Staphylococcus aureus Antibiotic Resistance- Methicillin Resistant *Staphylococcus aureus* (MRSA) and Vancomycin Resistant *Staphylococcus aureus* (VRSA)

CHAPTER CONTENT

1. CASE DEFINITION

Confirmed Case

- Isolation of Methicillin Resistant *Staphylococcus aureus* from any body site **AND** is a newly identified MRSA case*
- *A newly identified MRSA case includes any MRSA cases identified for the first time either within a hospital facility or in community and **does not include** any MRSA cases previously identified at any other facility or other community.

Severe MRSA

Isolation of Methicillin Resistant *Staphylococcus aureus* from a normally sterile site**

**Normally sterile site specimens are defined as,

- Blood
- Cerebrospinal fluid (CSF)
- Pleural fluid
- Peritoneal fluid
- Pericardial fluid
- Bone

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- Joint fluid

NOTE: Once a case is confirmed, it can be classified according to when, where, and how it was acquired. Information surrounding MRSA classification can be found at: Infection Prevention and Control Canada CNISP Surveillance Protocols

2. 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 test of isolates should be performed
    - All MRSA strains are resistant to cloxacillin, oxacillin and cephalosporins
    - Health care associated MRSA strains are always resistant to vancomycin (VRSA) and linezolid, usually resistant to macrolides, clindamycin, gentamicin, and quinolones and sometimes resistant to tetracycline, and trimethoprim-sulfamethoxazole
    - Community associated MRSA strains are always resistant to vancomycin (VRSA) and linezolid, usually resistant to macrolides and variably resistant to fluoroquinolones
- The more types of antimicrobials the organism is resistant to the harder it will be to treat.
- **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.
- Staphylococci can be characterized through molecular methods such as antibiotic resistance profile or whole genome sequencing.
- For more information, refer to the Alberta Provincial Laboratory Guide to Services

3. REPORTING

Health Care Professionals

- Confirmed or probable cases are to be reported to the Office of the Chief Public Health Officer (OCPHO) by telephone (867) 920-8646, fax (867) 873-0442, or email within **7 days** after diagnosis is made or opinion is formed, ***AND***
- Complete and fax (867) 873-0442 the Communicable Disease Report Form to the OCPHO within **7 days**
- **Immediately** report all outbreaks or suspect outbreaks by telephone (867) 920-8646 to the OCPHO

Laboratories

- Report all positive results to the OCPHO by fax (867) 873-0442 within **7 days**

4. OVERVIEW

Causative Agent

- MRSA is a strain of *Staphylococcus aureus* bacteria that is resistant to a large number of semisynthetic penicillins, such as methicillin, cloxacillin and oxacillin.
- Some strains of MRSA become resistant to other antimicrobials including vancomycin (VRSA) due to repeated use.

Clinical Presentation and Major Complications

- The most common presentation with all MRSA is soft skin and tissue infections (SSTI) including impetigo, folliculitis, furuncles (boils), carbuncles, abscesses, and infected lacerations
    - Often described as spider bites
- Infections often results in redness, swelling and tenderness at the site of infection.
- In more serious infections, fever, tiredness, headache, and anorexia may develop.
- **In health care settings** MRSA presents as infection of surgical wounds, around invasive devices, burns, catheter site, pneumonia, and bloodstream infections.
- **In community settings** MRSA usually presents as localized infections, infected scratches, insect bites, furuncles, and small to moderate abscesses, or cellulitis.
- **Severe presentations** include, sepsis, osteomyelitis, necrotizing fasciitis, necrotizing pneumonia, lung abscess, endocarditis, infectious arthritis, meningitis, brain abscess, scalded skin syndrome & empyema.
- MRSA conjunctivitis can occur in newborns and the elderly.

Transmission

- *S. aureus* (including drug resistant form MRSA) is commonly found on the skin and in the noses of healthy people.
- 20-30% of the population carries *S. aureus* on their hands or in their nose but are not ill; some of these may be MRSA.
- MRSA is primarily spread by skin-to-skin contact or through contact with items contaminated by the bacteria.
- In the community, MRSA is spread through contact with an infected wound or by sharing personal items such as towels, sporting equipment or razors that have touched infected skin.
- Risk of infection increases in the following situations:
    - When a person is living in overcrowded conditions
    - Athletes, day cares, schools, gyms, barracks
    - In health care facilities, MRSA is primarily spread through direct and indirect contact with infected or colonized patients
    - Poor adherence to standard infection control precautions (i.e., hand hygiene) can lead to transmission between patients and to clusters of infections

- Droplet transmission may be possible from a person with respiratory symptoms
- Airborne spread is possible in health care settings during aerosolizing generating procedures
- The disease can be spread for as long as purulent lesions are present or the carrier state persists

Incubation Period

- Variable and indefinite; Commonly 4 to 10 days

Clinical Guidance

- For patient specific clinical management consult your local health care professional, paediatrician, infectious disease specialist, or the NWT Clinical Practice Guidelines.

5. PUBLIC HEALTH MEASURES

Management of Cases

- For cases in hospital
  - Notify the facility's infection prevention & control practitioner
  - Follow the NWT Infection Prevention and Control Manual contact precautions
- Cases occurring in the community setting should be provided with education on prevention and treatment of MRSA/VRSA **but need not be followed up by public health except in outbreak situations.**
- Decolonization is not recommended in the NWT.

Management of Contacts

- There are no contact tracing, or management steps for Antibiotic Resistant *S. aureus.*

Prevention

- Encourage the judicious use of antimicrobials.
- The OCPHO recommends health care providers use Alberta Health Services' "Bugs & Drugs" now only available online: https://www.bugsanddrugs.org/.
- Encourage the public to complete the full course of antibiotics if prescribed by their health care provider.
- Health care facilities should have infection prevention and control policies and procedures in place for identifying and isolating patients with MRSA, cleaning and disinfection, hand hygiene facilities and conduct regular infection prevention and control audits.
- Provide public education in personal hygiene, especially hand washing.
- In the community, public education should target the following risk groups, households with MRSA infected individuals, corrections facilities, schools, illicit drug use populations, sport settings, pet owners, and childcare facilities.
- Support and encourage good sanitation practices in households and other community settings.

- Ensure regular cleaning of bathroom and kitchen facilities with an approved combined detergent/disinfectant and ensure hand hygiene facilities are available and are fully stocked.
- Cover any skin lesions until healed
- Avoid sharing personal items like towels, razors, or sporting equipment.
- Seek medical care if you think you might have an infection.
- Regularly launder clothes, bed linens and towels in hot water and hot dryer.
- Public centers like gyms, and sport centers, schools, daycares should have routine protocols for cleaning and disinfection of sporting equipment, toys, etc.

6. PUBLIC & HEALTH PROFESSIONAL EDUCATION

For more information about MRSA and VRSA:

- The Government of Canada: Fact Sheet
- Centers for Disease Control and Prevention: General Information | MRSA | CDC
- World Health Organization: Antimicrobial resistance (who.int)
- BC Center for Disease Control: MRSA Guidelines (bccdc.ca)

7. EPIDEMIOLOGY

- **Data Collection**
  - For surveillance purposes, a case of MRSA is only counted if there is an accompanying symptomatic infection, and the laboratory result has been reported to the Office of the Chief Public Health Officer (OCPHO).
  - Screening and colonization results are not counted.
  - When a client presents with two or more laboratory confirmed MRSA infections then the additional case is counted when there is an accompanying clinically apparent infection and when they are distinct episodes of 8 weeks or longer between positive cultures and/or a different anatomic site was implicated.
- For more information on the epidemiology of MRSA in the Northwest Territories (NWT) see: Epidemiological Summary of Communicable Diseases HSS Professionals.

8. REFERENCES

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3. Alberta Provincial Laboratory Guide to Services: Public Health Laboratory (ProvLab) | Alberta Health Services
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15. World Health Organization: https://www.who.int/news-room/fact-sheets/detail/antimicrobial-resistance