transmit (with infected wounds, uncovered skin lesions, stomas or respiratory tract infections, and young children with inadequate hygiene who cannot be confined to their bed or bed space). In shared rooms, maintain strict physical separation of at least 1 m between patients, and choose roommates who are at low risk of MRSA acquisition or of adverse outcome if infection should occur. Patients colonized with MRSA strains with similar antibiograms may be cohorted. Do not cohort a patient with a community strain (which may be more virulent) with a patient with a hospital strain (which may be more resistant).
Outpatients with known MRSA	<ul style="list-style-type: none"> Separate a child with risk factors for transmission (colonized wounds, skin lesions or stomas, or respiratory tract infection) from other patients, and place in an examination room as soon as possible; consider scheduling clinic visits for the end of the day.
Patients exposed to MRSA, awaiting results	<ul style="list-style-type: none"> Place in a single room if possible. Otherwise, prioritize as above. Maintain strict physical separation between patients, and choose roommates carefully.
Barrier precautions	
Inpatients	<ul style="list-style-type: none"> Wear gloves to enter the patient's room or bed space. Wear a surgical/procedure mask and eye protection as for Routine Practices (eg, during suctioning of patient and for procedures that may result in splashing of secretions, excretions, blood or other body fluids into the face). Wear a surgical/procedure mask if within 1 m of patient with respiratory tract infection. Wear a gown if it is anticipated that the forearms or clothing will have direct contact with the patient or potentially contaminated items in the patient's environment. Remove gown and gloves before leaving the room.
Outpatients	<ul style="list-style-type: none"> Use gloves, gowns, masks and eye protection as for Routine Practices. If patient has risk factors for transmission (infected wounds, uncovered skin lesions, stomas or respiratory tract infection), use gloves and gowns as with inpatients.
Hand hygiene	
	<ul style="list-style-type: none"> Wash hands using an antiseptic soap or hand rinse after patient contact, after touching contaminated equipment or surfaces, and when leaving the patient's room or bed space. Wash hands after removing gloves.
Patient bathing	
	<ul style="list-style-type: none"> Use antiseptic skin cleanser for patient bathing (chlorhexidine, triclosan or hexachlorophene).
Environment	
	<ul style="list-style-type: none"> Reserve equipment for use with the patient or disinfect it before use with another patient. Clean room at least once daily with attention to frequently touched surfaces, such as bed rails and doorknobs, and items in the direct vicinity of the patient.
Eradication of MRSA	
Consider in selective situations only	<ul style="list-style-type: none"> May be indicated for <ul style="list-style-type: none"> outbreak control patients to be transferred to a facility where isolation is not feasible health care workers implicated in transmission selected high-risk patients to reduce their risk of MRSA infection Use a combination of daily antiseptic bathing (eg, chlorhexidine), topical therapy (eg, mupirocin 2% ointment to nares three times daily) and oral therapy based on antimicrobial sensitivity of the colonizing strain (eg, trimethoprim-sulfamethoxazole 4 mg/20 mg trimethoprim/sulfamethoxazole/kg/dose twice daily [maximum dose 160 mg/800 mg twice daily] plus rifampin 10 mg/kg/dose twice daily [maximum dose 300 mg twice daily]) for seven days.
Duration of precautions	
Known MRSA carrier	<ul style="list-style-type: none"> Continue for the entire duration of hospitalization, unless the patient is a long-stay patient. For long-stay patients (eg, longer than two months), discontinue after three sets of cultures taken at intervals of at least one week, and when patient has not received antibiotic therapy for at least a week, are negative for MRSA. Culture nares and any other potentially positive sites. If readmitted, screen for MRSA; continue precautions until three consecutive sets of cultures, taken as above, are negative. Screening should also be performed on follow-up clinic visits.
MRSA contact	<ul style="list-style-type: none"> Discontinue if screening tests are negative.
Management of contacts	
If one case	<ul style="list-style-type: none"> If a patient with MRSA is identified and precautions had not been taken, screen likely patient contacts. This may be indicated for roommates only, or for a patient care unit or a special care area (eg, hemodialysis), depending on the index patient's activities.

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TABLE 1 (continued)
Summary of recommendations to control methicillin-resistant *Staphylococcus aureus* (MRSA) transmission in health care facilities

Management of contacts (continued)	
If one nosocomial case	• Further screening may be warranted to identify the potential source.
If an outbreak	<ul style="list-style-type: none"> • An outbreak is defined as an increase in the incidence or prevalence of MRSA over background rates. • If MRSA is endemic, knowledge of the background rate is important to permit the detection of an outbreak. • If there were no previous cases, two cases documented concurrently or in close proximity should be investigated. • Seek the advice of an expert for outbreak management.
Education	<ul style="list-style-type: none"> • Educate all staff about infection control policies. • Provide information for the patient and his or her family (eg, reasons for precautions, implications for the patient, what to do at home and if the patient is returning to a health care facility).
Transfer to another facility	• Inform the facility in advance.
Judicious antibiotic use	• Use antibiotics wisely; avoid excessive or inappropriate use. Limit use of fluoroquinolones.

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The recommendations in this statement do not indicate an exclusive course of treatment or procedure to be followed. Variations, taking into account individual circumstances, may be appropriate. Internet addresses are current at time of publication.