

New Brunswick Disease Watch Bulletin

Office of the Chief Medical Officer of Health

Introduction:

Welcome to the fourth NB Disease Watch for this year. The focus of this edition is on the important issue of health-care-acquired infections (HAIs) and the continuing emergence of pathogens of increased virulence and resistance in our health-care institutions and in the community. We focus this time on Methicillin-resistant *Staphylococcus aureus* (MRSA), and we will update information about Vancomycin-resistant enterococci (VRE) and *Clostridium difficile* in subsequent editions. An outline of this year's influenza eligibility is also included in this edition and will be covered in more detail in the next edition; it will be the subject of a separate mail-out. We are also including information about Lyme disease. paul.vanbuynder@gnb.ca

Health-care and community associated infections

Infections associated with health care, particularly due to resistant organisms, are one of the most significant challenges in Canada. Epidemiological data suggest that Methicillin-resistant *Staphylococcus aureus* (MRSA), Vancomycin-resistant enterococci (VRE) and *Clostridium difficile* are becoming endemic in Canada. It is estimated that more than 220,000 HAIs result in 8,000 to 12,000 deaths in Canada each year, and the rates are rising.

Resistance among these pathogens is much more prevalent among nosocomial infections than among community-acquired infections. One in nine Canadian patients admitted to hospital each year will acquire an infectious disease while an inpatient.

Methicillin-resistant *S. aureus*

MRSA are resistant to beta-lactam antibiotics, including penicillins (for example, penicillin and amoxicillin),

“anti-staphylococcal” penicillins (for example, methicillin and oxacillin), and cephalosporins (for example, cephalexin). Ten epidemic strains have been identified in Canada.

Humans are a natural reservoir for *S. aureus*, and asymptomatic colonization is far more common than infection. Colonization of the nasopharynx, perineum or skin, particularly if the cutaneous barrier has been disrupted or damaged, may occur. Community carriage rates are 25 per cent to 50 per cent. Higher carriage rates are seen in health-care workers, persons with insulin-dependent diabetes, persons with chronic dermatologic conditions and persons with long-term indwelling intravascular catheters. Young children also tend to have higher colonization rates, probably because of their frequent contact with respiratory secretions. Colonization may be transient or persistent and can last for years.

S. aureus can be transmitted by:

- **direct contact with a colonized carrier;**
- **indirect contact with contaminated objects such as towels, wound dressings and workout areas; and**

- **ingestion of food containing *S. aureus* enterotoxin.**

Two main categories of MRSA are recognized: health-care-associated (HA-MRSA) and community-associated MRSA (CA-MRSA).

HA-MRSA infections are linked to persons with health-care-associated risk factors such as hospitalization or nursing home care, chronic dialysis, antibiotic treatment and exposure to invasive devices or procedures. HA-MRSA is highly resistant to many antibiotics and causes infections associated with increased morbidity and mortality.

MRSA infections acquired in the community by healthy

HA-MRSA case definition

Isolation of *S. aureus* from any body site

AND

Resistance of isolate to oxacillin

AND

Patient must be admitted to the hospital / acute-care facility

AND

Is a “newly identified MRSA case”

individuals who have neither been hospitalized within the past year nor have had a medical procedure are known as CA-MRSA. CA-MRSA strains demonstrate less resistance to antibiotics than their health-care counterparts, but many community strains carry a virulence factor, the Panton-Valentine Leukocidin (PVL) gene, which is associated with more serious infections.

CA-MRSA infections differ from those acquired in health-care facilities with respect to their epidemiology and the characteristics of the causative MRSA strains. Over time, though, the strains and the settings in which they are found have begun to overlap.

Clinical presentation

The incubation period is variable and indefinite, but it is commonly four to 10 days. Disease may not occur until several months after colonization.

The common bacterial skin lesions are impetigo, folliculitis, furuncles, carbuncles, abscesses and infected lacerations. Constitutional symptoms are unusual, but if lesions extend or are widespread, fever malaise, headache and anorexia may develop. Lesions are usually uncomplicated, but

TABLE 1: Comparison of classic characteristics of HA-MRSA and CA-MRSA

	HA-MRSA	CA-MRSA
Patients	Elderly, debilitated, chronically or critically ill.	Healthy children (including newborns) and young adults.
Infections	<ul style="list-style-type: none"> - Associated with hospitalizations, health-care interventions; - Varied invasive infections (for example, surgical wounds, bacteraemia and pneumonia). 	<ul style="list-style-type: none"> - Onset in the community; - Primarily skin and soft tissue infections: cellulitis; furuncles; abscesses; boils; often mistaken for spider bites on presentation; - Infections commonly escalate; - Less common infections: necrotizing pneumonia; bacteraemia; necrotizing fasciitis; osteomyelitis; endocarditis.
Transmission	<ul style="list-style-type: none"> - Highly transmissible, spread rapidly and cause outbreaks in health-care facilities; - Limited spread in healthy people in the community. 	<ul style="list-style-type: none"> - Ability to spread effectively between individuals in households and cause outbreaks in community; - Can cause outbreaks in health-care facilities.
Medical history-risk factors	<ul style="list-style-type: none"> - Antibiotic usage, hospitalization, immunosuppression, newborns, chronic illness, diabetes, surgery, drug users, cystic fibrosis, neutrophil function disorders, neoplastic disease, burns. 	No significant medical history, hospitalization or antibiotic usage
Virulence and susceptibility	<ul style="list-style-type: none"> - PVL genes unusual; - Resistant to macrolides, clindamycin, gentamicin, quinolones, tetracycline; - uniformly susceptible to vancomycin and linezolid. 	<ul style="list-style-type: none"> - PVL and type 4 SCC mec genes; - Resistant to macrolides; - Susceptible to fluoroquinolones, gentamicin, clindamycin, trimethoprim-sulfamethoxazole, tetracycline, fusidic acid, rifampin, vancomycin and linezolid.

when organisms are invasive, then pneumonia, lung abscesses, osteomyelitis, sepsis, endocarditis, pyarthrosis, meningitis or brain abscess may occur.

Skin lesions due to some virulent CA-MRSA strains often progress

rapidly, recur and spread within households and close groups.

In addition to primary lesions of the skin, staphylococcal conjunctivitis occurs in newborns and the elderly. Parenteral use of illicit drugs or nosocomially acquired infection may result in Staphylococcal endocarditis and other complications of staphylococcal bacteraemia. Embolic skin lesions are frequent complication of endocarditis and/or bacteraemia. As long as the purulent lesions continue to drain, the infection is communicable.

MRSA skin infection–Cellulitis



Confirmation of diagnosis

Isolation of *S. aureus* by culture from purulent skin lesions, nose, throat, rectum, blood, open wounds, pleural fluid and bone or catheter exit sites confirms the diagnosis. Antimicrobial susceptibility tests will then confirm that an isolate is an MRSA.

Obtaining specimens for culture and susceptibility testing

is useful to guide therapy, particularly for those who fail to respond adequately to initial management.

Treatment

Incision and drainage constitutes the primary therapy for purulent skin infections. Empiric antimicrobial coverage for MRSA may be warranted in addition to incision and drainage based on clinical assessment (for example, presence of systemic symptoms, severe local symptoms, immune suppression, extremes of patient age, infections in a difficult to drain area or lack of response to incision and drainage alone). For severe infections, an infectious disease specialist should be consulted.

MRSA skin infections can develop into more serious infections. It is important to discuss a follow-up plan with your patients in case they develop systemic symptoms or worsening local symptoms; or, if symptoms do not improve within 48 hours.

Healthy people who are carriers (colonized) with no symptoms of infection do not need treatment.

Epidemiology

From 1995 to 2006, the total incidence of MRSA increased 17-fold in hospitals participating in the Canadian Nosocomial Infection Surveillance Program (CNISP). CNISP researchers extrapolated that 11,700 patients acquired new MRSA infections in 2006.

Update on Lyme disease

Lyme disease is caused by the spirochete *Borrelia burgdorferi*. In eastern Canada, it is transmitted by the bite of infected blacklegged ticks (*Ixodes scapularis*). Infection may occur after a tick has been attached and feeding on blood for 24 to 36 hours. Although the risk is low, it is possible to be bitten by an infected tick in New Brunswick. The risk is higher in areas with endemic tick populations. Studies indicate that infected blacklegged ticks are established in the Millidgeville area of Saint John. Tick surveillance to monitor tick endemicity in New Brunswick is ongoing.

The public is advised to follow tick bite protection measures during the summer and the fall, particularly if they spend time outdoors in endemic areas. This includes checking their bodies daily and removing ticks promptly when found.

The clinical manifestations of Lyme disease may involve skin, joints, the central nervous system and the heart. Both early and late manifestations of the disease are observed.

The most common early manifestation of Lyme disease is Erythema migrans (EM). EM is a round or oval expanding erythematous rash greater than five centimetres in diameter and enlarging slowly over several days

to weeks. It appears one to two weeks (range: three to 30 days) after inoculation and persists for up to eight weeks. Some lesions are homogeneously erythematous, whereas others have prominent central clearing or a distinctive target-like appearance. EM may be accompanied by systemic symptoms of fever, arthralgia, headache and fatigue. There is usually minimal pain, itching, swelling, scaling, exudation or crusting associated with EM although some inflammation may be associated with the tick bite itself at the centre of the lesion. An erythematous skin lesion present while a tick vector is still attached or which has developed within 48 hours of detachment is most likely a tick bite hypersensitivity reaction (a non-infectious process). Tick bite hypersensitivity reactions are usually smaller than five centimetres in largest diameter. Sometimes they have an urticarial appearance, and they typically begin to disappear within 24 to 48 hours.

Early Lyme disease may occur without EM although a clinical diagnosis is then difficult because of the similarity of the systemic symptoms to those of a viral infection. Early Lyme disease may result in spirochetemia and dissemination of infection to other organs.

The most common manifestations of disseminated Lyme disease include secondary skin lesions, arthritis, neurological abnormalities (facial nerve palsy,

Is there a vaccine to prevent *Staphylococcus aureus* infections?

Several vaccine clinical trials are assessing the safety, efficacy and immunogenicity of a vaccine to prevent *S. aureus* infections. Some of these studies involve healthy adult subjects as well as patients undergoing cardiothoracic surgery. Within the setting of cardiothoracic surgery, *S. aureus* is a major concern because these patients can develop serious surgical site infections, including mediastinitis. Several strains of *S. aureus*, including MRSA, are resistant to antibiotics, making it extremely difficult to prevent *S. aureus* infection. Therefore, a vaccine that could be used prophylactically would provide important therapeutic benefits to patients at risk of developing a life-threatening *S. aureus* infection.

meningitis and motor/sensory radiculoneuritis) and cardiac abnormalities (atrioventricular block). Late infection may occur months after the onset of illness and most commonly manifests as chronic arthritis.

Lyme disease can be diagnosed clinically if the typical EM rash is seen and there is a history of residence in or visit to an endemic area. For suspicious non-typical rashes, extracutaneous manifestations of Lyme disease and in patients presenting without history of residence or visit to an

endemic area, laboratory testing is recommended. The two-tiered testing process that follows Canadian national guidelines is recommended. Screening enzyme immunoassay tests are highly sensitive but lack the necessary specificity for the diagnosis; positive or indeterminate enzyme immunoassay results undergo Western blot confirmatory testing. Clinical specimens should be sent only to laboratories that adhere to these guidelines.

In New Brunswick, both clinically diagnosed and laboratory

confirmed cases of Lyme disease should be reported to Public Health.

More specific information, including tick bite prevention measures, and reference material is at www.gnb.ca/health.

The seasonal influenza vaccine eligibility criteria has expanded.

As of the 2010-11 seasonal influenza season, the eligibility criteria for groups eligible to receive publicly funded influenza vaccine will expand to include:

- **Children 24 to 59 months.**
- **Household contacts of children 24 to 59 months.**
- **Children five to 18 years.**
- **Household contacts of children five to 18 years **WILL NOT** be eligible.**

For further information on all groups eligible for publicly funded influenza vaccine and the New Brunswick 2010-11 influenza policy, visit:

http://www.gnb.ca/0053/public_health/health_professionals-e.asp

Remember,
being immunized gives your
children the protection they need.



Visit www.gnb.ca/health
or contact your local
Public Health office

New Brunswick
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