

Bloodstream Infection (BSI) Protocol

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Introduction

Bloodstream infections (BSI) are an important cause of morbidity and mortality in severely ill patients, contributing to increased length of stay and a higher cost of care.

Surveillance is an essential component of Infection Prevention and Control (IPC). If carried out in a uniform manner, surveillance provides a measure of the burden of illness, establishes benchmark rates for internal and external comparison, identifies potential risk factors, and allows assessment of specific interventions. Surveillance of hospital-acquired BSI is considered a measure of quality of care (Public Health Agency of Canada [PHAC], 2022; Centers for Disease Control and Prevention [CDC], 2023a).

Surveillance can be performed for all BSI, but the provincial IPC focus is on two types of BSIs – those attributed to a central line in critical care patients and those with any of four antibiotic-resistant organisms (methicillin-resistant *Staphylococcus aureus* (MRSA), vancomycin-resistant enterococcus (VRE), carbapenemase-producing organisms (CPO) or extended-spectrum beta-lactamases (ESBL). Additional BSI surveillance is determined at a local level by IPC leadership.

In conjunction with the BSI surveillance protocol, there are seven supporting documents to assist in the interpretation and practical use of this protocol – the BSI Protocol-Specific and the General Surveillance Definitions ([Appendix A](#) and [Appendix B](#)), BSI Algorithms ([Appendix C](#)), Information on Central Lines ([Appendix D](#)), BSI Surveillance Process ([Appendix E](#)), BSI Data Collection Process ([Appendix F](#)) and the ProvSurv User Guide (Alberta Health Services [AHS], 2018).

Goal

To decrease hospital-acquired BSIs associated with MRSA, VRE, CPO or ESBL, and hospital-acquired central line-associated BSIs in Alberta Health Services (AHS) and Covenant Health facilities.

Objectives

1. To establish site-specific rates for central line-associated bloodstream infection (CLABSI) in critical care (intensive care unit, general systems-burn intensive care unit, neurosciences intensive care unit, cardiovascular intensive care unit, coronary care unit, pediatric intensive care unit, pediatric cardiac intensive care unit, and neonatal intensive care unit) in AHS/Covenant Health facilities.
2. To establish site specific rates for hospital-acquired BSI with an antibiotic-resistant organism (MRSA, VRE, CPO or ESBL) in the patient population under surveillance in AHS/Covenant Health facilities.
3. To use surveillance results to develop and evaluate IPC interventions which support safer patient care.
4. To establish quarterly and annual CLABSI and hospital-acquired BSI with an antibiotic-resistant organism incidence rates for trend analysis over time and to compare with internal and external benchmarks.
5. To detect clusters of CLABSI and hospital-acquired BSI with an antibiotic-resistant organism.

Methodology

Cases eligible for surveillance are new episodes of positive blood culture with an antibiotic-resistant organism (MRSA, VRE, CPO, ESBL) or any positive blood culture related to a central line attributable to critical care (intensive care unit, general systems-burn intensive care unit, neurosciences intensive care unit, cardiovascular intensive care unit, coronary care unit, pediatric intensive care unit, pediatric cardiac intensive care unit, and neonatal intensive care unit) that meet case definition criteria.

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- Reports of blood cultures originating from facilities under surveillance will be forwarded by laboratories to facility-based IPC programs or designates.
- Facility infection control professionals or designates receiving blood culture reports will determine if cases are a new BSI and classify as hospital-acquired, healthcare-associated, or community-acquired. The representative will compile and record at least the minimum case information. Data from completed BSI surveillance will be entered into the provincial surveillance data management system (ProvSurv) in a timely manner.

Patient population

All individuals admitted to AHS/Covenant Health acute and acute tertiary rehabilitation facilities where inpatient care is provided 24 hours/day, 7 days a week, who have a positive blood culture while admitted. Acute and acute tertiary rehabilitation facilities will be referred to 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

Lab confirmed BSIs can be classified as primary or secondary to an infection at another body site. Provincial surveillance for BSIs will include:

1. A primary laboratory-confirmed BSI in an admitted patient with a central line in place for greater than 2 calendar days **and** onset occurred during their critical care⁺ stay or CLABSI occurred on the day of transfer or the next day after transfer out of critical care;

or

2. A Primary or Secondary laboratory-confirmed antibiotic-resistant organism (MRSA, VRE, CPO or ESBL) from a blood culture in an admitted patient.

⁺Please refer to [Appendix A](#): Bloodstream Infection Data Dictionary for units that would be included under this term.

Inclusion criteria

- BSI case identified in the emergency department in patients who are subsequently admitted to a facility under surveillance.

Relapse **vs.** new BSI

- If the same organism is isolated from a subsequent blood culture:
 - If less than or equal to 10 days from a negative culture **or** less than or equal to 10 days from completion of appropriate antibiotic therapy^{*}, consider as a relapse and **do not report**;
 - If greater than 10 days from a negative culture (if culture was done);and
 - Greater than 10 days from completion of appropriate antibiotic therapy, **report as a new** infection.

^{*}Appropriate antibiotic therapy: The antibiotic therapy given to patient to treat the BSI. If you are unsure whether the antibiotic therapy charted is the appropriate one for treating the BSI please discuss with your IPC medical lead/MOH or microbiologist.

Exclusion criteria

CLABSI

- Infection is already present on admission to critical care.
- CLABSI in neonate less than 3 days old, unless epidemiologic evidence indicates acquisition in the neonatal intensive care unit (e.g., procedure-associated; known endemic neonatal intensive care unit strain).

BSI with an antibiotic-resistant organism

- ESBL-BSI classified as healthcare-associated or community-acquired.

Types of BSI

Primary BSI

Criterion 1: Patient of any age has a recognized pathogen (i.e., an organism which is not on the National Healthcare Safety Network common commensal list or are listed as exceptions in the National Healthcare Safety Network BSI definitions) cultured from one or more blood cultures and pathogen identified in blood unrelated to infection at another site according to National Healthcare Safety Network definitions (refer to Secondary BSI definition in this protocol p 8);

or

Criterion 2: Patient of any age has at least one of: fever greater than 38° C, chills, or hypotension;

and

Organism cultured from blood is not related to an infection at another site according to National Healthcare Safety Network definitions (refer to Secondary BSI definition in this protocol p 10);

and

The same [common commensal](#) (for example, diphtheroids, *Corynebacterium* spp. excluding *Corynebacterium diphtheria*; *Bacillus* spp excluding *B. anthracis*; *Propionibacterium* spp.; coagulase-negative staphylococci including *S. epidermidis*; viridans group streptococci; *Aerococcus* spp.; *Micrococcus* spp.; and *Rhodococcus* spp.) is cultured from **two** or more blood cultures drawn on separate occasions, on the same or consecutive calendar days. Criterion elements must occur within a seven-day time period (the three calendar days before and three days after the positive blood culture date);

or

Criterion 3: Patient ≤ 1 year has at least one of the following with no other recognized cause: fever (>38°C core), hypothermia (<36 °C core), apnea, or bradycardia;

and

Organism cultured from blood is not related to an infection at another site according to National Healthcare Safety Network definitions (refer to Secondary BSI definition in this protocol p 8);

and

The same [common commensal](#) (for example, diphtheroids, *Corynebacterium* spp. excluding *Corynebacterium diphtheria*; *Bacillus* spp excluding *B. anthracis*; *Propionibacterium* spp.; coagulase-negative staphylococci including *S. epidermidis*; viridans group streptococci; *Aerococcus* spp.; *Micrococcus* spp.; and *Rhodococcus* spp.) is cultured from **two** or more blood cultures drawn on separate occasions, on the same or consecutive calendar days. Criterion elements must occur within a seven-day time period (the three calendar days before and three days after the positive blood culture date) (PHAC, 2022; CDC, 2023a).

For primary BSI, determine if CLABSI

A laboratory-confirmed BSI where:

- A central line or umbilical catheter was in place for more than two consecutive calendar days, following the first access of the central line, with day of device placement being Day 1, in an inpatient location, during the current admission.

And

- The date of the positive blood culture was in an inpatient location, during the current admission. If a central line or umbilical catheter was in place for more than two calendar days, following the first access of the line and then removed, the BSI criteria must be fully met on the day of discontinuation or the next day.

For CLABSI, determine if BSI is unit-related to critical care

- Intensive care unit, general systems-burn intensive care unit, neurosciences intensive care unit, cardiovascular intensive care unit, coronary care unit, pediatric intensive care unit, pediatric cardiac intensive care unit, and neonatal intensive care unit), defined as:
 - CLABSI onset on day three or later during a stay in Critical care or on the day of transfer out or the next calendar day after transferring out of Critical care.

CLABSI example

Hospital Day in ICU	BSI Infection Window Period	Central Line
1		
2		Inserted
3		
4	Fever >38.0 C	
5	Blood Culture: coagulase-negative <i>Staphylococcus</i>	
6	Blood Culture: coagulase-negative <i>Staphylococcus</i>	
7		
8		
9		
10		
11		

Hospital acquired Primary CLABSI, ICU related

- Blood culture with a commensal was isolated from 2 blood cultures drawn on separate occasions identified on or after the 3rd calendar day of admission
- No infection at another body site
- Central line was inserted for more than 2 calendar days
- Patient was admitted to ICU

(CDC, 2023b)

<p>Infection Window Period (First positive diagnostic test, 3 days before and 3 days after)</p>
<p>Secondary BSI Attribution Period (Infection window period of primary infection event + 10 days after)</p>

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Types of primary BSI

Types	Description
Primary – Line-related	<ul style="list-style-type: none"> An intra-vascular catheter (central) present for more than 2 calendar days, after first access, on the date of the BSI episode and the BSI is not related to an infection at another site. An intra-vascular catheter (peripheral) present for more than 2 calendar days, after first access, on the date of BSI episode and there is pus at the peripheral line with matching organism as the blood culture.
Primary- Maternal	<ul style="list-style-type: none"> A BSI that occurs in newborns with BSI event date on hospital day 1 or day 2. This includes infections acquired as a result of passage through the birth canal or those acquired transplacentally.
Primary - Mucosal barrier Injury BSI	<ul style="list-style-type: none"> A patient with at least one blood culture growing ONLY eligible intestinal organisms from the NHSN MBI organism list or at least two blood cultures with ONLY viridans group streptococci and/or Rothia but no other organisms isolated who meets any National Healthcare Safety Network criteria for Mucosal Barrier Injury BSI, specifically, allogeneic hematopoietic stem cell transplant recipient who meets National Healthcare Safety Network criteria or a neutropenic patient meeting National Healthcare Safety Network criteria. Please refer to the National Healthcare Safety Network document http://www.cdc.gov/nhsn/PDFs/pscManual/4PSC_CLABScurrent.pdf for complete definitions (CDC, 2023a).
Primary – Unknown origin	<ul style="list-style-type: none"> BSI is not secondary to an infection at another site and patient does not have and has not had an intravascular catheter (central) present for more than 2 calendar days, after first access, on the date of the BSI episode.

Secondary BSI

These are BSIs which are related to a primary infection at another body site. The National Healthcare Safety Network definitions of healthcare-associated infections are used to determine criteria of infection at another body site. For a BSI to be considered secondary to an infection at another body site, the following requirements must be met:

- A National Healthcare Safety Network site-specific infection definition must be fully met - including urinary tract infection, pneumonia, surgical site infection, ventilator-associated infection, or one of the other surveillance definitions for specific types of infections;

and

- One of the following scenarios must be met:
 - At least one organism from the blood specimen matches an organism identified from the site-specific infection that is used as an element to meet the National Healthcare Safety Network site specific infection criterion AND the blood specimen is collected during the secondary BSI attribution period (see NHSN BSI Event definitions for examples);

or

- An organism identified in the blood specimen is an element that is used to meet the National Healthcare Safety Network site-specific infection criterion and is collected during the site-specific infection window.

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Secondary BSI example

Hospital Day	Secondary BSI Attribution Period	Infection Window Period for Primary Site of Infection
1		
2		
3		
4		Urine Culture: ≥ 10 ⁷ CFU/mL K. pneumoniae
5		Fever > 38.0°C
6		
7		
8		
9		
10		Blood Culture: K. pneumoniae
11		
12		
13		
14		
15		
16		
17		
18		
19		
20		
21		

<p>Infection Window Period (First positive diagnostic test, 3 days before and 3 days after)</p> <p>Secondary BSI Attribution Period (Infection window period of primary infection event + 10 days after)</p>
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Hospital-acquired Primary BSI Secondary to UTI

- Blood culture with a pathogen identified on or after the third calendar day of admission
- Urine culture and blood culture pathogen = K. pneumoniae
- Urine culture met NHSN UTI criteria during infection window period
- Blood culture taken during secondary BSI attribution period

Note: This example is adapted from the National Healthcare Safety Network Secondary BSI example; however, be careful when using these examples because the AHS/Covenant Health secondary BSI attribution period differs from the term used in the National Healthcare Safety Network definition.

Special considerations

Primary BSI

1. If the patient is admitted or transferred into critical care with an implanted central line in place and that is the patient’s only central line, the day of first access (line placement, infusion, withdrawal through the line or hemodynamic pressure monitoring) is considered day 1. Such lines remain eligible for CLABSI once they are accessed until they are either discontinued or the day after the patient is discharged from ICU. Note that the “de-access” of a port does not result in the patient’s removal from CLABSI surveillance.
2. Occasionally, a patient with both a central line and another vascular access device will have pus at the other access site. If a specimen of the pus identifies an organism(s) that matches at least one organism found in the blood during the infection window period, the BSI will not be considered central line-associated. The primary BSI is then line-related to the other access site, but the line-days count would

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still include the patient’s central line days in the denominator count (CDC, 2023a). If there is evidence of infection and pus at the central line site and the organism(s) from that site match the blood culture then it would be considered a central line-associated bloodstream infection.

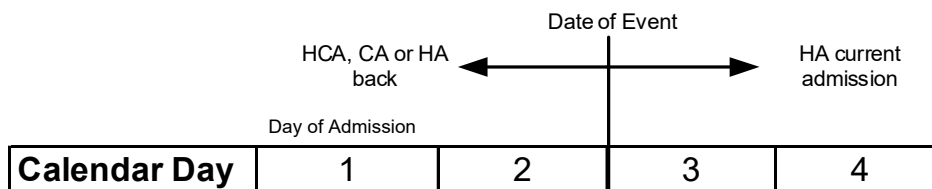
3. **Specimen collection considerations:** Although blood cultures drawn through central lines can have a higher rate of contamination than blood cultures collected through peripheral venipuncture, all positive blood cultures, regardless of the sites from which they were collected, must be included when conducting CLABSI surveillance
4. **Patient suspected of injecting into vascular catheter:** A positive blood specimen meeting primary BSI criteria that is accompanied by documentation during the infection window period of observed or suspected patient injection into vascular lines will be excluded from CLABSI surveillance. This exclusion is very specific to INJECTION into the line (tampering with, manipulating, etc., do not meet the intent of the exclusion).

Secondary BSI

1. If the blood isolate by itself does not meet BSI criteria (e.g., only one positive blood culture with a common commensal), then that isolate may not be used to indicate the presence of a secondary BSI.
2. Physician diagnosis can be accepted as evidence of infection only when physician diagnosis is an element of the specific infection definition.

Case classification

Once a positive blood culture has been identified as meeting surveillance definition for BSI, it will be classified as hospital-acquired, healthcare-associated, or community-acquired based on the following criteria:



Hospital-acquired BSI

BSI is identified on or after the 3rd calendar day of admission;

and

The primary BSI or the infection site where the secondary BSI is attributed to must not be present or incubating at the time of admission.

If patient has been in hospital for less than 3 calendar days prior to the onset of the BSI, there must be compelling evidence that the infection is attributable to the hospital (i.e., there is an established epidemiological link – [Appendix A](#) (BSI Data Dictionary).

Direct transfers between inpatient locations or facilities

Transfer rule: If all elements of a BSI are present within 2 calendar days of transfer from one inpatient location to another in the same facility or to a new facility (i.e., on the day of transfer or the next day), the infection is attributed to the transferring location or facility. Receiving facilities should share information about such hospital-acquired infections with the transferring location/facility to enable reporting.

- The infection control professional at the receiving facility creates a *For Info* record using the encounter information of their facility and sends invite to infection control professional at the sending facility. The infection control professional at the sending facility will change the record to a New BSI surveillance case if the BSI is deemed to meet the National Healthcare Safety Network transfer rule criteria.
- For example, the date of event is on the date of transfer or discharge, or the next day, the infection is attributed to the transferring/discharging location (i.e. hospital-acquired back). The patient must have been at the sending facility for 3 calendar days. If deemed to be hospital-acquired back, the infection control professional at the sending facility would go into the For Info record, change it to a New BSI record, classify as hospital-acquired and enter the encounter information during the patient's stay prior to transfer. Also the infection control professional must enter antibiotic-resistant organism positive blood cultures into the corresponding antibiotic-resistant organism module (MRSA, VRE and CPO). Refer to the individual protocols for information on correct case classification and data entry.

Healthcare-associated BSI

Does not meet the criteria for hospital-acquired (i.e., patient is a newly identified BSI positive on the day of admission (day 1) or the next day (day 2).

and

Was previously admitted to any AHS/Covenant Health facilities under surveillance for 3 calendar days or more in the past 30 days. If the admission was less than 3 calendar days, there must be compelling evidence of an established epidemiological link to that facility healthcare encounter; **or**

Has an indwelling catheter or a medical device at the time of culture that is externally exposed and can be manipulated for care on a regular basis (e.g. urinary catheter, intravenous catheter, etc.); **or**

Is a resident at a long-term care facility where care is provided 24 hours/day, 7 days a week; **or**
in the past 30 days was known to have:

- a surgical procedure;
- peritoneal or hemodialysis;
- received wound care or specialized nursing;
- had intravenous medical therapy (e.g. chemotherapy, antibiotics, TPN, etc.);
- attended a hospital clinic.

(Friedman et al., 2002; Shorr et al., 2006; Lenz et al., 2012).

Community-acquired BSI

Patient becomes BSI positive on the day of admission (day 1) or the next day (day 2) and does not fulfill the criteria for hospital-acquired or healthcare-associated; **or**

If the infection control professional's judgment rules out the hospital-acquired or healthcare-associated definitions based on a history of risk factors.

Acquired-outside Alberta

Identified BSI positive on the day of admission (day 1) and/or the day after admission (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) suggesting that the patient acquired the BSI outside of Alberta, which will be determined on a case-by-case basis.

Other considerations for classification

BSI identified in Surgical Site Infections (SSI)

If a BSI is identified as secondary to an SSI, it will be classified as hospital-acquired to the facility where the surgery was done if infection occurs within their National Healthcare Safety Network SSI defined follow-up time.

Secondary BSI

If a BSI is determined to be secondary to a primary infection that was present or incubating on admission the BSI would not be considered hospital acquired. An algorithm for case inclusion for hospital-acquired BSI is available in [Appendix C](#).

Data collection and data entry

Mandatory data entry

- All new episodes of BSI with an antibiotic-resistant organism (MRSA, VRE, CPO), of any case classification (hospital-acquired, healthcare-associated, community-acquired).
- All new episodes of hospital-acquired BSI with ESBL.
- All new episodes of critical care (intensive care unit, general systems-burn intensive care unit, neurosciences intensive care unit, cardiovascular intensive care unit, coronary care unit, pediatric intensive care unit, pediatric cardiac intensive care unit, and neonatal intensive care unit)-related CLABSI.
- All new episodes of BSI coming from patient with all the following criteria:
 - a central line in place for two or more days,
 - two or more days in the ICU,
 - at least two common commensals or a pathogen;
- Enter all non-CLABSI meeting these criteria as “New” cases, with the BSI attributed field as “Other” (not CL-ICU, CL-PICU or CL-NICU).

For inpatient BSIs with MRSA, VRE and CPO, entry is required in the BSI module and their corresponding antibiotic-resistant organism module, regardless of record type (*Initial, First Infection, For Info, Follow-up*) – refer to the individual protocols for information on correct case classification. The BSI module can also be used to enter data from local surveillance initiatives.

Minimum case information

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

- 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 and case classification (i.e., hospital-acquired, healthcare-associated, community-acquired);
- Admission date to reporting facility;
- Reporting zone and facility name;
- Encounter service and area where patient is admitted;

- BSI type (Primary, Secondary), BSI Symptoms, Attributed Line Type or Secondary BSI origin (as applicable);
- BSI association (e.g., intensive care unit CLABSI);
- Culture date, laboratory name, accession number, cultured site, culture result, and pathogen(s);
- Additional information if CLABSI is intensive care unit-associated: intensive care unit admission/discharge dates; central line insertion date; Risk Factors; Birth Weight (if applicable);

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 infection control professional manually or electronically as soon as possible after the lab report of the new BSI isolate is obtained.

Each infection control professional, or IPC designate will be responsible for timely entry of BSI 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 infection control professionals and/or 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 infection control professional or an IPC designate. Refer to [Appendix E](#) for more information and to [Appendix F](#) for the BSI data collection form.

Outcomes

- Thirty (30) days following positive blood culture determine if patient is:
 - discharged;
 - deceased;
 - still in healthcare facility.

Risk factors

Certain factors may be associated with BSI in specific patient populations. Information about these factors may be documented as additional data for these patients. These factors include:

- premature rupture of membranes (PROM) (maternal) for neonates (PROM>24 hrs);
- total parenteral nutrition (TPN);
- intra-aortic balloon pump (IABP);
- extracorporeal membrane oxygenation (ECMO);
- central line characteristics – e.g., central line type (e.g., tunnelled, non-tunnelled); central line insertion site.

Denominator data

Numbers of inpatient admissions and inpatient days are provided by AHS Analytics. These denominators are presented by month, which are aggregated for the fiscal quarter of the report. Denominators used for reporting can be accessed on Tableau Workbook.

Central line-days

Denominator data are collected electronically for Critical care patients. The number of patients with one or more eligible central line is counted at the same time once each day. A patient with more than one central line counts as only one central line day. Refer to [Appendix D](#) for further details.

Rate calculations

BSI rates will be calculated quarterly for facilities participating in surveillance.

Incidence Rates for AHS/Covenant Health Hospitalized Patients	Calculations
CLABSI*	$\frac{\text{Number of CLABSI cases attributed to ICU} \times 1,000}{\text{Number of central line days}}$
Hospital-acquired (HA) BSI [^]	$\frac{\text{Number of hospital-acquired BSI cases} \times 10,000}{\text{Number of patient-days}}$
HA- BSI with an antibiotic-resistant organism [#]	$\frac{\text{Number of HA BSI with an antibiotic-resistant organism cases} \times 10,000}{\text{Number of patient-days}}$
Healthcare-associated BSI [^]	$\frac{\text{Number of healthcare-associated BSI cases} \times 1,000}{\text{Number of admissions}}$
Community-acquired BSI [^]	$\frac{\text{Number of community-acquired BSI cases} \times 1,000}{\text{Number of admissions}}$

*Rates may be further analyzed to derive rates for neonates by birth weight and line type or to derive rates for intensive care unit/unit types

[^] rates may be further analyzed to derive rates for Primary and Secondary BSI

[#]antibiotic resistant organism may be: MRSA, VRE, CPO or ESBL

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. Formal reports are generated routinely (usually quarterly) using reconciled and validated data.

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, 2019). Operational reports are created by local infection control professionals 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 CLABSI and ARO-BSI information can be accessed on our Tableau Workbooks.

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Any new hospital-acquired BSI where the pathogen is an antibiotic-resistant organism is included in the hospital-acquired BSI with an antibiotic-resistant organism rate, which is reported provincially. This is regardless of the status of the antibiotic-resistant organism (either Initial or Follow-up). The event is reported in the reporting quarter of the BSI event date. Any new CLABSI case attributed to the ICU is included in the CLABSI rate, which is reported provincially and within the reporting quarter where the CLABSI event occurred.

Data quality

The purpose of evaluating the quality of data is to ensure that surveillance-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 surveillance-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 infection control professional 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 infection control professionals 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.

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 infection control professionals through the Data Quality Forum and are 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
September/October 2009	Alberta Health Services-Hospital-acquired BSI surveillance commenced with a protocol trial September 2009 with full implementation October 2009.
April 2012	Updated line inclusion criteria
February 2013	Additional case classifications, definitions included
February 2015	Updated BSI definitions, change to timeframe for relapse BSI, and revisions for electronic line-days collection.
October 2015	Updated BSI definitions for change in MRSA and VRE protocol
April 2016	Updated antibiotic resistant organism to include ESBL
March 2017	Provincial protocol alignment and CVC BSI changed to CLABSI
March 2018	Updated for clarity and to incorporate exclusion criteria of observed or suspected patient injection into vascular access lines
March 2019	Updated case definition, exclusion list, calculation tables, and appendices
Spring 2020	Updated primary-line related definition to only include central lines or peripheral lines where patient had pus and matching organism, special considerations for primary BSI, case classification language, and appendices Updated to new template and reposted to web page.
Spring 2021	Updated references
Spring 2022	Updated mandatory data entry to include BSIs that are not CLABSI but had a line inserted and stayed in ICU as mandatory NEW BSI.
Spring 2023	<p>Revised primary CLABSI definition to be clear that line must be in place for 2 days and in ICU for 2 days – addition in bold:</p> <ul style="list-style-type: none"> • A central line or umbilical catheter was in place for more than two consecutive calendar days, following the first access of the central line, with day of device placement being Day 1, in an inpatient location, during the current admission. • CLABSI onset on day three or later during a stay in Critical care or on the day of transfer out or the next calendar day after transferring out of Critical care. <p>Clarified that for common commensals, the two or more blood cultures need to be collected on the same or consecutive calendar days.</p> <p>Updated MBI definition to align with NSHN – additions in bold:</p> <ul style="list-style-type: none"> • A patient with at least one blood culture growing ONLY eligible intestinal organisms from the NHSN MBI organism list or at least two blood cultures with ONLY viridans group streptococci and/or Rothia but no other organisms isolated. <p>For a BSI to be considered secondary to an infection at another body site, the following requirements must be met – following statement was revised to:</p> <ul style="list-style-type: none"> • A National Healthcare Safety Network site-specific infection definition must be fully met – including urinary tract infection, pneumonia, surgical site infection, ventilator-

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	<p>associated event, or one of the other surveillance definitions for specific types of infections.</p> <p>Clarified that MRSA BSIs also require data entry in both BSI and MRSA module.</p> <p>Revised data collection form.</p> <p>Updated Primary BSI algorithm #2.</p> <p>Added information on CLABSI reporting: Any new CLABSI case attributed to the ICU is included in the CLABSI rate, which is reported provincially and within the reporting quarter where the CLABSI event occurred.</p> <p>Updated References.</p> <p>Updated LTC definition.</p> <p>Changed reporting process from IPC Surveillance Committee to IPC Surveillance, Evaluation, Quality Improvement and Research Committee.</p>
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Appendix A: BSI protocol-specific definitions

Terms	Definitions
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.
Critical care	Specialized treatment units including intensive care units, general systems-burn intensive care units, neurosciences intensive care units, cardiovascular intensive care units, coronary care units, pediatric intensive care units, pediatric cardiac intensive care units, and neonatal intensive care units.
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 cath 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 (CDC, 2023; The Kidney Foundation of Canada, n.d.).
Epidemiological link	A case is thought to be epidemiologically linked to another person(s) or healthcare worker(s) 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 antibiotic-resistant organism colonization or infection)
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 catheter 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, 2023b).
Matching organisms	Genus and species identification are used to determine if the organisms are the "same". Antibiograms will only be considered if differentiating between ARO and non-ARO BSIs. If the organism is less definitively defined in one culture than in the other, the identifications must be complementary (e.g., <i>Candida albicans</i> and "yeast" are complementary). The matching common commensals represent a single element; therefore, the collection date of the first common commensal is the date of the element used to determine the date of the event.
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, 2022). Examples to consider when determining whether an incident BSI, CPO, ESBL, MRSA or VRE case is classified as healthcare-associated include central venous catheters, intravenous lines, peripheral, umbilical catheters, peripherally inserted central catheter, stoma, tracheostomy, feeding tube, suprapubic catheter, endotracheal tube, wound drains etc.
Secondary BSI attribution period (Infection window period + 10 days)	The infection window period of the primary infection event and 10 days after. This 10-day period is not the same as the 10 days used for determining a relapse BSI. The provincial BSI protocol does not use the Repeat Infection Timeframe that is included in the National Healthcare Safety Network definition.

Terms	Definitions
Separate occasions	Means that blood from at least two separate blood draws were collected on the same or consecutive calendar days and were collected in a manner that suggests two separate blood site preparations were performed. For example, blood specimens drawn from different sites (i.e., different venipunctures, a combination of venipuncture and lumen withdrawal, or different lumens of the same central line), or at different times, would be expected to undergo separate decontaminations and are therefore considered drawn on “separate occasions”.

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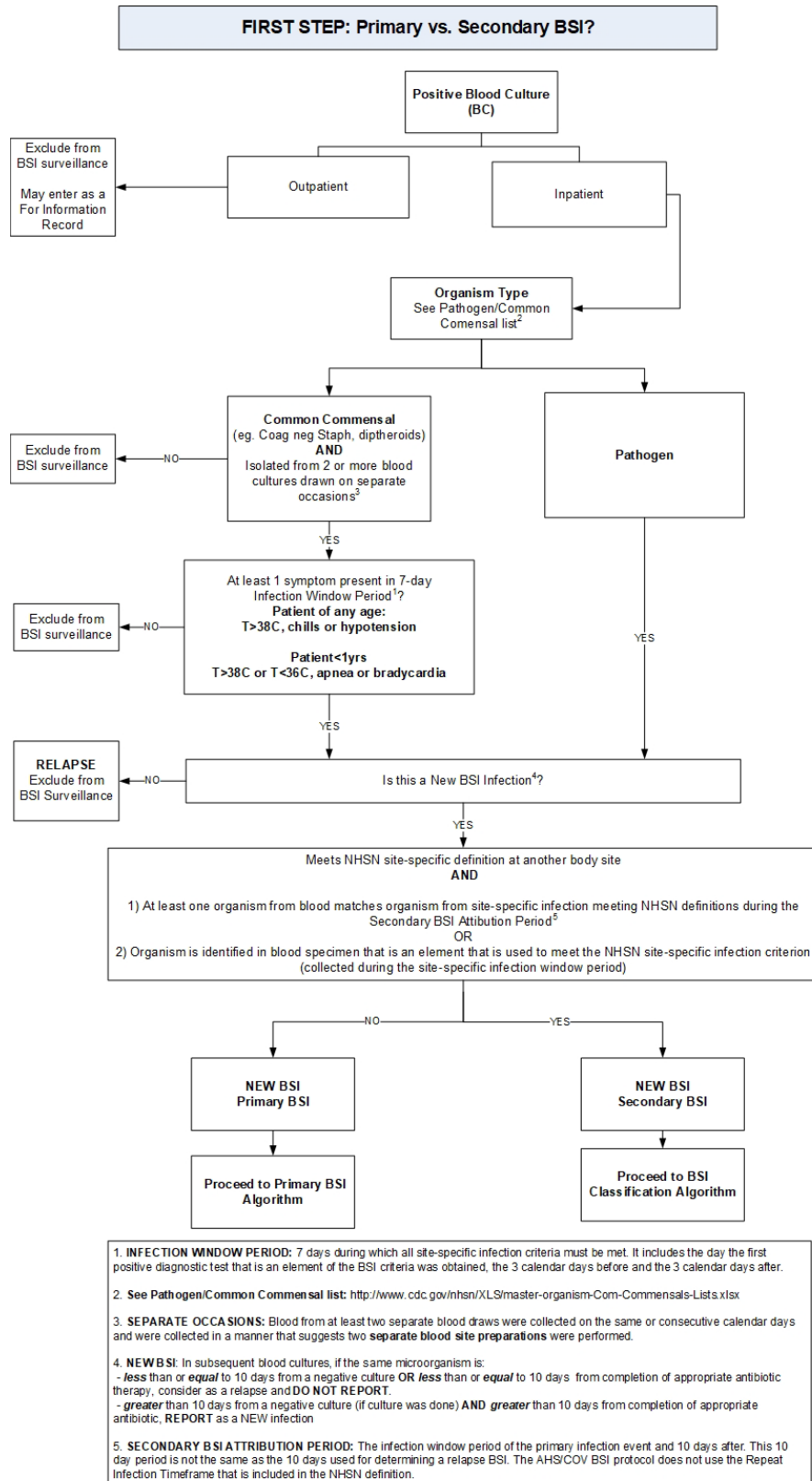
Appendix B: General surveillance definitions

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 and are 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 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 3 calendar days before and the 3 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

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Terms	Definitions
	used to 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 [(emergency department departure date and time – emergency department discharge date and time) ÷ 60 ÷ 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.

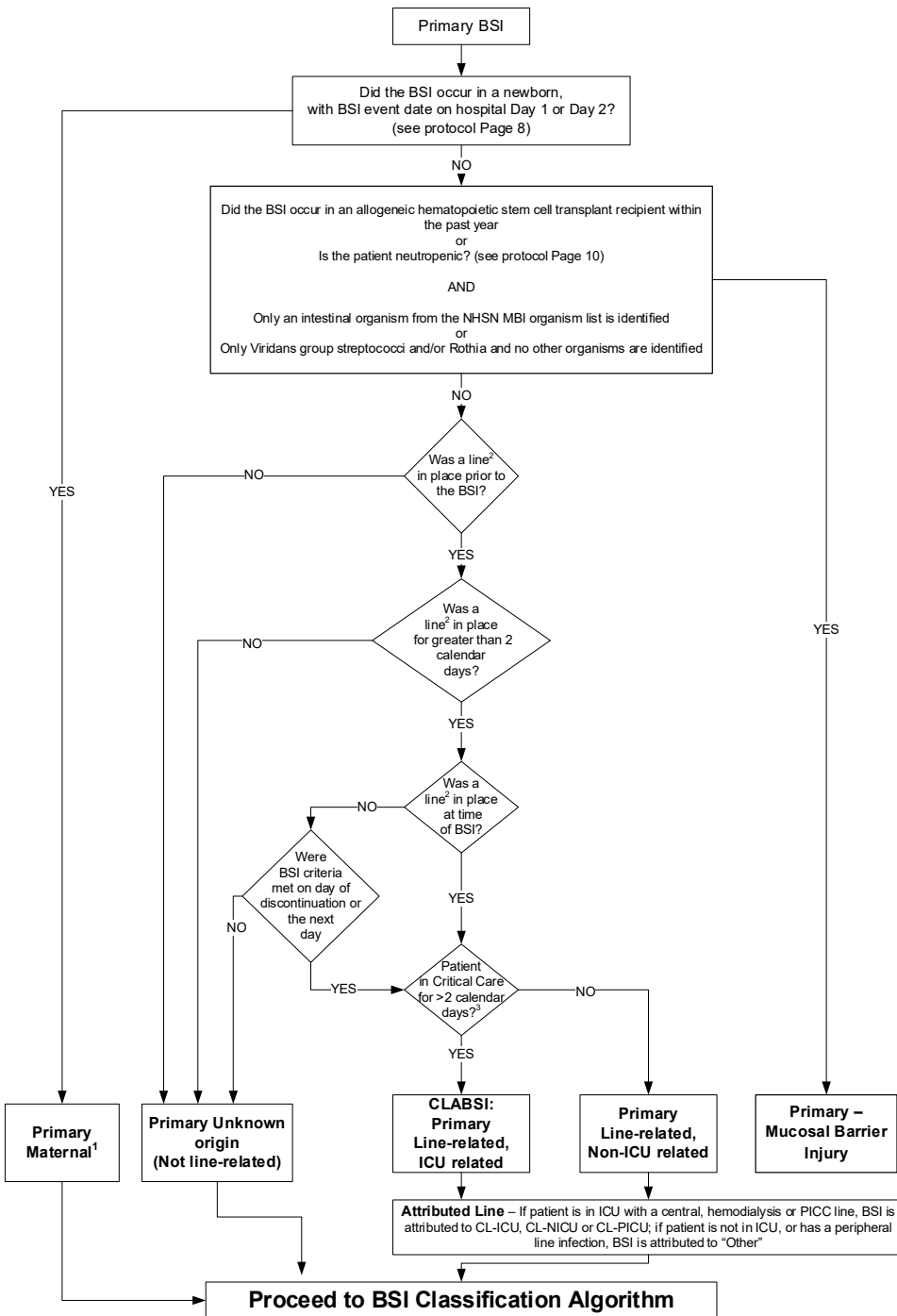
Appendix C: BSI algorithms



REMINDER: For consistency across the province the cut off to use for urine colony counts is 10^7 cfu/L for interpreting NHSN definitions, no matter how your lab is currently reporting colony counts.

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SECOND Step: Primary BSI Algorithm



Attributed Line – If patient is in ICU with a central, hemodialysis or PICC line, BSI is attributed to CL-ICU, CL-NICU or CL-PICU; if patient is not in ICU, or has a peripheral line infection, BSI is attributed to "Other"

1. **PRIMARY, MATERNAL:** A BSI that occurs in newborns with BSI event date on hospital Day 1 or Day 2. This includes infections acquired as a result of passage through the birth canal or those acquired transplacentally.
2. **Line:** An intravascular catheter that terminates at or close to the heart or in one of the great vessels which is used for infusion, withdrawal of blood, or hemodynamic monitoring (Appendix D). If there is pus with matching organism as the blood culture and the patient has a peripheral line, this would be included.
3. **Critical Care:** Units under surveillance if applicable to the site for CLABSI are the Intensive Care Unit (ICU), General Systems-Burn ICU, Neurosciences ICU, Cardiovascular Intensive Care Unit (CVICU), Coronary Care Unit (CCU), Pediatric Intensive Care Unit (PICU), Pediatric Cardiac Intensive Care Unit (PCICU) and Neonatal Intensive Care Unit (NICU). CLABSI onset on day three or later during critical care stay or on the day of transfer or the next calendar day after transfer out of the critical care (protocol pg 7).

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FINAL Step: BSI Classification Algorithm

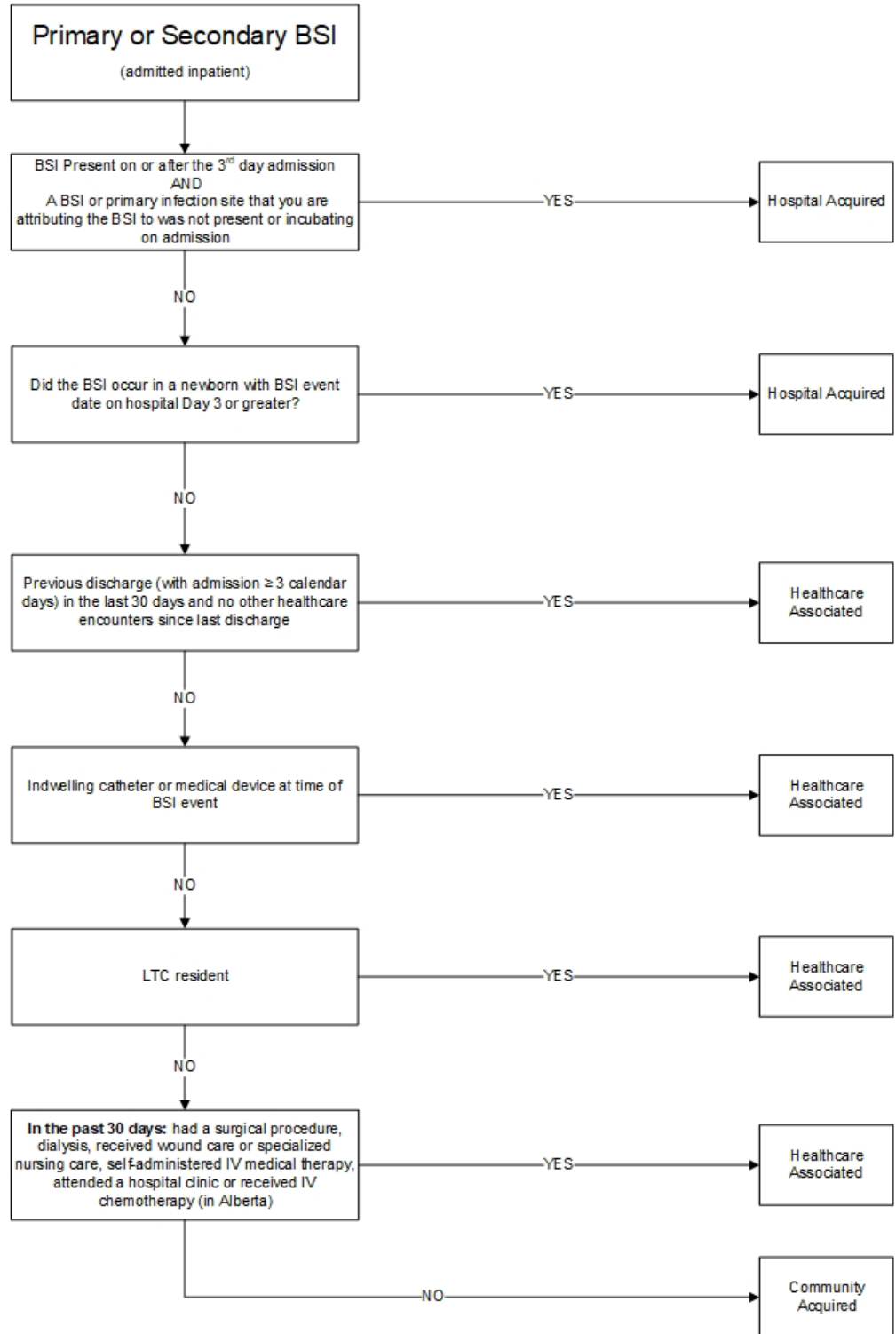
Other Considerations for Hospital-acquired Classification

BSI identified in Surgical Site Infections (SSI)

A. If a BSI is identified as secondary to an SSI, it will be classified as hospital-acquired to the facility where the surgery was done if infection occurs within their NHSN SSI defined follow-up time.

Direct transfers between inpatient locations or facilities

B. *Transfer Rule*²: If all elements of a BSI are present within two calendar days of transfer from one inpatient location to another in the same facility or to a new facility (i.e., on the day of transfer or the next day), infection is attributed to the transferring location or facility (hospital-acquired back).



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Appendix D: Information on central lines

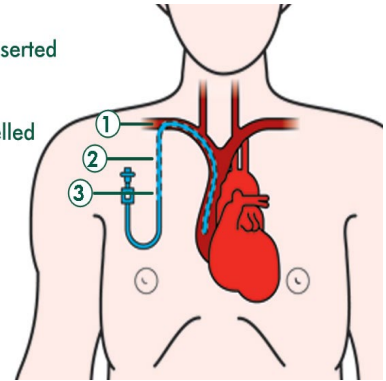
Central lines

A central line is an intravascular catheter that terminates at or close to the heart or in one of the great vessels which is used for **infusion**, **withdrawal** of blood, or hemodynamic **monitoring**.

The following are considered great vessels for the purpose of reporting Central Line-Associated Bloodstream Infection (CLABSI) and counting central-line days:

- Aorta
- Pulmonary artery
- Superior vena cava, inferior vena cava
- Brachiocephalic veins
- Internal jugular veins
- Subclavian veins
- External iliac veins, common iliac veins
- Femoral veins
- Umbilical artery/vein in neonates

- 1 Central line is inserted into chest here
- 2 The line is tunneled under the skin
- 3 The line comes out here



Counting central line-days

- Line-days are the denominator used for reporting CLABSI rates since the presence of the central line is the risk factor for acquisition of a CLABSI. Line-days data are collected either electronically or by manual count. For both methods, the number of patients with **one or more eligible central lines** is counted at the same time once each day (i.e. a patient with more than one central line counts as only one line-day). In this methodology, patients are not included if a central line is inserted then discontinued within 24h but not crossing time of counting. For example, if a central line inserted at 10am and discontinued at 3am next day, that patient would not be included in the count at 8am on either day.

Electronic central line-days query

- The CLABSI Data Quality Working Group has worked with the clinical and technical team for the intensive care units electronic charting system (eCritical) to create an electronic query for line-days, including defining central line types for inclusion in the line-days denominator. Note that neither the insertion site nor the type of device is used to determine if a line qualifies as a central line. The device must terminate in one of the great vessels or in or near the heart and be used for one of the purposes outlined above, to qualify as an eligible central line for this surveillance.

The eCritical line-days are available through the Critical care dashboard:

https://tableau.albertahealthservices.ca/#/views/Line_Days/LineDaysDashboard?iid=1

There is a useful guide to using Tableau Workbook so you can get the most out of the eCritical line-days reports, and you can set up a subscription to be mailed to you every Monday morning.

<http://insite.albertahealthservices.ca/ecritical/tms-ecrt-tracer-tableau-notes.pdf>

Note that line-days for the last reporting quarter are preliminary until all patient charts have been closed by the Quality Assurance eCritical team, **this may take up to six weeks following the end of the quarter.**

Neonate-specific denominator

- Line-days are reported by **each** birth weight group.
- The neonatal population is stratified into five distinct categories based on weight at the time of birth and is not changed as the infant gains weight.

These categories are:

- | | |
|---------------|---------------|
| 1. ≤ 750g | 2. 751-1000g |
| 3. 1001-1500g | 4. 1501-2500g |
| 5. >2500g | |

Central lines INCLUDED in the eCritical electronic line-days query

- Central Venous Catheter (CVC)
- PICC lines (peripherally inserted central catheter)
- Long term Tunneled CVC (e.g., Broviac, Hickman)
- Dialysis Catheter
- Implanted Vascular Access Device (IVAD/Portacath)
- **Rapid Infusion Catheter (RIC) – femoral or internal jugular insertion only**
- **Introducer, Minimally Invasive Mitral Valve Surgery Introducer**
- **Atrial Pressure Line, Pulmonary Artery Catheter**
- **Quattro Catheter, Cool Line Catheter, ICY Catheter**
- Neonatal: Umbilical Arterial Catheter, Umbilical Venous Catheter

Central lines EXCLUDED from the eCritical line-days query

- Pacemaker wires and other non-lumened devices inserted into central blood vessels or the heart are not considered central lines, because fluids are not infused, pushed, nor withdrawn through such devices.
- Extracorporeal membrane oxygenation (ECMO) devices
- Femoral arterial lines
- Intra-aortic balloon pump (IABP) devices
- Hemodialysis reliable outflow (HeRO) dialysis catheters
- Rapid Infusion catheters – antecubital, external jugular insertion sites
- Angio lines (axilla, brachial, popliteal, radial);
- Arterial lines - axillary, brachial, dorsal, femoral, radial, ulnar insertion sites
- Thrombolytic sheath (axillary, brachial, femoral)
- Arteriovenous fistula
- Arteriovenous graft
- Non-accessed central line (not accessed nor inserted during the hospitalization)
- Peripheral intravenous or Midlines
- Ventricular Assist Device (VAD)

Notes on eligible central lines

1. Lines in red font above have been reviewed by Clinical expert for eCritical and approved by the IPC CLABSI Data Quality Working Group. These are considered central lines since all terminate in eligible large vessels.
2. An introducer is considered an intravascular catheter and depending on the location of its tip and use, may be a central line. The eCritical clinical experts have indicated that these devices are used as central lines in the eCritical system.
3. The eCritical query includes pulmonary arterial catheters since the critical care clinical experts have indicated that these are long lines that terminate in great vessels and are used as central lines.

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4. Rapid Infusion catheters (RIC) are short lines (2 inches) so are only included in the eCritical query if inserted directly into a central vein; therefore, RIC from internal jugular or femoral insertion sites are included, but those from other sites (see exclusion list) are not.
5. If the patient is admitted or transferred into the intensive care unit with an implanted central line in place and that is the patient's only central line, day of first access (line placement, infusion, or withdrawal through the line) is considered Day 1. Such lines remain eligible for the eCritical query once they are accessed until they are either discontinued or the day after the patient is discharged.

Note: The "de-access" of a port does not result in the patient's removal from the line-days count.

CLABSI surveillance

- Provincial surveillance for central line-associated bloodstream infection (CLABSI) is performed in critical care (intensive care unit, general systems-burn intensive care unit, neurosciences intensive care unit, cardiovascular intensive care unit, coronary care unit, pediatric intensive care unit, pediatric cardiac intensive care unit, and neonatal intensive care unit) in AHS and Covenant Health acute care facilities.

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Appendix E: BSI surveillance process

1. Identification of patients with BSI

- Review of microbiology laboratory results by infection control professionals.
- For each positive blood culture: determine if patient is an inpatient when the specimen was obtained.
- Determine if case definition for BSI is met and determine case classification of BSI.
- Determine if BSI meets definition for Primary or Secondary bacteremia.
 - Refer to National Healthcare Safety Network definitions to determine if Secondary BSI
 - If patient meets definition for Primary BSI, determine the type of primary infection (line-related, maternal, unknown)
 - If CLABSI Primary BSI, determine if attributable to Critical care (intensive care unit, general systems-burn intensive care unit, neurosciences intensive care unit, cardiovascular intensive care unit, coronary care unit, pediatric intensive care unit, pediatric cardiac intensive care unit, and neonatal intensive care unit)
- Complete data entry through the ProvSurv BSI data entry module. Refer to [Appendix F](#) for a BSI data collection form which may be used. Follow-up at 30 days to determine outcome and finalize data entry.

2. Provincial process: CLABSI Surveillance in critical care

These include intensive care unit, general systems-burn intensive care unit, neurosciences intensive care unit, cardiovascular intensive care unit, coronary care unit, pediatric intensive care unit, pediatric cardiac intensive care unit, and neonatal intensive care unit.

3. Communication

- The infection control professional or designate will enter the CLABSI case in the ProvSurv BSI data entry module
- The infection control professional or designate will notify the intensive care unit clinicians of the case.

4. Responsibilities

- The intensive care unit infection control professional(s) is responsible for identification, notification and verification of cases for their site, including data entry into ProvSurv and to the intensive care unit clinicians. The intensive care unit infection control professional will ensure an intensive care unit contact receives the surveillance reports.
- IPC Surveillance and Standards team will confirm that the infection control professional has communicated to critical care prior to generating any reporting of CLABSIs through communication with the reporting infection control professional.

Appendix F: BSI data collection form

Name _____
AB PHN/ULI _____
MRN _____

DEMOGRAPHIC DATA			
Name: _____			
Last name		First Name	Middle Name
Date of Birth: (yyyy/mmm/dd) _____ / _____ / _____		Gender: <input type="checkbox"/> M <input type="checkbox"/> F <input type="checkbox"/> Unk	AB PHN/ULI: _____
Hospital ID # _____		<input type="checkbox"/> Unk	CC MRN: _____
ENCOUNTER INFORMATION			
BSI Record Type: <input type="checkbox"/> New BSI <input type="checkbox"/> For Information		BSI Classification: <input type="checkbox"/> Hospital-acquired (HA) <input type="checkbox"/> Healthcare-associated (HCA) <input type="checkbox"/> Community-acquired (CA) <input type="checkbox"/> Acquired Outside Alberta	
Encounter Type: <input type="checkbox"/> Clinic <input type="checkbox"/> Cont. Care - Supportive <input type="checkbox"/> Cont. Care - LTC <input type="checkbox"/> Correctional Centre <input type="checkbox"/> Emergency <input type="checkbox"/> Inpatient-Acute Care <input type="checkbox"/> Inpatient - MH/Rehab			
Encounter Date: (yyyy/mmm/dd) _____ / _____ / _____ <input type="checkbox"/> No Admission		Facility Discharge Date: (yyyy/mmm/dd) _____ / _____ / _____	
Encounter Zone: _____		Encounter Site: _____	
Encounter Service: _____		Encounter Area: _____	Room & Bed: _____
Primary BSI: <input type="checkbox"/> Line-related <input type="checkbox"/> Maternal <input type="checkbox"/> Mucosal Barrier Injury <input type="checkbox"/> Unknown Origin	Attributed Line: <input type="checkbox"/> Central Line* <input type="checkbox"/> Peripheral <input type="checkbox"/> Hemodialysis <input type="checkbox"/> PICC <input type="checkbox"/> Umbilical	Other Line: <input type="checkbox"/> Central Line <input type="checkbox"/> Peripheral <input type="checkbox"/> Hemodialysis <input type="checkbox"/> PICC <input type="checkbox"/> Umbilical	BSI Symptoms: <input type="checkbox"/> Has Symptoms <input type="checkbox"/> No Symptoms Attributed To: <input type="checkbox"/> Adult ICU-Central Line <input type="checkbox"/> PICU-Central Line <input type="checkbox"/> None <input type="checkbox"/> NICU-Central Line
<input type="checkbox"/> Secondary BSI: (see reverse side of form)			
<input type="checkbox"/> BJ bone/joint	<input type="checkbox"/> CNS central nervous system	<input type="checkbox"/> CVS cardiovascular system	<input type="checkbox"/> EENT eye, ear, nose, throat
<input type="checkbox"/> GI gastrointestinal system	<input type="checkbox"/> LRI lower resp. tract, not PNEU	<input type="checkbox"/> PNEU pneumonia	<input type="checkbox"/> REPR reproductive
<input type="checkbox"/> SSI surgical site inf.	<input type="checkbox"/> SST skin/soft tissue	<input type="checkbox"/> UTI urinary tract inf.	<input type="checkbox"/> OTHER
CULTURE INFORMATION			
Culture Date: (yyyy/mmm/dd) _____ / _____ / _____		Laboratory: _____	
Accession Number: _____		Organism Isolated 1. _____ 2. _____ 3. _____ (List ARO first if present)	
ICU/Risk Factors			
ICU Admission Date: (yyyy/mmm/dd) _____	Central Line Insert Date: (yyyy/mmm/dd) _____	ICU Discharge Date: (yyyy/mmm/dd) _____	
Birth Weight: <input type="checkbox"/> ≤750g <input type="checkbox"/> 751-1000g <input type="checkbox"/> 1001 – 1500g <input type="checkbox"/> 1501 – 2500g <input type="checkbox"/> ≥ 2501g			
Risk Factors (Optional): <input type="checkbox"/> PROM>24 hrs <input type="checkbox"/> TPN <input type="checkbox"/> IABP <input type="checkbox"/> ECMO <input type="checkbox"/> Scope		Outcome: Patient disposition 30 days following BSI <input type="checkbox"/> Discharged <input type="checkbox"/> Deceased <input type="checkbox"/> Alive, Inpatient	
Central Line Type: _____		Central Line Insertion Site: _____	
ARO Section - NOTE: Data entry also required in ProvSurv MRSA, VRE, or CPO module			
MRSA/CPO Record Type: <input type="checkbox"/> Initial <input type="checkbox"/> For Info <input type="checkbox"/> Follow Up		Case Classification: MRSA <input type="checkbox"/> HA <input type="checkbox"/> HCA <input type="checkbox"/> CA for incident MRSA, <input type="checkbox"/> Acquired Outside Alberta VRE or CPO records only	
VRE Record Type: <input type="checkbox"/> First Infection <input type="checkbox"/> For Info <input type="checkbox"/> Follow Up		VRE <input type="checkbox"/> Hospital-identified (HI) <input type="checkbox"/> On-admission CPO <input type="checkbox"/> HA <input type="checkbox"/> HI <input type="checkbox"/> On-admission	
ARO Case Status: <input type="checkbox"/> Active <input type="checkbox"/> Inactive		ARO CHEC number: _____ If applicable	
ARO Typing/Pattern: Class Based on: <input type="checkbox"/> Protocol <input type="checkbox"/> ICP Opinion			
ICP: _____		Additional Comments: _____	

* Central line is the same as CVC in ProvSurv

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Guidelines for completing BSI surveillance form

HA-BSI: The BSI is identified on or after the 3rd calendar day of admission and the BSI must not present or incubating on the time of admission and if patient has been in hospital for less than 3 calendar days prior to the onset of the BSI, there must be compelling evidence that the infection is attributable to the hospital.

Primary BSI

Criterion 1: Recognized pathogen cultured from one or more blood cultures, unrelated to infection at another site according to NHSN definitions;

or

Criterion 2: At least one of: fever greater than 38° C, chills, hypotension;

and

Organism cultured from blood is not related to an infection at another site according to NHSN definitions

and

The same common commensal (i.e., diphtheroids, *Corynebacterium* spp. excluding *Corynebacterium diphtheria*; *Bacillus* spp excluding *B. anthracis*; *Propionibacterium* spp.; coagulase-negative staphylococci including *S. epidermidis*; viridans group streptococci; *Aerococcus* spp.; *Micrococcus* spp.; and *Rhodococcus* spp.) is cultured from **two** or more blood cultures drawn on separate occasions* on the same or consecutive calendar days. Criterion elements must occur within a seven-day time period (the three calendar days before and after the positive blood culture date;.

or

Criterion 3: Patient ≤ 1 year: one of the following with no other recognized cause: fever (>38°C core), hypothermia (<36 °C core), apnea, or bradycardia;

and

Organism cultured from blood is not related to an infection at another site according to NHSN definitions;

and

The same common commensal (i.e., diphtheroids, *Corynebacterium* spp. excluding *Corynebacterium diphtheria*; *Bacillus* spp excluding *B. anthracis*; *Propionibacterium* spp.; coagulase-negative staphylococci including *S. epidermidis*; viridans group streptococci; *Aerococcus* spp.; *Micrococcus* spp.; and *Rhodococcus* spp.) is cultured from **two** or more blood cultures drawn on separate occasions* on the same or consecutive calendar days. Criterion elements must occur within a seven-day time period (the three calendar days before and after the positive blood culture date).

***Separate occasions:** blood from at least two separate blood draws were collected on the same or consecutive calendar days and were collected in a manner that suggests two **separate blood site preparations** were performed. For example, blood specimens drawn from different sites (i.e., different venipunctures, a combination of venipuncture and lumen withdrawal, or different lumens of the same central line), or at different times, would be expected to undergo separate decontaminations and are therefore considered drawn on "separate occasions".

Matching organisms: Genus and species identification are used to determine if the organisms are the "same". Antibiograms will only be considered if differentiating between ARO and non-ARO BSIs. If the organism is less definitively defined in one culture than in the other, the identifications must be complementary (e.g., *Candida albicans* and "yeast" are complementary). The matching common commensals represent a single element; therefore, the collection date of the first common commensal is the date of the element used to determine the date of the event.

Central line-associated BSI (CLABSI): Central line-associated where a central line or umbilical catheter was in place for more than two calendar days on the date of the positive blood culture, with the day of device placement being day 1 **AND** a central line or umbilical catheter was in place on the date of the positive blood culture or the day before. If a central line or umbilical catheter was in place for more than two calendar days and then removed, the BSI criteria must be fully met on the day of discontinuation or the next day.

ICU-associated BSI: BSI was not present on admission to critical care (intensive care unit, general systems-burn intensive care unit, neurosciences intensive care unit, cardiovascular intensive care unit, coronary care unit, pediatric intensive care unit, pediatric cardiac intensive care unit, and neonatal intensive care unit).

BSI onset occurred on or after the 3rd calendar day during the stay in critical care or within 2 calendar days of leaving critical care.

Relapse vs. New infection - Matching organism is isolated from a subsequent blood culture:

- If **less** than 10 days from a negative culture **OR less** than 10 days from completion of appropriate antibiotic therapy*, consider as a relapse and **DO NOT REPORT**.
- If **more** than 10 days from a negative culture (if culture was done) **AND more** than 10 days from completion of appropriate antibiotic therapy*, **REPORT** as a NEW infection

* Appropriate antibiotic therapy: The antibiotic therapy given to patient to treat the BSI. If you are unsure whether the antibiotic therapy charted is the appropriate one for treating the BSI, please discuss with your IPC medical lead/MOH or microbiologist.

Secondary BSI

These are bloodstream infections which are related to an infection at another body site of the patient. The NHSN definitions of healthcare-associated infections are used to determine criteria of infection at another body site. For a bloodstream infection to be determined to another site of infection, the blood culture must be collected during the site-specific infection secondary BSI Attribution Period - refer to this link

http://www.cdc.gov/nhsn/PDFs/pscManual/4PSC_CLABScurrent.pdf

Refer to documents here for NHSN infection definitions: COMMON - PROVINCIAL\Surveillance\NHSN Definitions

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