

Methicillin-resistant *Staphylococcus aureus* (MRSA) Protocol

Approved by Provincial IPC Surveillance Committee: June 2010
Revised: April 2023

Copyright © 2023 Alberta Health Services. This material is protected by Canadian and other international copyright laws. All rights reserved.

This material may not be copied, published, distributed or reproduced in any way in whole or in part without the express written permission of Alberta Health Services (please contact the **Senior Provincial Director** of Infection Prevention and Control at InfectionPreventionControl@albertahealthservices.ca).

This material is intended for general information only and is provided on an "as is", "where is" basis. Although reasonable efforts were made to confirm the accuracy of the information, Alberta Health Services does not make any representation or warranty, express, implied or statutory, as to the accuracy, reliability, completeness, applicability or fitness for a particular purpose of such information. This material is not a substitute for the advice of a qualified health professional. Alberta Health Services expressly disclaims all liability for the use of these materials, and for any claims, actions, demands or suits arising from such use.

Approved: June 2010
Revised: April 2023

Contents

INTRODUCTION.....	4
GOAL.....	4
OBJECTIVES.....	4
METHODOLOGY.....	4
PATIENT POPULATION.....	5
CASE DEFINITION.....	5
INCLUSION CRITERIA.....	5
EXCLUSION CRITERIA.....	5
CASE CLASSIFICATION.....	5
HOSPITAL-ACQUIRED.....	6
HEALTHCARE-ASSOCIATED.....	6
COMMUNITY-ACQUIRED.....	7
ACQUIRED OUTSIDE ALBERTA.....	7
OTHER CONSIDERATIONS FOR CLASSIFICATION.....	7
DATA COLLECTION AND DATA ENTRY.....	8
MANDATORY DATA ENTRY.....	8
MINIMUM CASE INFORMATION.....	9
OTHER CONSIDERATIONS FOR DATA ENTRY.....	10
DENOMINATOR DATA.....	10
COMPARATOR RATES.....	10
REPORTING.....	10
DATA QUALITY.....	11
PROTOCOL REVISION HISTORY.....	12
REFERENCES.....	13
APPENDIX A: MRSA PROTOCOL-SPECIFIC DEFINITIONS.....	14
APPENDIX B: GENERAL SURVEILLANCE DEFINITIONS.....	15
APPENDIX C: MRSA CLASSIFICATION ALGORITHM.....	17
APPENDIX D: “NEEDS INITIAL” RECORD EXPLANATION.....	18
APPENDIX E: CASE EXAMPLES.....	21

Introduction

Antibiotic-resistant organisms constitute a significant and growing threat to patients/clients/residents in health care facilities and in our communities. Methicillin-resistant *Staphylococcus aureus* (MRSA) is a strain of *Staphylococcus aureus* and a type of antibiotic-resistant organism that has developed resistance to beta-lactam antibiotics which include penicillins (methicillin, dicloxacillin, nafcillin, oxacillin etc.) and cephalosporins, through the process of natural selection. MRSA infections are more difficult to treat with standard types of antibiotics and if left untreated, they may develop into serious, life-threatening complications such as infection of the bloodstream, bones and/or lungs (e.g., pneumonia).

MRSA is primarily spread by skin-to-skin contact or through contact with items contaminated by the bacteria. Those with weakened immune systems and chronic illnesses are more susceptible to the MRSA infection and MRSA has been shown to spread easily in those healthcare settings (Association for Professionals in Infection Control and Epidemiology, 2010).

In conjunction with the MRSA surveillance protocol, there are six supporting documents to assist in the interpretation and practical use of this protocol: the MRSA Protocol-Specific and General Surveillance Definitions ([Appendix A](#) and [Appendix B](#)), MRSA Case Classification Algorithm ([Appendix C](#)), Needs Initial Explanation ([Appendix D](#)), Select Case Examples ([Appendix E](#)) and the ProvSurv User Guide (Alberta Health Services [AHS], 2018).

Goal

To decrease hospital-acquired and healthcare-associated MRSA in Alberta Health Services (AHS) and Covenant Health acute and acute tertiary rehabilitation care facilities.

Objectives

1. To determine the incidence of recognized hospital-acquired, healthcare-associated and community-acquired MRSA colonization and infections in the population under surveillance in AHS and Covenant Health acute and acute tertiary rehabilitation care facilities.
2. To use surveillance results to develop and evaluate Infection Prevention and Control (IPC) interventions which support safer patient care.
3. To establish quarterly and annual MRSA incidence rates for trend analysis over time and to compare with internal and external benchmarks.
4. To establish MRSA Blood Stream Infection (BSI) incidence rates.

Methodology

- Cases eligible for surveillance are inpatients with laboratory confirmed MRSA.
- Reports of isolates originating from facilities under surveillance will be forwarded by laboratories to facility-based IPC programs or designates. Confirmation must be obtained at the reporting facility where the patient is an inpatient, except in the case of admission screening of direct patient transfers within provincial facilities under surveillance, where acquisition is being attributed to the sending facility.
- Facility Infection Control Professionals (ICPs) receiving MRSA laboratory reports will determine if cases are hospital-acquired, healthcare-associated, community-associated, or acquired outside Alberta and compile and record at least the minimum case information. Data from completed MRSA surveillance will be entered into the provincial surveillance data management system (ProvSurv) in a timely manner.

Approved: June 2010
Revised: April 2023

Patient population

All individuals admitted to AHS and Covenant Health acute and acute tertiary rehabilitation care facilities, where inpatient care is provided 24 hours/day, 7 days a week. Acute and acute tertiary rehabilitation facilities will be referred as the “facilities under surveillance” in this protocol for simplicity. Please refer to [Appendix B](#): General surveillance definitions for facilities that would be included under this term.

Case definition

An Initial case is a laboratory confirmed MRSA from a body site;

and

Is identified as positive with MRSA at the time of admission or during hospitalization.

Inclusion criteria

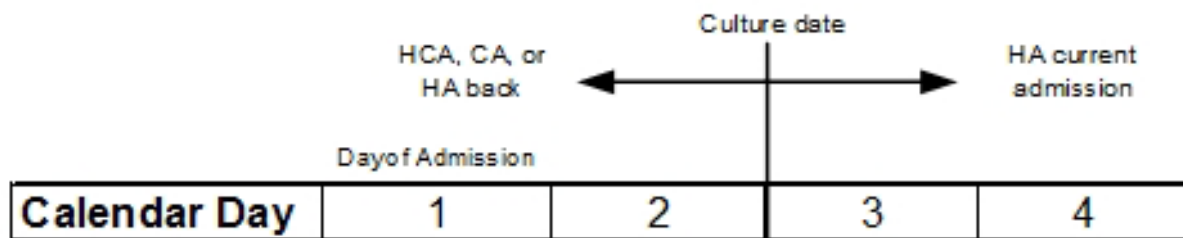
- MRSA case identified for the first time while patient admitted to a facility under surveillance.
- MRSA case identified for the first time in the emergency department in patients who are subsequently admitted to a facility under surveillance.
- Previously known MRSA positive patients with a For Information record and no Initial record.

Exclusion criteria

- Patients with a previous Initial MRSA case are not eligible to be a new MRSA surveillance case unless they are identified with a different strain of MRSA, i.e., another Initial case if patient was exposed again to MRSA and acquired another strain of MRSA from a different source (Public Health Agency of Canada, 2021). This means that patients have only one Initial case, even if patient is culture-negative and then becomes culture-positive again, unless another MRSA strain is identified.
- Patients with laboratory confirmed MRSA who were not admitted at the time of specimen collection or were not subsequently admitted as an inpatient following their emergency department visit are not eligible to be an Initial case.

Case classification

Once the person has been identified as an Initial MRSA case, they will be classified as hospital-acquired, healthcare-associated, community-acquired, or acquired outside Alberta based on the following criteria:



Hospital-acquired

Newly identified MRSA positive **on or after the 3rd calendar day of admission** to an inpatient location **where day of admission is calendar day 1** based on an assessment by the ICP using the following criteria:

- No known MRSA colonization at time of admission.
- Patient not known to be MRSA positive in the past.
- An MRSA infection was not present or incubating on admission (MRSA infection meeting all elements of National Healthcare Safety Network site-specific infection criterion were present during the two calendar days before the day of admission, on the day of admission (calendar day 1) and/or the day after admission (calendar day two) and are documented in the medical record).
- If patient has been admitted for less than three calendar days prior to the identification of an MRSA, there must be compelling evidence that the initial case is attributable to the facility (i.e., there is an established epidemiological link).

Hospital-acquired back to previous facility admission (Needs Initial - see [Appendix D](#))

- If a patient has been admitted for less than three calendar days prior to the identification of an MRSA
AND
the patient was directly transferred from one provincial facility under surveillance to another

OR
- If a patient has been admitted for less than three calendar days prior to the identification of an MRSA
AND
- the patient had a previous acute care admission (≥ 3 days) from the same or different provincial facility within 14 days
AND
there were no other acute care admissions (<3 days) and no other [healthcare encounters](#) between admissions.

Legacy MRSA without initial

- If the patient is known to be MRSA positive (legacy records or community results) they cannot be classified as hospital-acquired, even if hospital-acquired criteria are met. Use protocol and the current situation of the patient to assign case classification.

See [Appendix E](#) for case example.

Healthcare-associated

Identified MRSA positive **on the day of admission (calendar day 1) and/or the day after admission (calendar day 2)** to an inpatient location;

and

Any of the following [healthcare encounters](#):

Patient was previously admitted to any facility under surveillance in the past 12 months outside of the 14-day hospital-acquired attribution time period for attributing case back to another facility under surveillance;

or

Previous admission(s) in a facility under surveillance within the hospital-acquired attribution time period (14 days) however the most recent admission was less than three calendar days;

or

Has an indwelling catheter or a medical device in place for at least 48 hours at the time of culture that is externally exposed and can be manipulated for care on a regular basis (e.g., Foley urinary catheter, intravenous (IV) line, tracheostomy, feeding tube etc.);

or

In the past 12 months was a resident at a long-term care facility where care is provided 24 hours/day, 7 days a week;

or

In the past 12 months was known to have a surgical procedure or peritoneal or hemodialysis.

See [Appendix E](#) for case example.

Community-acquired

Identified MRSA positive **on the day of admission (calendar day 1) and/or the day after admission (calendar day 2)** to an inpatient location and does not fulfill the criteria for hospital-acquired or healthcare-associated (i.e. no previous admissions or healthcare encounters in the last 12 months).

See [Appendix E](#) for case example.

Note: When infection control professional judgment rules out any classification above, please note the rationale in ProvSurv in order to use case for discussion and training. Update the Class Based On field to Infection Control Professional Opinion.

Acquired outside Alberta

Identified MRSA positive **on the day of admission (calendar day 1) and/or the day after admission (calendar day 2)** to an inpatient location

and

There is epidemiological evidence (e.g., travel outside of Alberta with healthcare exposure, patient was a direct transfer from outside of Alberta, patient known to be previously MRSA positive in their province of residence) suggesting that the patient acquired the MRSA outside of Alberta, which will be determined on a case-by-case basis.

See [Appendix E](#) for case example.

Other considerations for classification

- Site of positive culture as an Initial case - if a patient has multiple body sites positive with the same MRSA strain within 1 day of each other, use the culture result with the most significant manifestation of MRSA (i.e. most clinically relevant specimen) to report as the Initial case. If the patient has an infection and colonization within 1 day of each other, the infection should be captured as the initial case. If specimens are collected more than 1 day apart, use the specimen with the earliest collection date as the Initial case, e.g., if blood and wound culture specimens are positive within 1 day of each other, the blood specimen should be used as the Initial case.

MRSA BSI surveillance

- All BSI records for an antibiotic-resistant organism under surveillance are to be entered into the ProvSurv MRSA and BSI module even for sites that are not performing local BSI surveillance.
- For MRSA-BSI, the case classification for the BSI and for the MRSA are determined independently.
- Classify the MRSA based on the MRSA protocol and the BSI based on the BSI protocol.
- Note: Each new MRSA BSI episode must be entered in ProvSurv but not every positive blood culture result from the same BSI episode. Please refer to the provincial BSI

Approved: June 2010
Revised: April 2023

protocol for more information (AHS, 2023a).

- Any new hospital-acquired BSI where the pathogen is MRSA is included in the hospital-acquired MRSA-BSI rate. This is regardless of the status of the MRSA (either Initial or Follow-up). The event is reported in the reporting quarter of the BSI event date.

MRSA identified in surgical site infections (SSIs)

- If a patient has an MRSA positive culture from a surgical site infection (SSI) and is deemed to be an SSI (according to the National Healthcare Safety Network Surgical Site Infection definitions (Centers for Disease Control and Prevention [CDC], 2023a), that information should be entered independently in the ProvSurv MRSA module and into the ProvSurv SSI module if the surgical procedure is one followed for either provincial or local SSI surveillance.
- If an MRSA is identified from a superficial incisional SSI (infection is occurring within 30 days of the surgery), the Initial MRSA case will be classified according to the criteria for case classifications above.
- If an MRSA Initial case is identified from a deep incisional or organ-space SSI it will be classified according to the following criteria:
 - If the surgery resulted in a deep or organ-space SSI, the MRSA Initial case will be hospital-acquired to the facility where the surgery was done if infection occurs within their National Healthcare Safety Network Surgical Site Infection defined follow-up time. The procedure facility and surgery admission date should be used as the encounter information for that record and the ICP s at that facility should be notified of the MRSA to agree with the interpretation of the National Healthcare Safety Network definition.
 - If the SSI is found by an ICP at a facility other than the procedure facility and it is the first positive for the patient, a Needs Initial record for the MRSA should be sent to the site contact at the procedure facility to confirm hospital-acquired attribution. The procedure facility will then enter the SSI into the SSI module.

Classifying cases in newborns

- If MRSA is identified on or after calendar day three after the baby is born and remains an AHS or Covenant Health inpatient: hospital-acquired regardless of the mother's MRSA status.
- If MRSA is identified prior to calendar day three after the baby is born and the baby has not been discharged from the AHS or Covenant Health facility: hospital-acquired if there is no laboratory, clinical or epidemiological reason to suspect that the mother was colonized prior to admission.
- If baby was admitted for less than three calendar days and has been discharged from an AHS or Covenant Health facility, later readmitted and found positive on admission: community-acquired (i.e.: normal birth in hospital and subsequent discharge is not considered to be a healthcare admission because less than three calendar days).

See [Appendix E](#) for case example.

Data collection and data entry

The following table highlights whether or not a record type is mandatory data entry in ProvSurv. For more information see the written explanations below the table. The highlighted cells indicate what record types are used for reporting purposes.

Mandatory data entry

- The first inpatient laboratory confirmed positive MRSA result (screening or clinical specimen) shall be entered as the Initial record.

Approved: June 2010
Revised: April 2023

AHS/Covenant Health - Provincial Surveillance Protocol (MRSA) Page | 9

- The Initial MRSA case (screening or clinical specimen) shall have a case severity decision using National Healthcare Safety Network Infection definitions (CDC, 2023a).
- If patient's Initial record was from a colonized specimen, enter the clinical isolate that represents the first episode of infection as a Follow-up.
- All inpatient blood cultures growing MRSA from facilities under surveillance must be evaluated and if determined to be a NEW BSI episode it must be entered directly into the ProvSurv BSI module regardless of the MRSA record type (Initial, For Info, Follow-up) (AHS, 2023a).
- Enter all valid MRSA positive or negative specimens identified by the ARO clearing protocol. Please refer to the ProvSurv data entry provincial ARO clearing document for more information on data entry (AHS, 2023b).

MRSA Data entry		
Record Type	Description	Mandatory Entry
For Info	Non-acute care positive MRSA BEFORE the first inpt MRSA specimen	No
	Any isolate (positive or negative) identified by the ARO clearing protocol BEFORE the Initial MRSA record	Yes
Initial	A patient's first MRSA positive as an inpatient (either a screening or clinical specimen)* OR Previously known MRSA positive patient with a different strain of MRSA * * Needs case classification (HA, HCA, CA, Acquired Outside Alberta) and Case severity (infection or colonization)	Yes
Follow-up	Clinical isolate that represents the first episode of infection AFTER an Initial MRSA from colonized specimen	Yes
	Any New BSI with MRSA identified AFTER the Initial MRSA record	Yes
	Any isolate (positive or negative) identified by the ARO clearing protocol AFTER the Initial MRSA record	Yes
	The first new positive for a patient who was previously cleared	Yes

Minimum case information

Basic demographic, facility and microbiological data will be collected on all cases and must include:

- Name (first, middle and last);
- Date of birth;
- Gender;
- Alberta Personal Healthcare Number (PHN) or Unique Lifetime Identifier (ULI);
- Connect Care Medical Record Number (MRN);
- Record type;
- Case classification (i.e. hospital-acquired, healthcare-associated, community-acquired, acquired outside Alberta);
- Admission date to reporting facility;
- Reporting zone and facility name;
- Encounter service and area where patient is admitted;
- Culture date, laboratory name, accession number, and cultured site;
- Case severity (colonization/infection);
- Specimen sampling reason.

Approved: June 2010
Revised: April 2023

Other considerations for data entry

- Information may be obtained from a variety of sources including inpatient/resident charts (current or archived), nurses' logs, laboratory reports, nursing and medical staff, etc. The data will be collected by the ICP manually or electronically as soon as possible after the lab report of the initial MRSA isolate is obtained.
- Each ICP or IPC designate will be responsible for timely entry of the surveillance data into ProvSurv. It is expected that the minimum data set is collected and entered into ProvSurv in a timely manner after factoring in time of collection, to time to reach laboratory, work-up and distribution to ICP s and IPC offices. Typically, the time it takes for a laboratory to work up a culture specimen is approximately three days. As a recommendation, data entry should be completed within 1-2 weeks of receiving the laboratory report by an ICP or an IPC designate.

Denominator data

Denominators (numbers of inpatient admissions and inpatient days) are provided by AHS Analytics. Denominators are presented by month, which are aggregated for the fiscal quarter of the report. Denominators used for reporting can be accessed on Tableau Workbooks.

Rate calculations

Incidence rates for AHS/Covenant Health hospitalized patients	Calculations
Hospital-acquired MRSA	$\frac{\text{Number of hospital-acquired MRSA cases} \times 10,000}{\text{Number of patient-days}}$
Healthcare-associated MRSA	$\frac{\text{Number of healthcare-associated MRSA cases} \times 1,000}{\text{Number of admissions}}$
Community-acquired MRSA	$\frac{\text{Number of community-acquired MRSA cases} \times 1,000}{\text{Number of admissions}}$
Total MRSA	$\frac{\text{Total Number of MRSA cases in AHS/Covenant Health} \times 1,000}{\text{Number of admissions}}$
Hospital-acquired MRSA Bloodstream Infections	$\frac{\text{Total Number of hospital-acquired -BSI cases with Initial and Follow-up MRSA} \times 10,000}{\text{Number of patient-days}}$

Comparator rates

Internal and external surveillance rates are used as comparators. The internal rates are the historical rates for the province or zone from the previous fiscal year. The external rates are provided by the Canadian Nosocomial Infection Surveillance Program (CNISP) which are created from data submitted by large and tertiary acute care facilities and therefore may not provide appropriate comparison for smaller acute care facilities.

Reporting

Communication and dissemination of surveillance reports is an integral part of surveillance, to inform IPC practice within AHS and Covenant Health facilities and provide support for interventions that improve the quality of patient care delivered. Responsibility for compiling, reporting, and disseminating data and reports is shared between provincial IPC Surveillance and Standards and the provincial IPC program.

Approved: June 2010
Revised: April 2023

Formal reports are generated routinely (usually quarterly) using reconciled and validated data and are available on SharePoint. The reports contain information on the facility, zone and provincial level and are presented to the provincial IPC Surveillance, Evaluation, Quality Improvement and Research committee for approval (AHS, 2023c). Operational reports are created by local ICPs or their designate and may or may not consist of reconciled and validated data, as they are often created with real-time, as is, data. Additional MRSA information can be accessed on IPCs Tableau Workbooks.

Data quality

The purpose of evaluating the quality of data is to ensure that MRSA-related events are being monitored efficiently and effectively. The evaluation should involve the assessment of the program (i.e. the protocol, and reporting) and system (i.e. electronic data collection tool) attributes, including relevance, simplicity, flexibility, data quality, acceptability, consistency, representativeness, timeliness and stability. Additionally, with the increasing use of technology, informatics concerns for surveillance systems need to be addressed. These include evaluating hardware and software, using a standard user interface, applying standard data formatting and coding, performing quality checks and adhering to confidentiality and security standards.

A standardized approach is used to reconcile and validate the data provincially. The first component of data reconciliation and validation of data in ProvSurv ensures that demographic data is valid and reliable. The second component entails ensuring that the MRSA-related events are entered in a manner that is consistent with the protocol definitions. At this latter stage, outliers are identified, and requests are sent to the ICPs to verify that the data was correctly entered, and the definitions were consistently applied according to the provincial surveillance protocol. Final designation of cases is a collaborative effort between the facility based ICPs and the epidemiologists/analysts of the IPC Surveillance and Standards team.

Further use of statistical software for validating records is still in development. Algorithms are continuously being updated and added to ensure capture of as many discrepancies as possible. In addition to this current process of data review, there will be data audits using external data sources to determine the validity and reliability of the data in ProvSurv. The data in ProvSurv will also serve to inform decisions made by the IPC Surveillance and Standards team to improve surveillance processes and methodologies.

On-going case-severity decision reviews are conducted to create a supportive environment for the ICPs and IPC physicians at the facilities, and to create mentoring relationships between Data Quality Working Group members and infection control professionals at these facilities to support all aspects of surveillance across the participating facilities.

Data quality working group

The IPC Surveillance Data Quality Working Group reports to the IPC Surveillance, Evaluation, Quality Improvement and Research committee and is responsible to develop, review and update indicator protocols to include the precise methodology for data collection to ensure consistency. Decisions from the Data Quality Working Group on specific protocol questions are communicated to provincial ICPs through the Data Quality Forum and will be included in the protocol User Guide. These decisions will be considered to be supplemental to the protocol and will be incorporated into the protocol when revised.

Protocol revision history

Date	Details
June 2010	Protocol approved by Surveillance Committee.
November 2012	
October 2015	
March 2017	
March 2018	
March 2019	Protocol style updated; reference style changed to APA
Spring 2020	<ul style="list-style-type: none"> • Minor changes made to language • Clarification added to community-acquired definition: Identified MRSA positive on the day of admission (calendar day 1) and/or the day after admission (calendar day 2) to an inpatient location and does not fulfill the criteria for hospital-acquired or healthcare-associated (i.e. no previous admissions or healthcare encounters in the last 12 months) • Added note to algorithm to provide guidance on case classification for patients with legacy records: <ul style="list-style-type: none"> ○ When creating an Initial record for previously known positive patients (legacy records or community results). Use the current positive to assign case classification of HCA or CA. For example, if patient had previous healthcare encounters in the past 12 months, assign as HCA. If patient had no healthcare risk factors meeting protocol definitions - assign as CA. • Updated to new template and reposted to web page.
April 2021	<ul style="list-style-type: none"> • Addition of definition for 'Healthcare encounter' to MRSA protocol-specific definitions; updated references
March 2022	<ul style="list-style-type: none"> • Revised
April 2023	<ul style="list-style-type: none"> • Replaced incident with initial throughout document. • Revised HA definition to clarify healthcare encounters – linked to definition in Appendix A. • Clarified that indwelling catheter or medical device needs to be in place for at least 48 hours prior to the MRSA culture to qualify for the HCA case classification. • Changed reporting process from IPC Surveillance committee to IPC Surveillance, Evaluation, Quality Improvement and Research committee. • Updated LTC definition. • Updated references.

Approved: June 2010 Revised: April 2023
--

References

- Alberta Health Services. (2023a). Bloodstream Infection (BSI) provincial surveillance protocol [PDF document]. Retrieved March 2023, from <https://www.albertahealthservices.ca/assets/healthinfo/ipc/hi-ipc-sr-bsi-surveillance-protocol.pdf>
- Alberta Health Services (2023b). *ProvSurv data entry provincial ARO clearing*.
- Alberta Health Services. (2018). MRSA User Guide. Retrieved March 2023, from <http://provsurv.healthy.bewell.ca/provhelp/mrsaug/mrsa-ug-001.html>
- Alberta Health Services. (2023c). *Infection Prevention and Control Alberta Health Services and Covenant Health, Action Plan Provincial Surveillance Program*.
- Association for Professionals in Infection Control and Epidemiology. (2010). Guide to the elimination of methicillin-resistant *Staphylococcus aureus* (MRSA) transmission in hospital settings, 2nd edition [PDF]. Retrieved March 2022, from <https://apic.org/Professional-Practice/Implementation-guides/>
- Centers for Disease Control and Prevention. (2023a). National Healthcare Safety Network: Surveillance Definitions for Specific Types of Infections. Retrieved March 2023, from http://www.cdc.gov/nhsn/PDFs/pscManual/17pscNosInfDef_current.pdf
- Centers for Disease Control and Prevention. (2023b). National Healthcare Safety Network: Dialysis Event Surveillance Protocol. Retrieved March 2023, from <http://www.cdc.gov/nhsn/PDFs/pscManual/8pscDialysisEventcurrent.pdf>
- Centers for Disease Control and Prevention. (2023c). National Healthcare Safety Network: Urinary Tract Infection (Catheter-Associated Urinary Tract Infection [CAUTI] and Non-Catheter-Associated Urinary Tract Infection [UTI]) Events. Retrieved March 2023, from <http://www.cdc.gov/nhsn/pdfs/pscmmanual/7pscCAUTICurrent.pdf>
- Government of Alberta. (2008). Continuing Care Strategy: Aging in the Right Place. Retrieved March 2022, from <https://open.alberta.ca/publications/9780778574224>
- Government of Alberta. (2022). Alberta Health Facility and Functional Centre Definitions and Facility Listing. Retrieved March 2022, from <https://open.alberta.ca/publications/alberta-health-facility-and-functional-centre-definitions-and-facility-listing>
- Health Canada. (2021). Safe Medical Devices in Canada. Retrieved March 2022, from http://www.hc-sc.gc.ca/dhp-mps/md-im/activit/fs-fi/meddevfs_matmedfd-eng.php
- Public Health Agency of Canada. (2022). Canadian Nosocomial Infection Surveillance Program (CNISP) 2021 Surveillance Protocol for Methicillin-Resistant and Methicillin-Susceptible *Staphylococcus aureus* Bloodstream Infections in CNISP Hospitals. Retrieved March 2022, from https://ipac-canada.org/photos/custom/Members/CNISPpublications/CNISP%202022%20MSSA_MRSA%20BSI%20protocol_EN.pdf
- The Kidney Foundation of Canada. (n.d.). Peritoneal Dialysis. Retrieved March 2022, from <https://kidney.ca/Kidney-Health/Living-With-Kidney-Failure/Dialysis#>

Appendix A: MRSA protocol-specific definitions

Terms	Definitions
Body or culture sites examples	Abscess, Bronchoalveolar lavage (BAL)-Bronchial Wash (BW), Blood, Burn, CSF Fluid, Device Insertion Site, Groin, Nose, Nose-Groin, Nose-Rectal, Pleural Fluid, Rectal-Stool, Skin, Soft Tissue, Sputum, Stoma, Surgical Site, Synovial Fluid, Throat, Ulcer, Urine, Wound.
Calendar days	Used for determining the timeline of presenting with or acquiring an antibiotic-resistant organism, CDI, BSI, or National Healthcare Safety Network infection definition. Calendar day 1 is the day of patient admission (see patient admission definition for more information) or day of surgical procedure.
Colonization	The presence of microorganisms on skin, on mucous membranes, in open wounds, or in excretions or secretions but are not causing adverse clinical signs or symptoms (CDC, 2023a).
Dialysis	Hemodialysis patients require a vascular access, which can be a catheter or a graft or enlarged blood vessel that can be punctured to remove and replace blood. Peritoneal dialysis works on the same principle as hemodialysis, but the blood is cleaned while still inside the patient's body, rather than in a machine. A catheter is surgically inserted in the abdomen, usually below and to one side of the navel. Because of frequent hospitalizations and receipt of antimicrobial drugs, dialysis patients are also at high risk for infection with antimicrobial-resistant bacteria (The Kidney Foundation of Canada, n.d.; CDC, 2023b).
Epidemiological link	A case is thought to be epidemiologically linked to another person(s) or healthcare worker(s) with an MRSA infection or colonization in a facility (e.g., shared same room, same ward/unit, same caregiver, and same procedure/surgery as a known patient/resident with the same MRSA).
Healthcare encounters	Healthcare encounters include: an indwelling catheter or medical device present at the time of culture; patient is a resident of a long-term care facility; the patient had surgery between the previous discharge and the current admission; or the patient is a peritoneal or hemodialysis patient These healthcare encounters qualify an initial case as healthcare-associated instead of hospital-acquired when attributing an initial case back to a previous admission (at the same or different facility as the current re-admission location) within the 14 days between discharge and re-admission for MRSA.
Indwelling catheter	A drainage tube that is inserted into the urinary bladder through the urethra, is left in place, and is connected to a closed collection system. It is also called a Foley catheter. It does not include straight in and out catheters or urinary catheters that are not placed in the urethra (e.g., suprapubic catheter) (CDC, 2023c)
Infection	Presence of micro-organisms from any site with signs and the manifestation of symptoms of a clinical infection. Refer to National Healthcare Safety Network definitions for infection definitions from specific sites (CDC, 2023a). http://www.cdc.gov/nhsn/PDFs/pscManual/17pscNosInfDef_current.pdf .
Medical device	Covers a wide range of products used in the treatment, mitigation, diagnosis or prevention of a disease or abnormal physical condition (Health Canada, 2021). Examples to consider when determining whether an initial MRSA case is classified as healthcare-associated include central venous catheters (CVCs), intravenous lines, peripheral, umbilical catheters, peripherally inserted central catheter, stoma, tracheostomy, feeding tube, suprapubic catheter, endotracheal tube, wound drains etc.
Sampling reason	The reason why the specimen was collected and cultured for MRSA. Please see the ProvSurv User Guide for detailed examples.
Sterile body sites	Sites include blood, cerebrospinal fluid, synovial fluid, pericardial fluid, pleural fluid, peritoneal fluid. Cultures positive with an MRSA from these sites are typically indicative of an infection, not colonization.
Strain typing	MRSA typing in Alberta is done by ProvLab which uses spa typing as the primary molecular typing for MRSA since 2010.

Approved: June 2010
Revised: April 2023

Appendix B: General surveillance definitions

Terms	Definitions
Encounter types	Type of AHS/Covenant Health healthcare location or facility where the patient is located at the time of identification. The following encounter types are referred to in acute care surveillance protocols (Government of Alberta, 2008; Government of Alberta, 2022).
Continuing care	An integrated range of services supporting the health and wellbeing of individuals living in their own home, a supportive living or long-term care setting. Continuing care clients are not defined by age, diagnosis or the length of time they may require service, but by their need for care.
Long-term care	Long-term care facilities include auxiliary hospitals and nursing homes reserved for those with unpredictable and complex health needs who require 24-hour nursing care. Residents of long-term care facilities usually have multiple chronic and/or unstable medical conditions. Specialized services such as respite, palliative care, case management, rehabilitation therapy, as well as services for advanced Alzheimer's and dementia are available at these facilities. A list of certified long-term care facilities in Alberta Health Services can be found on the COMMON-PROVINCIAL Surveillance drive. In this file, if the site has "LTC" listed in the "Accommodation Subtype II" column, it will qualify as a LTC site. If the site has "LTC" AND another type (i.e. subacute in LTC) listed in the column we would assume they are from a site that offers LTC.
Auxiliary hospital	A facility designated for the provision of medical services to in-patients who have long-term or chronic illnesses, diseases or infirmities. Services may include acute palliative programs, geriatric day programs or day/night programs. They may include functional centres such as long-term care, medical or clinical areas.
Emergency	Emergency Departments take care of people that are very sick or injured on a priority basis by providing medical care, which may include assessment, treatment, stabilization to prepare people for transport to a higher level of care facility (if needed) and follow-up care, including referrals to a family doctor or specialist (if needed). This option can be used to capture outpatient encounters when a patient visited the emergency department at a facility and did not subsequently get transferred to an inpatient unit, but rather returned back to his/her home setting.
Inpatient acute care	Refers to a General Hospital: According to the <i>Hospitals Act</i> , a general hospital is defined as a "hospital providing diagnostic services and facilities for medical or surgical treatment in the acute phase for adults and children and obstetrical care" (Government of Alberta, 2022). General hospitals have several functional centres. Each functional centre is associated with in-patient, outpatient, or diagnostic and therapeutic services.
Inpatient mental health/rehab	A designated mental health facility providing diagnosis and treatment for mental illness and addiction in the acute phase for adults and children. Inpatient services refer to a person admitted to and assigned a bed in a facility by order of a physician for provision of diagnostic and/or treatment services. They would have a patient/group room in which inpatient services are provided within the patient's room or within a common group room within the designated mental health facility. AHS facility examples include Glenrose Rehabilitation Hospital, Centennial Centre for Mental Health and Brain Injury.
Infection window period	The 7-days during which all site-specific infection criteria must be met. It includes the day of the first positive diagnostic test (i.e. lab specimen collection, imaging test, procedure or exam, physician diagnosis and initiation of treatment) that is an element of the site-specific infection criterion, was obtained, the three calendar days before and the three calendar days after. For site-specific infection criteria that do not include a diagnostic test, the first documented localized sign or symptom that is an element of National Healthcare Safety Network infection criterion, excluding SSIs, should be used to

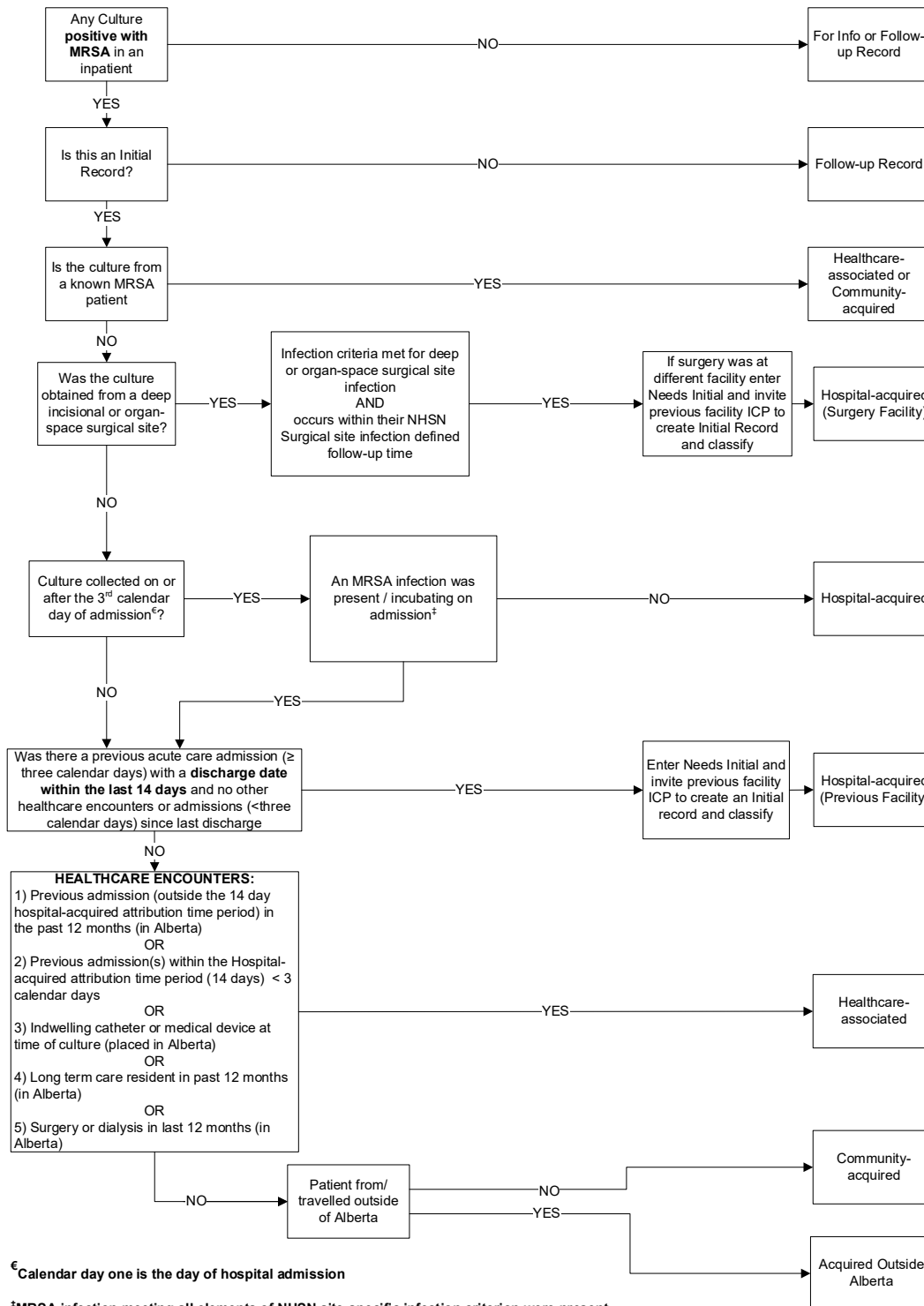
Approved: June 2010
Revised: April 2023

AHS/Covenant Health - Provincial Surveillance Protocol (MRSA) Page | 16

Terms	Definitions
	define the window (i.e., diarrhea, site specific pain, purulent exudate).
Infection prevention and control baseline	A comparator rate created for each acute care facility in the IPC Surveillance on-line dashboards and reporting modules, to guide efforts to reduce healthcare-associated infections. The IPC baseline is based on reported monthly rates for the previous fiscal year. The calculation excludes the monthly rates higher than 1 Standard Deviation above the 12-month average but includes all rates where the site had optimal performance. This calculation method biases the IPC baseline rate towards zero, to focus on the best patient safety outcomes.
Patient admission	A person admitted to and assigned a bed in a hospital by the order of a physician, for the provision of diagnostic or treatment services or both. Includes any time in the emergency department where the patient is subsequently transferred to an inpatient unit. This is the denominator used for non-hospital-acquired rates (see Rate Calculation Section) (Government of Alberta, 2022).
Patient days	As defined by AHS, this is used to create the denominator for hospital-acquired or hospital-identified cases. The total is equal to midnight census with patients admitted and discharged on the same day counted as a one day stay. It includes patients out on a pass. Day of admission is counted but the day of separation (discharge, death or transfer out of hospital) is not counted. Patient-days are included for inpatient encounters where discharge date is not recorded in the data source. Inpatient totals exclude the time patients are waiting in the emergency department for an inpatient bed (time from decision to admit to discharge from emergency department).
Emergency department inpatient days (EDIP)	As defined by AHS, denominators for provincial surveillance modules include these figures in the total patient-days. Includes the number of acute care inpatient patient-days utilized in the emergency department during the reporting period. The figures reflect the time from emergency department discharge (i.e. decision to admit) to emergency department departure for patients admitted to an acute care hospital. It is calculated as $[(\text{emergency department departure date and time} - \text{emergency department discharge date and time}) \div 60 \div 24]$. Figures exclude cases where the emergency department discharge date and time or emergency department departure date and time were not provided, or the value has a negative number.

Approved: June 2010
Revised: April 2023

Appendix C: MRSA classification algorithm



NOTE
When creating an Initial record for previously known positive patients (legacy records or community results) Use the current positive to assign case classification of HCA or CA. For example, if patient had previous healthcare encounters in the past 12 months, assign as HCA. If patient had no healthcare risk factors meeting protocol definitions - assign as CA.

REMINDER
Patients cleared under the "ARO Flag Clearing Protocol" are still considered to be a known MRSA patient and therefore cannot be classified as hospital-acquired.

REMINDER
For consistency across the province the cut off to use for urine colony counts is 10⁷ cfu/L for interpreting NHSN definitions, no matter how your lab is currently reporting colony counts.

€ Calendar day one is the day of hospital admission
*MRSA infection meeting all elements of NHSN site-specific infection criterion were present during the two calendar days before the day of admission, on the day of admission (day one)
NHSN: National Healthcare Safety Network; ICP: Infection Control Professional

Approved: June 2010
Revised: April 2023

Appendix D: “Needs Initial” record explanation

The **Needs Initial** record is used to communicate cases between ICPs at different AHS and Covenant Health acute care facilities, where a case identified at one facility on the day of admission (calendar day 1) and/or the day after (calendar day 2) within the 14-day hospital-acquired attribution time frame for attributing case back needs to be considered as hospital-acquired at another facility. **It is not to be used to communicate cases between ICPs at different units of the same facility.**

This feature can only be used for facilities under surveillance. Outpatient/Community/Continuing Care labs cannot be used to attribute back to a previous admission.

Data entry for Needs Initial

1. The ICP at Hospital B reviews the case, then creates a **Needs Initial** record and completes the following:
 - Encounter fields: **Hospital B encounter information** (site, admission date, etc.).
 - Culture fields: culture date, accession number, lab info, case severity, sampling reason.

The screenshot displays the 'MRSA View' interface in ProvSurv. At the top, there are navigation tabs for 'Guide', 'Events', 'Patients', and 'Sign Out'. Below the header, a search bar shows 'TEST PATIENT EXAMPLE | 2000-01-01 | UUU000000000000'. The main content area is a grid of fields organized into three columns. The first column contains patient and encounter information, the second column contains culture and laboratory details, and the third column contains administrative and tracking information. Blue arrows point to the 'Record Type: NEEDS INITIAL' and 'Encounter Type: INPATIENT-ACUTE CARE' fields. At the bottom of the grid, there are 'Invitation' and 'Edit' buttons.

2. The ICP at Hospital B sends an invitation to the contact ICP at Hospital A.
3. An infection control professional at Hospital A will review the information in the Needs Initial record. If in agreement that this case is attributable to their facility, the ICP will create a **NEW** Initial hospital-acquired record with the information for the admission MRSA is being attributed to.

AHS/Covenant Health - Provincial Surveillance Protocol (MRSA) Page | 19

ProvSurv | MRSA View
Guide Events Patients Sign Out

TEST PATIENT EXAMPLE | 2000-01-01 | UUU0000000000000
Pt Search > Patient > MRSA List > Event

Patient System ID: 1	Culture Date: 2023-04-01	Discharge Date: 2023-04-01
MRSA System ID: 239 832	Laboratory: CONNECT CARE	Infection Condition:
Record Type: INITIAL	Accession Number: 23AP-004A12345	Other Infection Info:
Case Status: ACTIVE	Cultured Site: NOSE-GROIN	MRSA Typing:
Age (at encounter): 23Y 2M 26D	Other Cultured Site:	Typing Pattern:
Case Classification: HOSPITAL ACQUIRED	Culture Result: POSITIVE	Class Based On: PROTOCOL
Encounter Type: INPATIENT-ACUTE CARE	Case Severity: COLONIZATION	MRSA CHEC Number:
Admission Date: 2023-03-27	Sampling Reason: OTHER	
Admission Zone: EDMONTON		Entered At: EDM IPC OFFICE
Admission Site: EDM WMC UNIVERSITY OF ALBERTA HOSPITAL 101094 EDM UAH WMC		Entered For: [REDACTED]
Acquired in Area: EDM UAH WMC SD2 GIM 101094227		Entered On: 2023-04-14 13:19
Room & Bed:		Last Modified For: [REDACTED]
Acquired in Service: GENERAL INTERNAL MEDICINE 106		Last Modified On: 2023-04-14 13:19

Comments:
Invitation

Edit

If the case is deemed not to be hospital-acquired to the previous facility (Hospital A), please contact Surveillance and Standards team member responsible for MRSA to convert the Needs Initial record to an Initial (healthcare-associated / community-acquired) record at the current facility (Hospital B). **The Needs Initial record can't be edited by ICPs.**

Approved: June 2010
Revised: April 2023

Features with Needs Initial

Can look up a patient in ProvSurv to see what the final decision was on the record.

PSID	MSID	Encounter Date	Record Type	Status	Result	Culture Date	Accession #	Cultured Site	Encounter Type	Severity	Encounter Site
1	239832	2023-03-27	INITIAL	ACTIVE	POSITIVE	2023-04-01	23AP-004A12345	NOSE-GROIN	INPATIENT-ACUTE CARE	COLONIZATION	EDM WMC UNIVERSITY OF ALBERTA HOSPITAL 101094 EDM UAH WMC
1	239828	2023-04-01	NEEDS INITIAL	ACTIVE	POSITIVE	2023-04-01	23AP-004A12345	NOSE-GROIN	INPATIENT-ACUTE CARE	COLONIZATION	EDM RAH ACTIVE TREATMENT CENTRE 101074 EDM RAH ATC

The Accession Number and other culture information can be reused if:

- the Encounter Site on the Initial record is different from the Encounter Site on the **Needs Initial** record.

The Needs Initial record will be part of Comperio searches when:

- the ICPs can find the records that they invited other facilities to review;
- there is better information on prevalence cases at your facility.

The Surveillance and Standards team:

- reviews all Needs Initial records as part of routine data quality checks to ensure that every Needs Initial has a corresponding Initial record.

Approved: June 2010
Revised: April 2023

Appendix E: Case examples

For more examples see the Data Entry User Guide in the ProvSurv Help section.

Case #1: Hospital-acquired	
Patient is in the emergency department for 1 calendar day and then gets admitted to the unit on calendar day 2. The first inpatient positive culture of MRSA is identified on calendar day three at Hospital A. There is no evidence of colonization or infection on admission to Hospital A.	
Data Entry	
Record Type	Initial
Classification	Hospital-acquired
Encounter type	Inpatient-acute care or inpatient-MH/rehab
Admission date	Current admission date to hospital A
Admission zone	Zone of hospital A
Admission site	Name of hospital A
Acquired in service	Service of care or service provided on unit where MRSA likely acquired. Required entry for hospital-acquired cases
Acquired in area	Unit where MRSA likely acquired. Required entry for hospital-acquired cases.
Rationale	
<p>The patient was admitted to the facility, therefore is included in the surveillance population. The patient was in Hospital A three calendar days prior to the first inpatient positive result for MRSA. (1 day in emergency department and 2 days on the unit)</p> <p>Once the patient is admitted to the hospital, the time in hospital prior to the first inpatient positive result starts from the earliest date the patient presented to the hospital for that admission. The admission date to emergency department is used only if the patient is subsequently admitted to the unit.</p>	
Case #2: Healthcare-associated	
Patient is admitted at Hospital A for more than three calendar days, is screened for MRSA on discharge from Hospital A and is negative. Patient is then transferred to Hospital B for less than three calendar days and no screening was done. Patient is then transferred back to Hospital A and is found MRSA positive in less than three calendar days of the direct transfer.	
Data Entry	
Record type	Initial
Classification	Healthcare-associated
Encounter type	Inpatient-acute care or inpatient-MH/rehab
Encounter date	Current admission date patient is admitted hospital A
Encounter zone	Zone of hospital A
Encounter site	Name of hospital A
Encounter service	Service of care or service provided on unit where MRSA culture is collected
Encounter area	Unit where MRSA culture is collected

Approved: June 2010
Revised: April 2023

Rationale

Negative culture results should not be factored in when trying to classify MRSA because there is no consensus on what a negative culture result means when testing for MRSA and how many negative culture results are required to decide a person is truly negative. With the current laboratory techniques, it is assumed that a negative culture suggests that the patient has low, undetectable levels of Gram+ antibiotic-resistant organism. Therefore, the classification is based on protocol timeframes and direct transfer rules for determining the case classification of this case. Since the most recent admission at Hospital B was less than three calendar days it would not meet criteria of attributing hospital-acquired back to the previous facility although it is within the 14-day time period for attributing back to a previous facility. However, it would meet criteria for healthcare-associated at Hospital A, since there were multiple admissions within the hospital-acquired attribution time period (14 days) and the last admission was less than 3 calendar days.

Case #3: Community-acquired

Patient is admitted to Hospital A on January 1, is screened and found MRSA positive on January 1. Patient is then transferred to Hospital B and has a wound infection that was swabbed and found positive with MRSA on January 2 (i.e. within 1 day of the screening culture). Patient does not have any healthcare encounters in the last 12 months.

Data Entry

Record type	Initial
Classification	Community-acquired
Encounter type	Inpatient-acute care or inpatient-MH/rehab
Encounter date	Current admission date patient admitted at Hospital B
Encounter zone	Zone of hospital B
Encounter site	Name of hospital B
Encounter service	Service of care or service provided on unit where MRSA culture is collected.
Encounter area	Unit where MRSA culture is collected

Rationale

Given that the wound infection was cultured within 1 day of the screening specimen, select the wound culture to enter in the Initial record to capture the most clinically significant specimen regardless of the facility they were collected at. A clinical isolate should be recorded as the Initial if it is collected within 1 calendar day of a screening specimen. A blood culture should be recorded as the Initial if it is collected within 1 calendar day of another clinical or screening specimen. The case is Community Acquired because the patient was previously positive on admission to Hospital A and there were no healthcare encounters in the past 12 months.

Case #4: Acquired outside Alberta

Patient is admitted to Hospital A on January 1, is screened and found MRSA positive on January 1. Patient was a direct transfer from a hospital in the U.S. where they had a surgical procedure performed.

Data Entry

Record type	Initial
Classification	Acquired outside Alberta
Encounter type	Inpatient-acute care or inpatient-MH/Rehab
Encounter date	Earliest date patient is admitted or registered to hospital A
Encounter zone	Zone of hospital A

Approved: June 2010
Revised: April 2023

AHS/Covenant Health - Provincial Surveillance Protocol (MRSA) Page | 23

Encounter site	Name of hospital A
Encounter service	Service of care or service provided on unit where MRSA culture is collected.
Encounter area	Unit where MRSA culture is collected
Rationale	
Patient was transferred from outside of Alberta and therefore is not included in the healthcare-associated classification. Patients who are known to be positive prior to admission in Alberta or have been transferred from outside Alberta are always classified as acquired outside Alberta.	
Case #5: Classifying cases in newborns	
A baby is born through normal delivery on January 1 in Hospital A and is found MRSA positive on January 2 while still in hospital (i.e., first inpatient positive MRSA culture less than three calendar days of birth). Mother is known MRSA positive prior to giving birth.	
Data Entry	
Record type	Initial
Classification	Community-acquired
Encounter type	Inpatient-Acute Care or Inpatient-MH/Rehab
Encounter date	Date baby is born
Encounter zone	Zone of Hospital A
Encounter site	Name of Hospital A
Encounter service	Service of care or service provided on unit where MRSA culture is collected
Encounter area	Unit where MRSA culture is collected
Rationale	
According to the protocol, if MRSA is identified prior to calendar day 3 after the baby is born and has not been discharged from the AHS or Covenant Health facility, classify as hospital-acquired if there is no laboratory, clinical or epidemiological reason to suspect that the mother was colonized prior to the admission, however, since the mother was known to be MRSA positive prior to giving birth the classification for this case would be community-acquired.	

Approved: June 2010
Revised: April 2023