PROVINCIAL SURVEILLANCE PROTOCOL FOR METHICILLIN-RESISTANT *STAPHYLOCOCCUS AUREUS*

Provincial Infection Control-NL

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Background

Provincial Infection Control Newfoundland Labrador (PIC-NL), established in 2007, is the provincially recognized source for best practices in infection prevention and control (IPAC). One of the key areas of practice for IPAC is surveillance for healthcare-associated infections (HAIs). PIC-NL launched a surveillance program for HAIs in 2009 and methicillin-resistant *Staphylococcus aureus (MRSA) and Clostridium difficile (C. diff)* infections were identified for provincial reporting.

In 2012 the Accreditation Canada Standards for Infection Prevention and Control required organizations to monitor trends in infections and to track safety indicators for healthcare-associated (nosocomial) infections: MRSA and *C. diff*. In 2019 definitions for MRSA were revised to align with Canadian Nosocomial Infection Surveillance Program (CNISP). Colonization will no longer be part of Surveillance.

Methicillin-resistant Staphylococcus Aureus Surveillance

Methicillin-resistant *Staphylococcus aureus* (MRSA) is a strain of *Staphylococcus aureus* resistant to all the beta-lactam classes of antibiotics including commonly used products such as penicillin, amoxicillin, and oxacillin. While MRSA usually causes skin and soft tissue infections, bacterial pneumonia and blood stream infections are more serious illnesses that can occur.

MRSA has historically been associated with hospitals and other healthcare settings; however, community-associated MRSA is increasingly common. Interventions such as antimicrobial stewardship practice may help reduce incidence of MRSA. Infection prevention and control strategies may also prevent the acquisition and spread of MRSA infection and colonization during hospitalization.

Purpose:

The purpose of this protocol is to provide a consistent approach for surveillance of methicillin-resistant *Staphylococcus aureus* infections in Newfoundland and Labrador.

Objectives:

1. To determine the incidence of MRSA infections in NL for acute and long-term care facilities.

2. To identify MRSA cases occurring associated with health care and cases acquired in the community.

3. To help identify at risk populations, inform health departments of trends, and to evaluate the effectiveness of infection prevention and control programs.

Definitions:

MRSA Non-Blood Stream Infection

Infection: The presence of microorganisms from any site with signs and the manifestations of symptoms of a clinical infection.

Colonization: The presence of microorganisms on the skin, on mucous membranes, in open wounds, or in excretions or secretions but are not causing adverse clinical signs or symptoms is present on the body but no cellular injury is occurring and there are no signs or symptoms of infection present.

MRSA infection inclusion criteria

MRSA Case

- Isolation of Staphylococcus aureus from any site on the body, AND
- Resistance of isolate to oxacillin, AND
- MRSA infection identified for the first time.

MRSA exclusion criteria:

- Repeat MRSA infections.
- MRSA colonization.

Infected cases

Once a case has been identified with a MRSA infection, they will be classified as healthcare-associated (HA) based on the following criteria and the ***best clinical judgement*** of the healthcare and/or infection prevention and control practitioner (IPC).[1]

I. Healthcare-associated – Hospitalized case:

- A case in which symptoms occur three (3) or more days (or greater than or equal to 72 hours) after current acute care admission[2].

OR

- Occur in a patient less than three (3) days after the current admission and had been previously hospitalized in your healthcare region and discharged within the previous 12 months.

OR

- Occur in a patient less than three (3) days after the current admission (or less than

[1] Consideration should be given to the frequency and nature of exposure to a medical device and/or procedure. For example, pediatric patients with clinic visits for otitis media, asthma, well-baby etc., may or may not be considered as HA while pediatric patients with clinic visits that involved invasive procedures or day surgery may be more likely to be considered HA. Adult patients attending dialysis, receiving chemotherapy, outpatient visits involving invasive procedures or day surgery may be more likely to be considered HA compared to adult patients with occasional outpatient or community health clinic visits.

[2] Calendar day 1 is the day of hospital admission.

72 hours) **AND** the patient had a previous healthcare exposure[3] within the previous 12-month period.

II. Healthcare-associated – Long Term Care (LTC) case:
The infection was not present on LTC admission[4], with onset of symptoms ≥ 3 days after admission to the long term care facility.

III. Healthcare-associated - Other:
Outpatient

- Had a previous healthcare exposure within the previous 12-month period.

OR

- Previously hospitalized in your region with in the previous 12 months.

LTC Resident:

- Infection was present < 3 days/ 72 hours after admission to long term care and the resident had exposure to any health care setting in the previous 12 months.

OR

- An acute care admission within the previous 12 months.

IV. Community-associated case:
Inpatient

- MRSA identified on admission to hospital (Calendar Day 1 = day of hospital admission) and/or the day after admission (day 2), **AND**

- Has no previous history of the organism, **AND**

- Has no prior hospital, long-term care admission or other exposure to a healthcare setting (rehab, clinics) in the past 12 months, **AND**

- Has no reported use of medical devices.

Long Term Care

- MRSA identified on admission to long term care (Calendar Day 1 = day of long-term care admission) and/or the day after admission (day 2), **AND**

- Has no previous history of the organism, **AND**

[3] For example, a MSSA/MRSA bacteremia from a surgical wound that occurs 3 weeks after a surgical procedure completed in your facility should be considered HA-YAF (up to 90 days after procedure if implant). A MSSA/MRSA bacteremic pneumonia occurring >7 days after discharge from your facility should not be considered HA.

[4] Calendar day 1 is the day of admission.

- Has no prior hospital, long-term care admission, or other exposure to a healthcare setting (rehab, clinics) in the past 12 months, **AND**

- Has no reported use of medical devices.

Outpatient

- Has no previous history of the organism, **AND**

- Has no prior hospital, long-term care admission, or other exposure to a healthcare setting (rehab, clinics) in the past 12 months, **AND**

- Has no reported use of medical devices.

MRSA Blood Stream Infection

Definition:

- To be considered a MRSA bloodstream infection (MRSA BSI) the patient must have MRSA cultured (lab-confirmed) from at least one blood culture.

AND

- MRSA BSIs identified for the first time.

OR

- A new MRSA BSIs infections (criteria to determine if it is a new MRSA BSI > 14 days since previously treated MRSA BSI and in the judgement of Infection Control physicians and practitioners represents a new infection).

Once the patient has been identified with a MRSA BSI infection, they will be classified as HA based on the following criteria and the ***best clinical judgement*** of the healthcare and/or infection prevention and control practitioner (IPC)[5].

I. HA –Hospitalized MRSA BSI:

- The first positive blood culture for MRSA was obtained on or beyond calendar day 3[6] of their hospitalization

OR

[5] Consideration should be given to the frequency and nature of exposure to a medical device and/or procedure. For example, pediatric patients with clinic visits for otitis media, asthma, well-baby etc., may or may not be considered as HA while pediatric patients with clinic visits that involved invasive procedures or day surgery may be more likely to be considered HA. Adult patients attending dialysis, receiving chemotherapy, outpatient visits involving invasive procedures or day surgery may be more likely to be considered HA compared to adult patients with occasional outpatient or community health clinic visits.

[6] Calendar day 1 is the day of hospital admission.

- Has been hospitalized in your facility in the last seven (7) days or up to 90 days[7] depending on the source of infection.

OR

- Has had a healthcare exposure at your facility that would have resulted in this bacteremia (using best clinical judgement).

II. HA – Long-term care MRSA BSI

LTC residents who have been admitted to acute care whose first positive MRSA blood culture is taken less than 3 days of the current acute care admission will be classified as HA-LTC MRSA BSI.

III. Community-associated (CA) MRSA BSI:

No exposure to healthcare that would have resulted in this bacteremia (using best clinical judgment) and does not meet the criteria for a healthcare-associated BSI.

[7] For example, a MSSA/MRSA bacteremia from a surgical wound that occurs 3 weeks after a surgical procedure completed in your facility should be considered HA-YAF (up to 90 days after procedure if implant). A MSSA/MRSA bacteremic pneumonia occurring >7 days after discharge from your facility should not be considered HA.

Roles, Responsibilities & Reporting

Laboratory

Laboratory Testing:

All specimens requiring testing for culture and sensitivity are processed through the microbiology laboratory of the acute care hospital facility in the Regional Health Authority (RHA).

Laboratory Reporting:

The Public Health Laboratory reports all positive samples for MRSA to the referring microbiology laboratory and to the Regional Medical Officer of Health (RMOH).

The staff in the RHA microbiology laboratory report all confirmed cases of MRSA to:

- RMOH
- Attending physician
- Infection Control Practitioner responsible for MRSA regional surveillance

Infection Prevention and Control

All laboratory identified cases of MRSA will be reviewed by an Infection Control Practitioner (ICP). The ICP will determine if the case meets the criteria in the definitions section. The ICP will collaborate with the Communicable Disease Control Nurse (CDCN) to collect the data if necessary.

- A data collection form (Appendix A) can be used to collect the data.
- Data will be entered into the HAI excel data base.

Public Health Reporting:

On a quarterly basis the ICP/designate, responsible for regional MRSA surveillance will submit data from the excel file to the provincial office.

Medical Officer of Health

- Review the quarterly reports.
- Determine any actions necessary as indicated by the incidence of MRSA.

Provincial Epidemiologist

- Compile regional MRSA reports into a yearly provincial HAI report.
- Support regional representatives in data extract, analysis, and reporting from HAI excel file.
- Provide surveillance advice and expertise, as needed.

Provincial Infection Control Nurse Specialist

- Update the protocol for MRSA surveillance as necessary.
- Provide input on the clinical requirements for the database.
- Review the quarterly reports from the RHAs.
- Coordinate the development of a yearly provincial report.
- Review the report with the Director of Disease Control.

Data Analysis

The data will be used to meet the objectives. The province will collect aggregate data from each RHA and no facility will be defined nominally. Additionally, RHAs will be able to use their own data as they feel appropriate and may want to collect additional data to support their internal Infection Control Programs.

Surveillance Period

The calendar quarter will be used for reporting purposes. A calendar quarter is a period of three (3) consecutive months starting on the first day of January, April, July, or October. The start date for the first quarter reporting will be January 1 of each year.

MRSA Case Data

All MRSA infections will be identified and classified according to the definitions.

Patient care days and resident care days will be used as denominator data to calculate the rates of MRSA infection in acute care and long-term care facilities respectively.

The RHAs will generate the following reports for the province on a quarterly basis:

- Rate of healthcare-associated – (hospitalized) MRSA infection incidence per 10,000 patient care days
- Rate of healthcare-associated – long term care MRSA infection incidence per 10,000 resident care days
- Number of cases of healthcare-associated MRSA infections: other
- Number of community associated cases

References

1. CDC/NHSH Surveillance Definition of Healthcare-Associates Infection and Criteria for Specific Types of Infections in the Acute Care Settings. Located online: http://www.cdc.gov/nhsn/PDFs/pscManual/17pscNosInfDef

2. Department of Health and Wellness (2015) *Protocol for Healthcare associated Methicillin-resistant Staphylococcus aureus (MRSA) Blood Stream Infection surveillance for acute care hospitals in Nova Scotia.*

3. Public Health Agency of Canada. (2018). *Canadian Nosocomial Infection Surveillance Program: (CNISP) 2018 Surveillance for Methicillin-resistant and Methicillin Susceptible Staphylococcus aureus Blood Stream Infections in CNISP Hospitals.*

4. Public Health Agency of Canada. (2017). *Canadian Nosocomial Infection Surveillance Program: (CNISP) 2018 Surveillance for Methicillin-resistant Staphylococcus aureus (MRSA) Infections in CNISP Hospitals*.

Appendix A: MRSA Data Collection Form

Instructions: Please complete for all adult cases. Please use data dictionary for definitions and notes (Appendix B).		
1.	Unique identified code	
2.	Community of residence	
3.	Date of birth	____/_____/_____ DD MMM YYYY
4.	Gender	□ Female □ Male □ Other
5.	Date of current admission (hospitalized acute care patients)	____/_____/_____ DD MMM YYYY
6.	Type of care	□ Acute care □ Long term care □ Outpatient □ Other
7.	Facility name	
8.	Type of patient/resident care unit	□ Surgical Unit □ Medical Unit □ Combined (med/surg) □ Other; specify _____ □ Outpatient □ Critical Care Unit □ Obstetric Unit □ Long-Term Care
9.	Date of specimen collection for first positive culture for this admission	____/_____/_____ DD MMM YYYY
10.	At which site has MRSA been isolated (positive culture obtained)? Check **all** that apply for non-blood infection.	□ Surgical site/wound infection □ Skin/soft tissue/burn □ Lower respiratory[8] □ Urine □ Bone/osteomyelitis □ Joint/septic arthritis □ Other: Please specify_____
11.	Where was the MRSA acquired?	□ Healthcare-associated □ Acute care facility □ LTC □ Other: _____ □ Community-associated □ Unknown □ Out of RHA

[8] Lower respiratory includes sputum, bronchial washes, ETT aspirates, pleural fluid or lung tissue or abscess and associated with pneumonia, lung abscess or empyema.

If identified as bloodstream isolate: please complete		
12.	What was the probable source of the MRSA bacteremia?	Check **one** only □ IV catheter-associated □ Primary bacteraemia, source unknown/can't determine) □ Skin/soft tissue/burn wound ➔If yes, is it a case of Necrotizing Fasciitis? □ Yes □ No □ Surgical site/wound infection □ Lower respiratory[9] ➔If yes, is it a case of necrotizing pneumonia? □ Yes □ No □ Endocarditis □ Osteomyelitis, septic arthritis, septic bursitis □ Pneumonia ➔if yes, is it a case of necrotizing pneumonia? □ Yes □ No □ Meningitis □ Urinary tract infection/urosepsis □ Other: Specify: _____
13.	In the 24 hours following the day the MRSA was identified/reported, please indicate which antibiotic(s) the patient had received.	Check **all** that apply □ Vancomycin □ Linezolid □ Daptomycin □ Nitrofurantoin □ Ceftriaxone □ Other: _____ □ No antibiotics
14.	At the time of the bloodstream culture was the patient	In an ICU[10] or discharged from an ICU within 48 hours AND in (or had been in) the ICU for 48 hours or more? □ Yes □ No
15.	Was the patient receiving hemodialysis at the time of the positive blood culture was obtained?	□ Yes □ No
16.	Is the patient known to use or inject him/her/them self with IV drugs?	□ Yes □ No

[9] Lower respiratory includes sputum, bronchial washes, ETT aspirates, pleural fluid or lung tissue or abscess and associated with pneumonia, lung abscess or empyema.

[10] ICU includes medical, surgical, combined medical-surgical, cardiovascular, coronary, neurosurgery, burn or step-down unit.

Appendix B: Data Dictionary

1. **Unique Identifier Code:** such as MCP/chart number.

2. **Community of Residence:** Choose from drop down box.

3. **Date of Birth:** Enter day (##), month (e.g., May) and year (e.g., 2008) in this order.

4. **Gender**: Check gender as appropriate.

5. **Date of Current Admission:** Enter day (##), month (e.g., May) and year (e.g., 2008) in this order.

6. **Type of care:** Placement (is the person in hospital or living at home) of the patient at the time of the positive culture; identify if it was acute care, long term care, outpatient or other. Other = living in the community or living in a personal care home at the time of the positive culture.

7. **Facility:** If applicable, identify the name of the acute care facility or the long-term care facility where the patient resided when the positive culture was identified.

8. **Type of Patient Care Unit:** If a patient was in a facility when laboratory confirmation was known, indicate the type of service provided on that Unit: medical, surgical, and critical care units. The ICP should use best judgement to determine to which unit the transmission is associated.

9. **Date of specimen for first positive culture**: For the current episode enter date of specimen collection for first positive culture positive obtained. Enter day, month, and year.

10. **At which site has MRSA been isolated (positive culture obtained)?** Check all that apply.

11. **Where was the MSRA acquired**: Please indicate whether the infection was acquired in a healthcare setting or in the community according to the definitions. If the site of acquisition cannot be determined, the MRSA case may be reported as unknown. The MRSA clinical infection would be considered HA if all elements of a CDC/NHSN site-specific infection criterion were present on or after the 3rd calendar day of admission of the facility (the day of hospital admission is calendar day 1). The MRSA infection would be considered CA if all elements of a CDC/NHSN site-specific infection criterion were present during the two calendar days before the day of admission, the first day of admission (day 1) and/or the day after admission (day 2) and are documented in the medical record.

If identified as Blood Steam Isolate: please complete.

12. **What was the probable source of MRSA bacteremia:** What infection most likely gave rise to the MRSA bacteremia? Choose from the list provided or specify if not included in the list. Please select only one response.

13. **In the 24 hours following the day the MRSA was identified reported, please indicate which antibiotics the patient received**. Choose all that apply.

14. **At the time the positive bloodstream culture was obtained, was the patient:** Please indicate if at the time the blood specimen that tested positive for MRSA was obtained, the patient was in an ICU or discharged from an ICU within 48 hours AND in (or had been in) the ICU for 48 hours or more. The purpose of this question is to identify bloodstream infections attributable to the ICU.

15. **Was the patient receiving hemodialysis at the time the positive blood culture was obtained?** Check the "Yes" box only if the patient was receiving hemodialysis.

16. **Is the patient known to use or inject him/herself with IV drugs**: Is the patient a KNOWN drug user?