



Canadian Nosocomial Infection Surveillance Program  
2023 Surveillance Protocol for Methicillin-Resistant and Methicillin-Susceptible  
*Staphylococcus aureus* Bloodstream Infections in CNISP Hospitals

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## BACKGROUND

Prior to 1995, national data describing the incidence and epidemiology of methicillin-resistant *Staphylococcus aureus* (MRSA) in Canada were not available. In 1995, national surveillance for MRSA was started in sentinel hospitals participating in the Canadian Nosocomial Infection Surveillance Program (CNISP) and has been ongoing. In 2018, surveillance for methicillin-susceptible *Staphylococcus aureus* (MSSA) bloodstream infections was added.

The Canadian Nosocomial Infection Surveillance Program (CNISP) is a collaborative effort between the Public Health Agency of Canada's Centre for Communicable Diseases and Infection Control (CCDIC) and the National Microbiology Laboratory (NML), the Association of Medical Microbiology and Infectious Disease (AMMI) Canada and sentinel hospitals across Canada.

Established in 1994, the objectives of CNISP are to provide rates and trends on healthcare-associated (nosocomial) infections at Canadian health care facilities thus enabling comparison of rates (benchmarks), and providing evidence-based data that can be used in the development of national guidelines on clinical issues related to healthcare-associated infections. As of January 2023, 90 sentinel hospitals including 13 stand-alone pediatric sites from 10 provinces and one territory participate in the CNISP network.

Data collected for the surveillance year 2023 will reflect all "newly-identified" methicillin-susceptible *Staphylococcus aureus* (MSSA) bloodstream infections acquired in the participating hospital and all MRSA bloodstream infections (BSIs) identified in participating CNISP hospitals.

## OBJECTIVES

1. Describe MSSA and MRSA BSIs in Canadian acute-care hospitals, participating in CNISP;
2. Determine annual MSSA and/or MRSA bacteremia rates (as an indicator of the burden of disease) in Canadian hospitals, participating in CNISP;
3. Determine the proportion of hospital-acquired (nosocomial) *S. aureus* BSI that are MRSA
4. Characterize all bloodstream MRSA isolates, from CNISP hospitals, by antimicrobial susceptibility testing and molecular typing.

## METHODS

### Eligibility

Any participating CNISP hospital.

### Patient population

Ongoing, prospective surveillance of MSSA and MRSA in admitted patients of all ages.

### Surveillance period

The MSSA and MRSA surveillance period begins January 1<sup>st</sup>, 2023 and continues to December 31<sup>st</sup>, 2023.

## Numerators

TABLE 1: CASE DEFINITION FOR MSSA AND FOR MRSA USED FOR CASE CLASSIFICATION BY CNISP.

MSSA	MRSA
<p>Isolation of <i>Staphylococcus aureus</i> from blood</p> <p><b>AND</b></p> <p>Patient must be admitted to the hospital</p> <p><b>AND</b></p> <p>Is a "newly identified <i>S. aureus</i> infection" at a CNISP hospital at the time of hospital admission or identified during hospitalization.</p>	<p>Isolation of <i>Staphylococcus aureus</i> from blood</p> <p><b>AND</b></p> <p>Resistance of isolate to oxacillin and/or laboratory confirmation of <i>mec</i> (phenotypic or genotypic)</p> <p><b>AND</b></p> <p>Patient must be admitted to the hospital</p> <p><b>AND</b></p> <p>Is a "newly identified MRSA infection" at a CNISP hospital at the time of hospital admission or identified during hospitalization.</p>

### Infection inclusion criteria

- MSSA or MRSA BSIs identified for the first time during this current hospital admission.
- MSSA or MRSA BSIs that have already been identified at your site or another CNISP site but are **new** infections.

#### Criteria to determine NEW MSSA or MRSA BSI

Once the patient has been identified with a MSSA or MRSA BSI, they will be classified as a new MSSA or MRSA if they meet the following criteria: > 14 days since previously treated MSSA or MRSA BSI and in the judgement of Infection Control physicians and practitioners represents a new infection

### Infection exclusion criteria

- Emergency, clinic, or other outpatient cases who are **NOT admitted** to the hospital.

## Case Classification

Once the patient has been identified with a MSSA or MRSA BSI, they will be classified as one of the following, based on the case criteria and the best clinical judgement of the healthcare and/or infection prevention and control practitioner (IPC):

- **1. Healthcare-associated your acute-care facility (HA-YAF)**, which includes **Newborn cases of HA-YAF**
- **2. Healthcare-associated any other healthcare exposure (HA-Other) - MRSA BSI only**
- **3. Community-associated (CA) - MRSA BSI only**

### 1a. HA-YAF case definition for a MSSA or MRSA BSI:

- Patient is on or beyond calendar day 3<sup>1</sup> of their hospitalization

OR

- Patient has been hospitalized in your facility in the last 7 days or up to 90 days<sup>2</sup> depending on the source of infection

OR

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

### 1b. HA-YAF Newborn case definition for a MSSA or MRSA BSI

- The newborn is on or beyond calendar day 3<sup>3</sup> of their hospitalization
- The mother was **NOT** known to have MRSA on admission and there is no epidemiological reason to suspect that the mother was colonized prior to admission, even if the newborn is < 48 hours of age.
- In the case of a newborn transferred from another institution, MSSA or MRSA BSI may be classified as HA-YAF if the organism was **NOT** known to be present and there is no epidemiological reason to suspect that acquisition occurred prior to transfer



**NOTE:** The following definitions apply to **MRSA BSI** only. As of January 1, 2020, we are **NOT** collecting data on MSSA BSI acquired through any other healthcare exposure or community acquired BSI

### 2. HA-Other case definition for MRSA BSI:

- Any patient who has a bacteremia not acquired at your facility that is thought to be associated with any other healthcare exposure (e.g. another acute-care facility, long-term care, rehabilitation facility, clinic, ER visit or exposure to a medical device).

### 3. Community-associated (CA) case definition for MRSA BSI:

- No exposure to healthcare that would have resulted in this bacteremia (using best clinical judgment<sup>4</sup>) and does not meet the criteria for a healthcare-associated BSI.

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<sup>1</sup> Calendar day 1 is the day of hospital admission

<sup>2</sup> 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-YAF

<sup>3</sup> Calendar day 1 is the day of hospital admission

<sup>4</sup> 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.

## Denominators

To obtain the necessary denominator information for the calculation of national MSSA and/or MRSA bacteremia rates (number of patient admissions and patient days), each participating healthcare facility will complete a **denominator data collection form** on a **quarterly basis online** through CNPHI at [www.cnphi-rcrsp.ca](http://www.cnphi-rcrsp.ca) no later than the **end of the following quarter**. See the SUBMISSION TIMELINE for a quarterly submission dates.

If your **final year denominator** (patient admission and/or patient days) total changes from those submitted through the **quarterly submissions**, this final calendar year total denominator will be required to be submitted by March 31 of the following calendar year (e.g. for 2020, annual total denominator data would be due March 31, 2021).

If your hospital provides care to both adult and pediatric populations and is able to provide separate denominators for adult and pediatric patients, please **submit the adult and pediatric denominators separately** on a quarterly basis.

*\*Note: Pediatric cases are defined as less than 18 years (< 18 years) of age.*

## Data Submission

**Note: As of January 1, 2020, only MSSA BSI acquired in the participating hospital (HA-YAF) and all MRSA BSIs should be reported**

### Electronic data entry

All MSSA or MRSA BSI patient data (questionnaires and denominator forms) should be submitted to the Agency online through the Canadian Network for Public Health Intelligence (CNPHI) at [www.cnphi-rcrsp.ca](http://www.cnphi-rcrsp.ca). When entering data into CNPHI, please ensure that the case is entered into the correct surveillance year based on the **date of positive culture**

**Online uploader tool:** Data can also be entered using the uploader tool available on CNPHI [www.cnphi-rcrsp.ca](http://www.cnphi-rcrsp.ca) under the 'Upload Data' tab (see image below).

### Blood Culture Isolates

Surveillance for MSSA or MRSA BSI is **laboratory-based**. Laboratory identification of MSSA or MRSA BSI is required for inclusion into the surveillance. Each MRSA BSI identified throughout the surveillance year is to be submitted to the NML (all year round). All data must be collected using the questionnaire for a blood isolate (APPENDIX 3 - Patient Questionnaire for MSSA (*S. aureus*) or MRSA Blood Isolate). Please complete the questionnaire for each MSSA or MRSA BSI case. Blood Isolates must be recovered through positive blood culture.

*Note: the unique patient ID for the isolate must match the unique patient ID on the corresponding submitted MRSA questionnaire.*

### New Infections

As a patient may have **more than one MSSA or MRSA BSI** during the same calendar year, **NEW** infections are to be identified by entering as a new case and 'linking' to the patient's original *S. aureus* or MRSA BSI by entering the original case ID at the end of the questionnaire.

In the case of a new infection in the same patient please indicate the patient's previous unique ID on the shipping form. As of January 1, 2019, MSSA BSIs are **NOT** sent to the NML.

Note: one blood isolate is required for every eligible MRSA BSI case.

### Surveillance Algorithm

The APPENDIX 1 - MSSA (S. AUREUS) AND MRSA SURVEILLANCE Algorithm for 2021 has been provided to assist in surveillance activities.

### Shipping Form

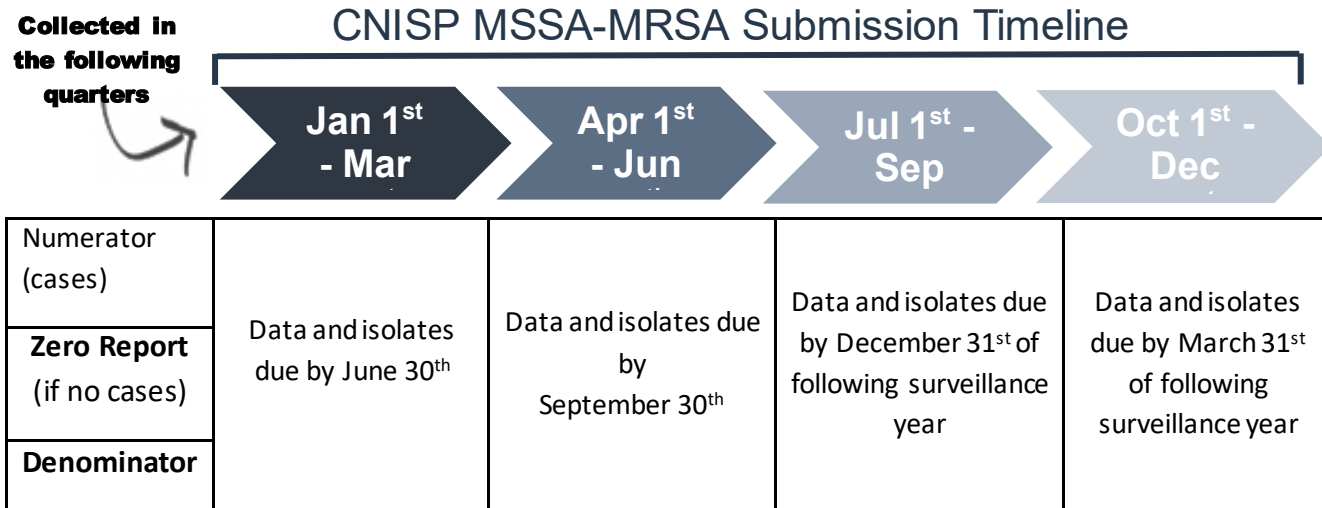
Each shipment of eligible MRSA blood isolates must be accompanied by a standardized shipping form. Please complete the MRSA standardized laboratory shipping form in APPENDIX 2 - MRSA STANDARDIZED Laboratory Shipping Form. The form must be sent to [phac.nml.ARN1-RAIN.lnm.aspc@canada.ca](mailto:phac.nml.ARN1-RAIN.lnm.aspc@canada.ca) AND included in the shipment to the NML. At the NML, *spa* typing, antimicrobial susceptibility testing and the detection of *mec* and PVL by PCR will be conducted on all submitted isolates.

Send isolates to the following address:

**Dr. George Golding**  
**National Microbiology Laboratory**  
**Public Health Agency of Canada**  
**1015 Arlington St.**  
**Winnipeg, Manitoba**  
**R3E 3R2**  
**Tel: 204 784 8096**  
**Use FedEx billing number: 6327-8173-3**

## Submission Timeline

Submit MSSA-MRSA data and MRSA isolates according to the following timeline:



### Zero Report

For any quarter with no cases at your site, a Zero Report must be made in the CNPHI MSSA-MRSA module so that quarters with zero counts can be differentiated from missing data. If no cases are submitted and you are missing zero reports for a surveillance year, your hospital data will not be included in the visual analytics.

## New Zero Report

**One Zero report is required for each quarter**

Required fields are marked with an asterisk (\*)

Site Number\*

Year\*

Quarter\*

 Q1  Q2  Q3  Q4

## ANALYSIS

Individual site-specific, regional and national rates (per 1,000 admissions and per 10,000 inpatient-days) will be calculated each year by Agency staff. Specifically, incidence rates of MSSA or MRSA bloodstream infections will be calculated. While individual site-specific rates will be kept confidential and may only be disclosed to the site's authorized contacts, regional and national rates will be reported via CNISP reports, presentations, publications, and published on the PHAC website.

## ETHICS

This surveillance project is observational and does not involve any alteration in patient care. Surveillance for healthcare associated infections is a routine component of quality assurance and patient care in Canadian healthcare institutions and therefore informed consent will not be required. All data submitted to the Public Health Agency of Canada are kept strictly confidential. Each questionnaire will be identified by a unique number and no personal identifiers will be transmitted to the Public Health Agency of Canada. This unique number will be linked to the patient's name or hospital number only at the local CHEC site and will be kept strictly confidential under secure conditions.



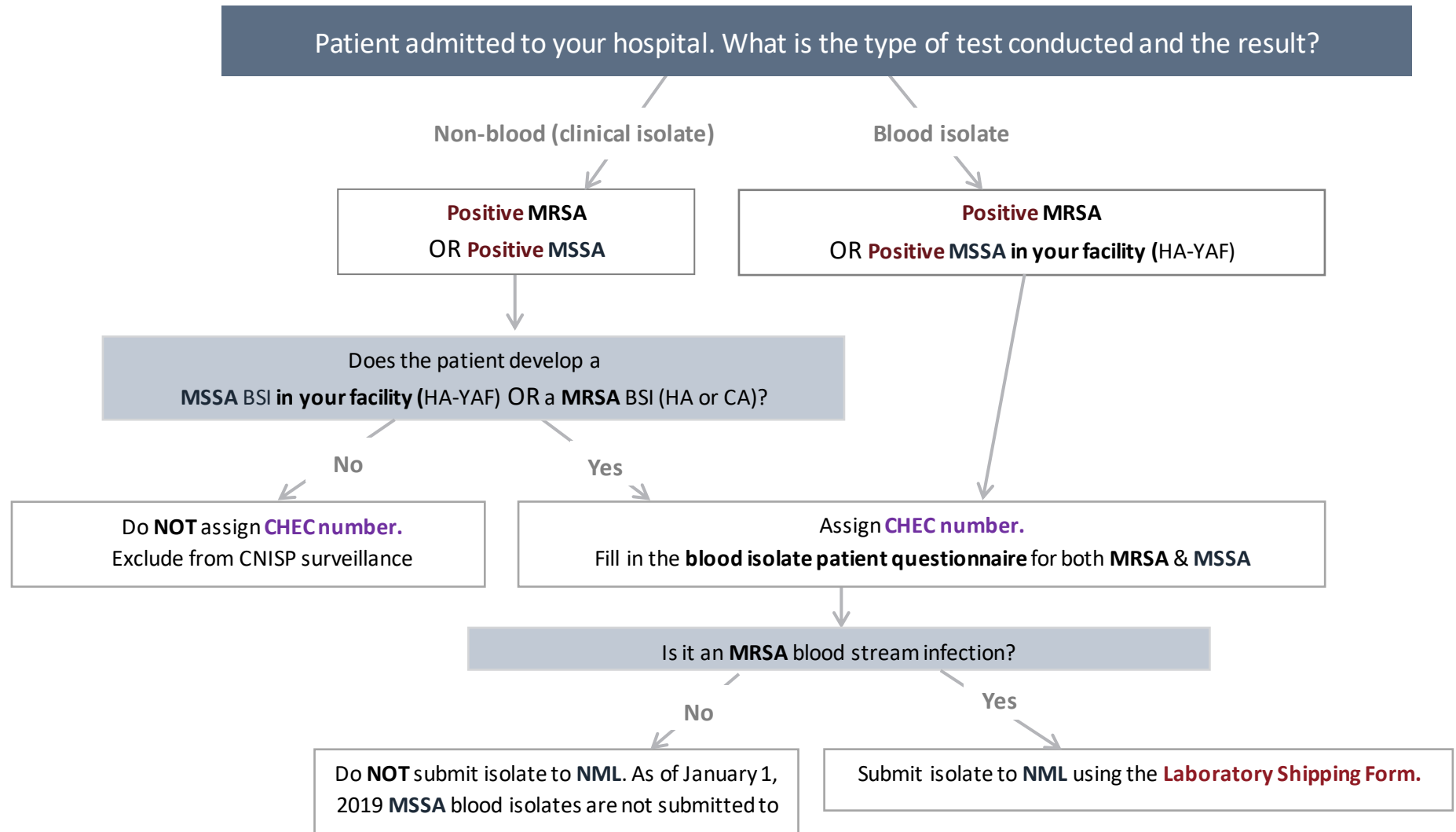
## PRIVACY

There is current demand for public disclosure of hospital-associated infections. Any data released by CNISP will be in summary format and will not identify individual hospitals. Hospital administrators should be made aware that national reporting of aggregate data will occur.

# Appendix 1

## Appendix 1 - MSSA (*S. aureus*) and MRSA Surveillance Algorithm for 2022

\*Note: MSSA refers to Methicillin susceptible *Staphylococcus . aureus*)



\* Note: If an MRSA BSI is identified any time during the surveillance year (January 1<sup>st</sup> to December 31<sup>st</sup>), notify your hospital laboratory to save and send the isolate to NML. Ensure each shipment of eligible MRSA blood isolates are accompanied by the MRSA standardized shipping form. In addition, please email the shipping form to the NML.

## Appendix 2 - MRSA Standardized Laboratory Shipping Form

Include the following form with the shipment **AND** email to the NML address provided.

**Send MRSA blood isolates to:**  
**Dr. George Golding**  
**National Microbiology Laboratory**  
1015 Arlington St., Winnipeg, Manitoba R3E 3R2  
Tel: 204 784 8096

**Use FedEx billing number: 6327-8173-3**

**In addition, email the shipping form to**  
[phac.nml.ARNI-RAIN.lnm.aspc@canada.ca](mailto:phac.nml.ARNI-RAIN.lnm.aspc@canada.ca)

***Please click on the icon below to access the excel shipping form:***



CNISP Laboratory  
Shipping Form MRS

## Appendix 3 - Patient Questionnaire for MSSA (*S. aureus*) or MRSA Blood Isolate

Please complete for all new MSSA and/or MRSA bloodstream infections. Please see Data dictionary in [APPENDIX 4](#) - Data Dictionary for definitions and notes.

### Laboratory requirements:

#### **As of January 1, 2019, ONLY send MRSA BSI to NML**

- Please notify the hospital laboratory to retain one blood specimen per MRSA BSI questionnaire (each new infection)
- Label the isolate as MRSA and if this is a new infection in a patient previously identified with a MRSA BSI in the same calendar year, please enter the previous (original) unique patient ID at the end of the questionnaire
- Forward MRSA BSI isolates (all year) to the NML using the standardized laboratory shipping form provided in [APPENDIX 2 - MRSA STANDARDIZED Laboratory Shipping Form](#).

1.	Is this bloodstream infection laboratory confirmed as: <input type="checkbox"/> <b>MSSA (<i>S. aureus</i>)</b> <input type="checkbox"/> <b>MRSA</b>
2.	CHEC Site: _____
3.	Unique Patient ID: _____ <b>YY</b> _____ (e.g. 99Z23001) <small>(CHEC site #) (year) (case number)</small>
4.	Age in years, months or days: <b>Age</b> _____ <input type="checkbox"/> <b>Years</b> <input type="checkbox"/> <b>Months</b> <input type="checkbox"/> <b>Days</b>
5.	Postal code (first 3 digits): _____
6.	Sex: <input type="checkbox"/> <b>Male</b> <input type="checkbox"/> <b>Female</b>
7.	Date of admission: ____/____/_____ <small>DD MMM YYYY</small>
8.	Date first positive blood culture was obtained: ____/____/_____ <small>DD MMM YYYY</small>
9.	What was the probable source/site of the bacteremia? <i>Check one response only:</i> <input type="checkbox"/> IV catheter-associated <input type="checkbox"/> Primary bacteremia, (source unknown/can't determine) <input type="checkbox"/> Skin/soft tissue/burn wound → <b>if yes, is it a case of Necrotizing Fasciitis?</b> <input type="checkbox"/> <b>Yes</b> <input type="checkbox"/> <b>No</b> <input type="checkbox"/> Surgical site/wound infection

	<input type="checkbox"/> Lower respiratory <sup>5</sup> <input type="checkbox"/> Endocarditis <input type="checkbox"/> Osteomyelitis, septic arthritis, septic bursitis <input type="checkbox"/> Pneumonia → <b>if yes, is it a case of Necrotizing Pneumonia?</b> <input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Meningitis <input type="checkbox"/> Urinary tract infection/urosepsis <input type="checkbox"/> Other (specify): _____	
10.	Where was this bacteremia (infection) acquired? <i>Check one response only</i> <input type="checkbox"/> Healthcare-associated – acquired in your acute facility (HA-YAF) <sup>6</sup> <input type="checkbox"/> Healthcare-associated – acquired from any other healthcare exposure (HA-Other) <sup>7</sup> <input type="checkbox"/> Community-associated (CA) <sup>8</sup> <input type="checkbox"/> Unknown	
11.	a. Was the patient previously known to have MRSA? <sup>9</sup>	b. If <b>YES</b> , where was the MRSA acquired? <sup>10</sup> :

<sup>5</sup> Lower respiratory includes sputum, bronchial washes, ETT aspirates, pleural fluid or lung tissue or abscess and associated with pneumonia, lung abscess or empyema.

<sup>6</sup> Patient is on or beyond calendar day 3 of their hospitalization (Calendar day 1 is the day of hospital admission) OR has been hospitalized in your facility in the last 7 days or up to 90 days depending on the source of infection (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-YAF) OR has had a healthcare exposure at your facility that would have resulted in this bacteremia (using best clinical judgement)

<sup>7</sup> Any patient who has a bacteremia not acquired at your facility that is thought to be associated with any other healthcare exposure (e.g. another acute-care facility, long-term care, rehabilitation facility, clinic, ER visit or exposure to a medical device).

<sup>8</sup> No exposure to healthcare that would have resulted in this bacteremia (using best clinical judgement) and does not meet the criteria for a healthcare-associated BSI. 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

<sup>9</sup> MRSA identified through screening on admission does not apply – the MRSA must have been identified through a clinical (wound, surgical site, respiratory, bone, blood etc.) specimen. Colonizations identified through clinical specimens are acceptable

<sup>10</sup> Please use the first known instance of MRSA (infection or colonization) in this patient to determine where acquired. This will depend on how far your hospital is able to look back. E.g if MRSA colonization from a clinical specimen was first identified in 2015, then a respiratory MRSA infection in 2016 – use the MRSA colonization identified in 2015 to determine where-acquired

	<input type="checkbox"/> <b>No</b> <input type="checkbox"/> <b>Yes → *if yes, go to 11b.</b>	<input type="checkbox"/> Healthcare-associated – acquired in your acute facility (HA-YAF) <sup>11</sup> <input type="checkbox"/> Healthcare-associated – acquired from any other healthcare exposure (HA-Other) <sup>12</sup> <input type="checkbox"/> Community-associated (CA) <sup>13</sup> <input type="checkbox"/> Unknown
12.	What was patient receiving hemodialysis at the time the positive blood culture was obtained? <input type="checkbox"/> <b>Yes</b> <input type="checkbox"/> <b>No</b>	
13.	Is the patient known to use or inject him/herself with IV drugs <sup>14</sup> ? <input type="checkbox"/> <b>Yes</b> <input type="checkbox"/> <b>No</b>	
14.	<b>After the blood culture was obtained, but BEFORE the results were available, please indicate which antibiotics the patient received. Check ALL that apply:</b>  <input type="checkbox"/> Vancomycin <input type="checkbox"/> Linezolid <input type="checkbox"/> Daptomycin <input type="checkbox"/> Clindamycin <input type="checkbox"/> Trimethoprim-sulfamethoxazole	

<sup>11</sup> Patient is on or beyond calendar day 3 of their hospitalization (Calendar day 1 is the day of hospital admission) OR has been hospitalized in your facility in the last 7 days or up to 90 days depending on the source of infection (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-YAF) OR has had a healthcare exposure at your facility that would have resulted in this bacteremia (using best clinical judgement)

<sup>12</sup> Any patient who has a bacteremia not acquired at your facility that is thought to be associated with any other healthcare exposure (e.g. another acute-care facility, long-term care, rehabilitation facility, clinic, ER visit or exposure to a medical device).

<sup>13</sup> No exposure to healthcare that would have resulted in this bacteremia (using best clinical judgement) and does not meet the criteria for a healthcare-associated BSI. 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

<sup>14</sup> This refers to current drug use within the last 6 months

	<input type="checkbox"/> Cloxacillin <input type="checkbox"/> Cefazolin <input type="checkbox"/> Ceftriaxone <input type="checkbox"/> Other: _____ <input type="checkbox"/> No Antibiotics	
15.	<p>In the <b>24 hours</b> following the <b>day the MSSA or MRSA was identified/reported</b>, please indicate which antibiotic(s) the patient had received. <i>Check ALL that apply:</i></p> <input type="checkbox"/> Vancomycin <input type="checkbox"/> Linezolid <input type="checkbox"/> Daptomycin <input type="checkbox"/> Clindamycin <input type="checkbox"/> Trimethoprim-sulfamethoxazole <input type="checkbox"/> Cloxacillin <input type="checkbox"/> Cefazolin <input type="checkbox"/> Ceftriaxone <input type="checkbox"/> Other: _____ <input type="checkbox"/> No Antibiotics	
16.	<p>a. Was the patient in ICU<sup>11</sup> when the positive blood cultures were obtained?</p> <input type="checkbox"/> <b>No</b> → *if no, go to Q16b <input type="checkbox"/> <b>Yes</b> → *if yes, go to Q17	<p>b. Was the patient admitted or transferred to an ICU within 30 days after the first positive blood culture</p> <input type="checkbox"/> <b>Yes, indicate date of admission to the ICU:</b> _____ / _____ / _____ DD            MMM        YYYY <input type="checkbox"/> <b>No</b> <input type="checkbox"/> <b>Unknown</b>
17.	<p>Within the 30 days<sup>15</sup> following the first positive blood culture, did the patient have:</p> <p>(a) <b>Persistent bacteremia</b> (<i>Blood cultures continue to be MSSA or MRSA positive for 7 or more days following the start of appropriate antibiotic therapy<sup>16</sup>, without any interim negative blood cultures.</i>)</p> <input type="checkbox"/> <b>Yes</b>	

<sup>15</sup> Do NOT include if >30 days.

<sup>16</sup> Appropriate antibiotics for the treatment of MRSA bacteremia include: vancomycin, daptomycin, or linezolid

- No
- Unknown

**OR**

(b) **Recurrent bacteremia** (*Recurrence of bacteremia = MSSA or MRSA positive blood culture(s) 14 days or more after documented negative blood cultures*)

- Yes
- No
- Unknown

18.

a. What was the outcome at 30 days from the date of first positive blood culture?

- Patient still in hospital (awaiting LTC<sup>17</sup>)
- Patient still in hospital (acute care)
- Patient discharged alive, **NO** readmission: → **Indicate date of discharge:**

\_\_\_\_ / \_\_\_\_ / \_\_\_\_  
DD      MMM      YYYY

- Patient discharged alive **and** readmitted → **\*Go to question 18b**
- Patient died → **Indicate date of death:** \_\_\_\_ / \_\_\_\_ / \_\_\_\_  
DD      MMM      YYYY

- If patient died, please indicate the relationship of MRSA/MSSA BSI to the death:

- MRSA/MSSA BSI was the cause of death
- MRSA/MSSA BSI contributed to death
- Death is unrelated to MRSA/MSSA BSI
- Causality between MRSA/MSSA BSI and death cannot be determined

Unknown

b. If the patient **was discharged and readmitted within 30 days following the first positive blood culture**, was it because of a recurrent MSSA or MRSA BSI?

- No → **\*Go to question 19**
- Yes → **Indicate date of discharge for previous admission, then \*Go to question 18c:**

\_\_\_\_ / \_\_\_\_ / \_\_\_\_  
DD      MMM      YYYY

c. If recurrent MSSA or MRSA **BSI** was the cause of readmission (*Q18b = yes*), indicate the site of positive culture for the recurrent infection:

- IV catheter-associated

<sup>17</sup> LTC = Long term care.



	<input type="checkbox"/> Primary bacteremia, (source unknown/can't determine) <input type="checkbox"/> Surgical site / wound infection <input type="checkbox"/> Skin/soft tissue / burn wound → <b>*if yes, is it a case of Necrotizing fasciitis?</b> <input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Lower Respiratory <sup>18</sup> <input type="checkbox"/> IV catheter exit site <input type="checkbox"/> Urine <input type="checkbox"/> Other, <i>specify</i> _____
19.	<p>Is this a <b>NEW</b> infection in a patient previously identified with a MSSA or MRSA BSI in this surveillance year?</p> <input type="checkbox"/> <b>No</b> <input type="checkbox"/> <b>Yes</b> → <b>please enter the original/previous unique patient ID:</b>  _____ <b>YY</b> _____ (e.g. 99Z23001) ( <i>CHEC site #</i> )    ( <i>year</i> )    ( <i>case number</i> )

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<sup>18</sup> Lower respiratory includes sputum, bronchial washes, ETT aspirates, pleural fluid or lung tissue or abscess and associated with pneumonia, lung abscess or empyema.

## Appendix 4 - Data Dictionary

### Definitions and notes for Patient Questionnaire ([REFER TO APPENDIX 3 - Patient Questionnaire for MSSA \(\*S. aureus\*\) or MRSA Blood Isolate](#))

**1. Is this bloodstream infection laboratory confirmed as MSSA (*S. aureus*) or MRSA?**

Please check only one response: MSSA or MRSA

**2. CHEC Site #**

This will be the **3-character** alphanumeric number assigned to your institution. It will always begin with the two-digit number assigned to your CHEC member e.g., 99, and a letter assigned by the CHEC member for that specific institution e.g., A, B, C, etc. The CHEC site # for each institution should always be the same for all the CHEC/CNISP surveillance projects and will always have all three alphanumeric digits reported as the CHEC site #, e.g., 99Z.

**3. Unique identifier code**

This 8-character code should consist of the 3 character CHEC site # (e.g., 99Z, the surveillance year the infection occurred in (e.g., 21), and a consecutive number starting at 001 and continuing on with each additional case. An example of the first case in an institution would be 99Z21001. An example of the thirty-fifth case would be 99Z21035, and so on.

**Note:** *Always label the laboratory isolate with this unique ID number.*

**4. Age in years, months or days**

Age (in years, months or days) at the time of positive culture.

**5. Postal code**

Please enter the first 3 digits of the patient's residential postal code.

**6. Sex**

Check male or female

**7. Date of admission**

Please indicate the date when the patient was admitted to the hospital. Please enter Day (08), Month (May)

and Year (1973) in this order.

**8. Date first positive blood culture was obtained:**

For the current admission, please indicate when the first blood isolate that tested positive was sampled. Please enter Day (08), Month (May) and Year (2021) in this order

**9. What was the probable source/site of the bacteremia?**

What infection most likely gave rise to the MSSA or MRSA bacteremia? Choose from the list provided or specify if not included in the list. Please select only **ONE** response.

**10. Where was this bacteremia (infection) acquired?**

Please indicate whether the BSI was acquired in a healthcare setting or in the community according to the following definitions. If the site of acquisition cannot be determined, the site of acquisition may be reported as "Unknown". Check only ONE response

**For MRSA & MSSA BSI:**

**Healthcare-associated acquired in your acute-care facility (HA-YAF)**

- Patient is on or beyond calendar day 3<sup>19</sup> of their hospitalization
- OR**
- Has been hospitalized in your facility in the last 7 days or up to 90 days<sup>20</sup> 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)

**Newborn HA-YAF case definition for a MSSA or MRSA BSI**

- I. The newborn is on or beyond calendar day 3<sup>21</sup> of their hospitalization
- II. The mother was **NOT** known to have MRSA on admission and there is no epidemiological reason to suspect that the mother was colonized prior to admission, even if the newborn is < 48 hours of age.
- III. In the case of a newborn transferred from another institution, MSSA or MRSA BSI may be classified as

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<sup>19</sup> Calendar day 1 is the day of hospital admission

<sup>20</sup> 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-YAF

<sup>21</sup> Calendar day 1 is the day of hospital admission.

HA-YAF if the organism was NOT known to be present and there is no epidemiological reason to suspect that acquisition occurred prior to transfer

**For MRSA BSI only:**

**Healthcare-associated any other healthcare exposure (HA-OTHER)**

Any patient who has a bacteremia not acquired at your facility that is thought to be associated with any other healthcare exposure (e.g. another acute-care facility, long-term care, rehabilitation facility, clinic, ER visit or exposure to a medical device).

**Community-associated (CA)**

No exposure to healthcare that would have resulted in this bacteremia (using best clinical judgement<sup>22</sup>) and does not meet the criteria for healthcare-associated BSI

**11. Previous MRSA**

**a. Was the patient previously known to have MRSA?**

Please indicate yes or no if this patient was previously known to have MRSA. However, MRSA identified through screening on admission does **NOT** apply. The MRSA must have been identified through a clinical (wound, surgical site, respiratory, bone, blood etc.) specimen. Colonizations identified through clinical specimens are acceptable. If the patient was previously known to have MRSA please answer Q11b.

**b. If yes, where was the MRSA acquired?**

*Healthcare-associated (acquired in your facility)*

*Healthcare-associated (acquired from any other healthcare facility or exposure)*

*Community-associated*

*Unknown*

Please select one response from the list and refer to the definitions outlined in question 9. Please use the first known instance of MRSA (infection or colonization) in this patient to determine where acquired. This will depend on how far your hospital is able to look back. For example if a MRSA colonization from a

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<sup>22</sup> 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.

clinical specimen was first identified in 2015, then a respiratory MRSA infection in 2016 – use the MRSA colonization identified in 2015 to determine where-acquired.

**12. 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.

**13. Is the patient known to use or inject him/herself with IV drugs?**

Is the patient a KNOWN current drug user? Has used within the past six months

**14. After the blood culture was obtained, but BEFORE the results were available, please indicate which antibiotics the patient received**

During the time between blood sampling and results of the laboratory test, if the patient was administered antibiotics please select the antibiotic(s) from the list. If the patient was not administered antibiotics during this time, please select the ‘No Antibiotics’ response.

**15. In the 24 hours following the day the MRSA was identified/reported, please indicate which antibiotics the patient had received**

Twenty-four (24) hours following the diagnosis of MSSA or MRSA bacteraemia, if the patient was administered antibiotics please select the antibiotic(s) from the list. If the patient was not administered antibiotics during this time, please select the ‘No Antibiotics’ response.

**16. Intensive Care United (ICU)\***

- a. Please indicate if the patient was already in an ICU\* when the positive blood cultures for MRSA were obtained by checking either “Yes”, or “No”.
- b. If answered “No” to Q16a, please indicate if the patient was admitted to the ICU\* from a non-ICU ward within 30 days of the date of positive culture.

*\* Intensive care unit (ICU) includes: medical, surgical combined medical-surgical, cardiovascular, coronary, neurosurgery, burn or step-down unit.*

**17. Within the 30-days following the first MRSA positive blood culture, did the patient have:**

Please indicate “Yes”, “No” or “Unknown” for the following:

- a. **Persistent bacteremia.** Persistent bacteremia means that the blood cultures continue to be positive with MSSA or MRSA for 7 or more days following the start of appropriate antibiotic therapy, without any interim negative blood cultures. (Appropriate antibiotics for the treatment of MRSA bacteremia include: vancomycin, daptomycin, or linezolid).
- b. **Recurrent bacteremia.** MSSA or MRSA positive blood culture(s) for 14 days after documented negative blood cultures.

**Note: If the ‘persistent’ or recurrent bacteremia occurs > 30 days after the first MSSA or MRSA blood culture, do NOT include.**

**18. 30-day outcome**

**a. Outcome at 30 days from the date of first positive blood culture**

Thirty days after the date of first positive blood culture, please select one of the options available. Please indicate the date if the patient was discharged and *not* readmitted or if the patient died.

If the patient died, please indicate the relationship to death.

If the patient died, please indicate if the MRSA/MSSA BSI was the cause of death (i.e. the patient had no other condition that would have cause death during the admission); MRSA/MSSA BSI contributed to death (i.e. MRSA/MSSA BSI exacerbated an existing condition that led to the patient’s death), MRSA/MSSA BSI was unrelated to death or unable to determine the causality between CDI and death.

**b. If the patient was discharged and readmitted within the 30 days following the first positive blood culture, was it because of a recurrent MRSA infection?**

Please indicate “Yes” or “No”. If yes, please indicate the date of discharge for the previous admission and continue to question 18c. If no, skip question 18c and go to question 19.

**c. If recurrent MRSA infection was the cause of readmission (Q18b = yes), indicate the site of positive culture for the recurrent infection**

Please indicate the anatomic site from which the positive culture for this recurrent MRSA infection was isolated.

**19. Is this a NEW infection in a patient previously identified with a MSSA or MRSA BSI in this surveillance year?**

Please indicate whether this is a new infection in a patient previously identified with a MSSA or MRSA BSI in this surveillance year by checking yes or no.

If yes, please enter the original/previous unique ID that was assigned to the previous/original infection

**20. During this admission or in the 14 days prior to this admission, did this patient test COVID -19 positive for the first time?”**

## Appendix 5 – Data Uploader on CNPHI

# CNPHI – UPLOAD DATA FILES

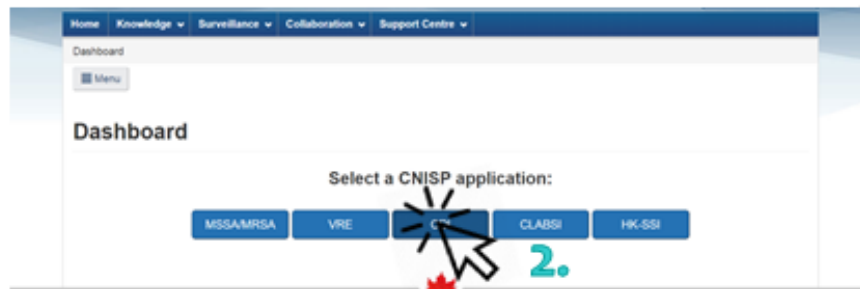
How to submit data using the uploader on CNPHI



### Step 1.

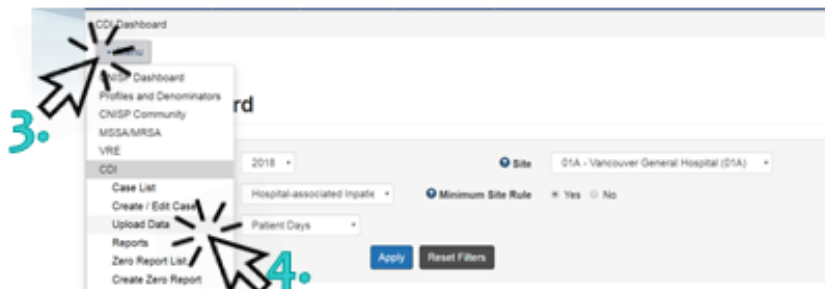
#### Surveillance

Canadian Nosocomial Infection Surveillance Program



### Step 2.

Choose an application



### Step 3.

Menu

### Step 4.

Upload Data



**\*Select surveillance year**

**\*Choose your file**

### Step 5.

Upload Epi Data

## Revision History

Date	Revisions Made
Oct 30, 2014	Changes made to homogenize CNISP protocol formatting
Nov 12, 2014	'Unique identifier code' edited in the data dictionaries
Dec 30, 2014	<ul style="list-style-type: none"> <li>• Q14 revised to better identify whether patient was in ICU at time of positive MRSA culture or if not then was the patient transferred into an ICU within 30 days of the positive culture.</li> <li>• 14a. Was the patient in ICU when the positive blood cultures for MRSA were obtained?</li> <li>• 14b. Was the patient admitted or transferred to an ICU<sup>23</sup> within 30 days after the first positive blood culture?</li> </ul>
Nov 2, 2015	<p><b>2016 MRSA protocol</b></p> <ul style="list-style-type: none"> <li>• The reporting of MRSA colonizations (clinical and screening) to CNISP has been stopped. CNISP hospitals no longer will submit any colonization (clinical and screening) data to CNISP. All sections of the 2015 MRSA surveillance protocol relating to colonization (screening and clinical) data have been removed.</li> <li>• Objectives clarified</li> <li>• Case definition – admission to hospital and exclusion criteria clarified.</li> <li>• Examples of application of HA &amp; CA definitions for clinical isolates clarified.</li> </ul> <p><b>Clinical questionnaire</b></p> <ul style="list-style-type: none"> <li>• Q8 – Responses: <ul style="list-style-type: none"> <li>○ Sputum/lower respiratory changed to lower respiratory</li> <li>○ Bone/osteomyelitis response added</li> <li>○ Joint/septic arthritis response added</li> </ul> </li> <li>• Q9 clarified</li> <li>• Q10 Outcome responses revised to: <ul style="list-style-type: none"> <li>○ Patient still in hospital (awaiting LTC)</li> <li>○ Patient still in hospital (acute care)</li> <li>○ Patient discharged alive, indicate date of discharge</li> <li>○ Patient died, indicate date of death</li> <li>○ Unknown</li> </ul> </li> </ul> <p><b>Blood questionnaire</b></p> <ul style="list-style-type: none"> <li>• Q7 – Responses: Sputum/lower respiratory changed to lower respiratory</li> <li>• Q15: Clarified that if persistent or recurrent bacteremia is identified &gt;30 days after first positive blood culture do NOT include <ul style="list-style-type: none"> <li>○ Q16a Outcome responses revised to: <ul style="list-style-type: none"> <li>○ Patient still in hospital (awaiting LTC)</li> <li>○ Patient still in hospital (acute care)</li> <li>○ Patient discharged alive, indicate date of discharge</li> </ul> </li> </ul> </li> </ul>

<sup>23</sup> ICU includes medical, surgical combined medical-surgical, cardiovascular, coronary, neurosurgery, burn, or step-down unit.



	<ul style="list-style-type: none"> <li>○ Patient died, indicate date of death</li> <li>○ Unknown</li> <li>● Q17a, 17b and 17c removed as data no longer relevant to surveillance</li> </ul> <p><b>MDS questionnaire</b></p> <ul style="list-style-type: none"> <li>● Q8 – Responses</li> <li>● Sputum/lower respiratory changed to lower respiratory</li> <li>● Bone/osteomyelitis response added</li> <li>● Joint/septic arthritis response added</li> <li>● Q10 Outcome responses revised to:</li> <li>● Patient still in hospital (awaiting LTC)</li> <li>● Patient still in hospital (acute care)</li> <li>● Patient discharged alive, indicate date of discharge</li> <li>● Patient died, indicate date of death</li> <li>● Unknown</li> </ul>
Nov 7, 2016	<p>Case definition clarified:</p> <ul style="list-style-type: none"> <li>● The following added to inclusion criteria: MRSA infection identified at a new site/source in a patient identified with a MRSA infection in a previous surveillance (calendar) year</li> <li>● The following added to exclusion criteria: Infections re-admitted with MRSA (unless it is a different strain or a new/different site of MRSA infection).</li> </ul>
Dec 18, 2017	<p>Collection of MRSA clinical infections stopped and only data on bacteremias will be collected. A review of the data indicated MRSA clinical infections have remained relatively constant in relation to the proportion of those that are SKST, respiratory, SSI etc. In addition, MRSA BSI molecular data mirror that seen in clinical specimens. As a result, it was decided to collect only data on <b>ALL NEW</b> MRSA BSIs and add the collection of <b>ALL NEW</b> MSSA (<i>S. aureus</i>) BSIs. Please see surveillance definitions for HA, HA-YAF and CA.</p>
Jan 18, 2018	<ul style="list-style-type: none"> <li>● Q10b clarified – If the patient was previously known to have MRSA – where was it acquired (e.g., HA-YAF, HA-OTHER, CA)? Please use the first known instance of MRSA (infection or colonization) in this patient to determine where acquired. This will depend on how far your hospital is able to look back. For example if a MRSA colonization from a clinical specimen was first identified in 2015, then a respiratory MRSA infection in 2016 – use the MRSA colonization identified in 2015 to determine where-acquired.</li> </ul> <p><b>Healthcare-associated and community-associated definitions updated.</b></p> <ul style="list-style-type: none"> <li>● Previously read as ‘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.</li> <li>● Now reads ‘Any patient who has a bacteremia not acquired at your facility that is thought to be associated with any other healthcare exposure (e.g. another acute-care facility, long term care, rehabilitation facility, clinic, ER visit or exposure to a medical device).’</li> <li>● This would capture those patients whose only healthcare exposure was a previous</li> </ul>

	admission at your hospital or another hospital greater than 90 days before their current admission – using your best clinical judgement this patient’s MRSA or MSSA BSI may be considered as CA or HA-OTHER
Jan 29, 2018	<p><b>Healthcare-associated and community-associated definitions revised due to feedback</b></p> <ul style="list-style-type: none"> <li>• <b>HA-YAF:</b> Have added ‘Has had a healthcare exposure at your facility that would have resulted in this bacteremia (using best clinical judgment)’. This is intended to capture those patients who in the clinician’s best judgment could only have contracted the MSSA/MRSA at their hospital even though may have been admitted &lt;3 calendar days or had been hospitalized in your facility &gt;90 days ago (depending on the source of infection)</li> <li>• <b>HA-OHE:</b> Reworded to try and ensure that this MSSA/MRSA BSI is NOT attributed to your facility</li> <li>• <b>CA:</b> Reworded to allow discretion by the clinician who in using their best judgment attributes this MSSA/MRSA BSI to the community</li> </ul>
Oct 17, 2018	<ul style="list-style-type: none"> <li>• Removed Date of Birth (DOB) as an option – now only option is to give actual age in years, months or days</li> <li>• Added Postal code (first 3 letters) (not mandatory) in order to try and see where patients are coming from when they get admitted to a CNISP hospital</li> <li>• From the question ‘What was the probable source/site of the bacteremia? Check one response only’ removed the option ‘if yes, is it a case of necrotizing pneumonia? <input type="checkbox"/> Yes <input type="checkbox"/> No’ if they check Lower respiratory</li> <li>• Q12 removed as repetitive – Q17 generally asks the same question with a different time frame. Question was: At the time the positive bloodstream culture was obtained, was the patient: In an ICU or discharged from an ICU within 48 hours AND In (or had been in) the ICU for 48 hours or more? <input type="checkbox"/> Yes <input type="checkbox"/> No</li> </ul>
Dec 18, 2018	<p>A decision was made at the annual CNISP meeting (Nov 2018) to</p> <ul style="list-style-type: none"> <li>• Not submit any MSSA BSI isolates to the NML starting January 1 2019</li> <li>• Review all the data (epi &amp; lab) on MSSA BSI submitted in 2018 - i.e. observe any difference in the number of MSSA isolates sent in by month, hospital type (adult vs mixed vs peds), molecular characterization, AMR</li> <li>• Make a decision based on the 2018 data on whether we restart submission of MSSA isolates in 2020 and if yes, what should the time frame for submission of isolates be (e.g. 2 months, 3 months, winter, summer? etc)?</li> </ul> <p>All references in the 2019 protocol relating to submitting MSSA BSI isolates to the NML have been removed</p>
Nov 21, 2019	<p>A decision was made at the annual CNISP meeting (Oct 2019) to</p> <ul style="list-style-type: none"> <li>• Only collect data on MSSA BSI that are identified in the participating hospital (nosocomial)</li> <li>• Q13 Is the patient known to use or inject him/herself with IV drugs?</li> <li>• A time frame was defined – only current drug use (used drugs within the past six months) is relevant</li> </ul>
Sep, 2020	<ul style="list-style-type: none"> <li>• A new question added: During this admission or in the 14 days prior to this admission, did this patient test COVID-19 positive for the first time?</li> </ul>

November 2021	Clarified Q16b - Was the patient admitted or transferred to an ICU within 30 days after the first positive blood culture No other changes to 2022 protocol
November 2022	Added attributable mortality Removed question # 20 relating to COVID – ‘During this admission or in the 14 days prior to this admission, did this patient test COVID-19 positive for the first time?’ No other changes to 2023 protocol