Bloodstream Infection (BSI) Surveillance

Bloodstream infection is the most serious form of healthcare associated infection and is associated with significant morbidity and mortality.

Case definition

An episode of BSI is defined as a laboratory confirmed **positive blood culture** which meets one of the following:

Criterion 1

One or more recognised bacterial or fungal pathogens are cultured from one or more blood samples.

NOTE: Recognised bacterial/fungal pathogens are rare contaminants in a blood culture and will only be considered a contaminant and therefore not reported in the surveillance data if, *the clinical picture is unsupportive of infection* and **either**:

- a repeat blood culture is negative ***AND/OR***
- no targeted antimicrobial treatment is prescribed/given.

Criterion 2

If a potential skin contaminant* is cultured, the patient must have at least one of the following signs and symptoms within a seven day timeframe (three days before and three days after) the date of the first positive blood culture being collected:

patients aged >1 year	patients aged ≤1 year
fever (>38˚C)	fever (>38˚C core)
chills, rigors	hypothermia (<36˚C core)
hypotension	apnoea or bradycardia

and the same organism(s) is isolated from two or more blood cultures[#] drawn on separate occasions^ within 24 hours.

Criterion 2 episodes should be recorded against the date of the first isolate.

*A list of potential skin contaminants is available from the Centers for Disease Control and Prevention (CDC) / National Healthcare Safety Network (NHSN) master organism list on the "common commensals" tab:
http://www.cdc.gov/nhsn/xls/master-organism-com-commensals-lists.xlsx

[#]If a potential contaminant is identified to the species level from one culture and the second culture is only identified to the corresponding genus level, it is assumed that the organisms are the same. Complete species identification should be obtained from the laboratory for clarification if available.

^A definition of "separate occasions" can be found in the Australian Commission on Safety and Quality in Health Care (ACSQHC) CLABSI implementation guide found at:
https://www.safetyandquality.gov.au/our-work/healthcare-associated-infection/national-hai-surveillance-initiative

NOTES:

- Only the first episode per patient is counted, unless at least 14 days has passed without a positive blood culture with the same organism, after which a new episode is recorded.
- If a MRO blood culture is considered a contaminant it should not be reported in the BSI or MRO surveillance data. Consideration should be given to screening the patient for MRO carriage.
- Where an episode is considered polymicrobial, report all significant organisms.
- Positive PCR blood or serology results are not a substitute for positive blood cultures and should not be included in BSI surveillance reporting.

MRSA Isolates

For all MRSA isolates please record antibiotic susceptibility data as indicated on the surveillance reporting form. *NOTE:* Intermediate susceptibility should be recorded as "R".

Place of Acquisition

A. Healthcare associated inpatient (IP):

The episode is considered healthcare associated if the patient's first positive blood culture was collected:

- greater than 48 hours after admission/delivery at your facility and was not present or incubating on admission*, **or**
- less than 48 hours after discharge/transfer

***NOTE:** present or incubating on admission means there is *documented* clinical, radiological or laboratory evidence of related infection on admission and there is *no evidence* of a link to a medical procedure and/or prior admission. If there is any uncertainty, then the episode should be classified as an HAI.

B. Healthcare associated non-inpatient (NIP):

The episode occurs:

- less than or equal to 48 hours after admission, **and**
- at least one of the "Associated Clinical Criteria" have been met

ICU Associated

(AICU=Adult, PICU=Paediatric, or NICU= Neonatal Intensive Care Units)

The episode occurs:

- greater than 48 hours after ICU admission, **or**
- less than 48 hours after ICU discharge.

Clinical Unit

Record the clinical unit responsible for the care of the patient at the time of the attributable source of the BSI; this may not be the same as the clinical unit in charge of care at the time the blood culture was taken.

Associated Clinical Criteria

B.1 DEVICE

BSI is a complication of the presence of an indwelling medical device, (e.g. intravascular line, haemodialysis vascular access, CSF shunt, urinary catheter, chest tubes).

NOTES:

- Criterion B.1 does not have a maximum timeframe
- Excludes surgical implants, these are captured under criterion B.2.
  NOTE: A surgical implant is a man-made medical device that is surgically implanted into the body during a procedure to replace a missing biological structure, support a damaged biological structure, or enhance an existing biological structure. Surgical implants include, but are not limited to: permanent pacemakers, joint prostheses, nerve stimulators, breast implants, surgical mesh, stents, intraocular lens

B.2 SURGERY

BSI occurs within 30 days of a surgical procedure where the BSI is related to the surgical site.

NOTE: The BSI will be associated with the relevant surgical procedure undertaken closest (prior) to the development of the BSI unless there is clear clinical evidence to link the BSI to another surgery.

B.3 PROCEDURE

An invasive instrumentation or incision related to the BSI was performed within 48 hrs prior to onset of sepsis.

Examples of invasive instrumentation or incision include, but are not limited to: pacing wires, endoscopic retrograde cholangiopancreatography (ERCP), cardiac catheterisation, chest drain insertion

B.4 NEUTROPENIA

BSI is associated with neutropenia. White Cell Count (WCC) or Absolute Neutrophil Count (ANC)[#] $<0.5 \times 10^9$/L, induced by cytotoxic or radiation treatment, on at least 2 separate calendar days during the period 3 days prior and 3 days after the date of blood culture collection (i.e. a 7 day period including the day of blood culture collection).

[#]Absolute Neutrophil Count = WCC x % neutrophils

NOTES:

- If the time period documented in any of the above criteria is exceeded, there must be compelling evidence that the infection was linked to the identified source. These records should be identified on the surveillance reporting form to ensure they can be excluded from National reporting if required.
- For the purpose of surveillance, clinical criteria B.1, B.2 and B.3 are considered mutually exclusive: only one option can be recorded against a single BSI episode. However neutropenia can be recorded as a risk factor with clinical criteria B.1, B.2 and B.3 or as an independent clinical risk factor.
- For clinical criteria B.1, B.2 and B.3, record the “Focus of Infection” code along with the name of the related Device or Procedure.

Focus of infection

Please record the one of the following codes below:

Focus of infection code	Description
BJ	Bone and joint
CNS	Central nervous system
CV	Cardiovascular system
DIS	Disseminated [4]
GEN	Genital tract
GIT	Gastrointestinal tract [3] (inc MBI)
HN	Head and neck (inc ENT)
IA	Intra-abdominal (inc Hepatobiliary)
LA	IV line-associated [1]
MAT	Maternally-acquired [2]
OTH	Other ***body*** site
RT	Respiratory tract
ST	Skin and soft tissue
UT	Urinary tract
UNK	Unknown

[1]IV line-associated

Identified organism is:

- not associated with any other identifiable source/focus* of infection **and**
- the IV line was *in situ* for at least 48 hours **and**
- the IV line was *in situ* within the 48 hours prior to the BSI episode (onset of signs and symptoms of infection or blood culture date)

NOTE: where there is another IV or arterial line in-situ in addition to the central line, unless there is direct evidence linking local infection at the insertion site of the additional IV line to the BSI (at least one matching organism identified in blood and insertion site specimen), the event is recorded as a CLABSI.

[2] Maternally-acquired

This is an infection in a neonate that is acquired from the mother during delivery.

Unless strong evidence suggests otherwise, an infection that appears less than 48 hours after birth is considered to be acquired from the mother, and are not reported to the ICS.

NOTE:

- For SA Health facilities, these infections should be reported via the Safety Learning System *(> Level 1 – Neonate > Level 2 – Incident related to neonatal care > Level 3 – Early onset sepsis*).
- Non-SA Health contributors should report these events through relevant Safety & Quality performance programs in their facilities.

[3] Gastrointestinal tract

Includes neutropenic haematology/oncology patients with no obvious clinical focus and the source is thought to be mucositis or mucosal barrier injury (MBI).

For MBI - related BSI definitions see the ACSQHC CLABSI implementation guide available from: https://www.safetyandquality.gov.au/our-work/healthcare-associated-infection/national-hai-surveillance-initiative

[4] Disseminated

Two or more identified sites of infection, excluding IV line-associated BSI[1].

Information to assist with source identification can be found in the Centers for Disease Control and Prevention (CDC) / National Healthcare Safety Network (NHSN) surveillance definitions for specific types of infections document available from: www.cdc.gov/nhsn/PDFs/pscManual/17pscNosInfDef_current.pdf

Central Line associated BSI (CLABSI)

Central lines are classified as intravascular devices with a tip ending in a major vessel. Central lines can be classified as either 'centrally inserted' in which case the skin entry point is on the trunk of the patient or 'peripherally-inserted' where the line is inserted through a limb vein.

A central line associated blood stream infection is a laboratory-confirmed BSI (as defined under case definition) where:

- the BSI is not related to an infection at another site/focus **and**
- the central line was *in situ* for at least 48 hours **and**
- the central line was *in situ* within the 48 hours prior to the BSI episode (onset of signs and symptoms of infection or blood culture date).

NOTE: If CLABSI criteria are met again within 14 days, and the same organism(s) is identified, it is deemed to be the same infection and should not be reported.

Central Line-days

To calculate central line-days, one of 3 methods can be used:

> count the total number of days each patient has a central line *in situ* (assign to relevant surveillance period) **OR**

> at the same time each day count the number of patients who have a central line *in situ* **OR**

> at the same time each day, on at least three days per week e.g. Monday, Wednesday and Friday, count the number of patients who have a central line *in situ* then calculate a daily average and multiply by the number of days in the month. (If an allocated count day falls on a public holiday, a count on the day before or after should be done).

NOTES:

- Patients with two or more central lines *in situ* on one day are counted only once i.e. one central line day.
- If there is a peripherally and a centrally inserted line *in situ*, count as a single central line day.
- Central line-day documentation should be unit specific (e.g. AICU, PICU, NICU, Haematology / Oncology) to allow for analysis of groups with similar risks.

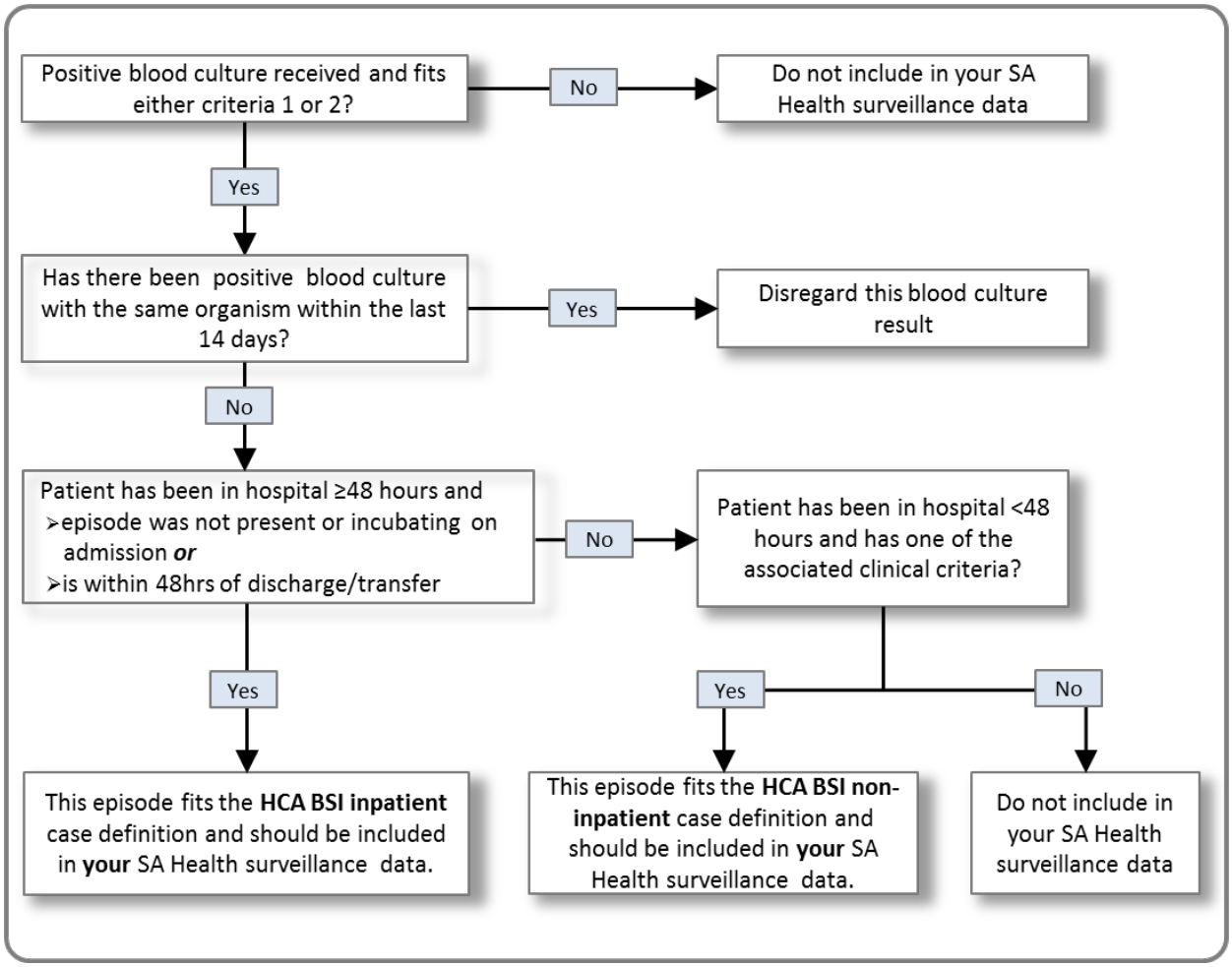
For more information on the application of the CLABSI definition, refer to the ACSQHC CLABSI Surveillance Implementation Guide, available from: https://www.safetyandquality.gov.au/our-work/healthcare-associated-infection/national-hai-surveillance-initiative/

Data Element Table

The data specification table is intended to support standardised provision of BSI surveillance data by assisting with the application of definitions and identification of the minimum data requirements

Field Name	Description and Details	Details
UR or Postcode	Unique record identification number	• This is the patient's medical record number (MRN) or postcode for Private hospitals that do not supply MRN • Mandatory field, cannot be null
Gender	Sex of the patient	• Mandatory field, cannot be null
Date of Birth	The patients full year of birth, including day and month	• If date of birth is not known or cannot be provided, provision of a generic estimate is acceptable (the first day of the appropriate month or 01/01/ of the appropriate year. • Format date as dd/mm/yyyy • Mandatory field, cannot be null
Clinical Unit	Patient's Clinical Unit at time of acquisition	• Institution specific clinical names are acceptable and are automatically assigned to clinical unit groups on load to the database.
ICU Status	Identifies if the specimen was taken in an Intensive Care Unit or a Non Intensive Care Unit i.e. ward	• Record as: AICU = Adult ICU PICU = Paediatric ICU NICU = Neonatal ICU Non-ICU = for all other ward locations • Mandatory field, cannot be null
Specimen Date	Identifies the date the specimen was taken	• Format date as dd/mm/yyyy • Must be within the reporting month • Mandatory field, cannot be null
LAB Name	Identifies the laboratory organisation that processed the specimen	• Field should not be null
Specimen Number	Positive specimen's unique identification number	• Identifier allocated by the laboratory to the pathology result • Field should not be null
Focus of Infection	Indicates the primary site of infection associated with the BSI episode	• Record the code that identifies the focus of the BSI according to the *"Focus of Infection"* table. • Mandatory field, cannot be null
Focus of Infection "Other"	Indicates the focus of the BSI episode if not associated with one of the areas documented in the *"Focus of Infection"* table	• Record detail • Mandatory if *"Focus of Infection"*= Other body site
DEV or PROC associated	Indicates if the BSI was associated with a health care associated intervention or device	• If appropriate, record the episode as DEVICE or PROCEDURE(includes surgery) otherwise document N/A • Field should not be null
Device type	Indicates the generic classification of the device associated with the BSI episode	• Mandatory field, cannot be null
PROC/DEV details	Include the name of the device, surgery or procedure if identified as the BSI source	• Record specific details associated with the PROC or DEV • Mandatory field, cannot be null
Neutropenia	Was the BSI associated with cytotoxic or radiation treatment - induced neutropenia?	• Only record cytotoxic or radiation induced neutropenia • Record as either Y or N • Field should not be blank
Acquisition	Indicates if the BSI episode is inpatient or non-patient acquired (based on BSI surveillance definition)	• Must be either IP or NIP • If Acquisition = NIP details must include information on the associated clinical criteria associated with the BSI episode. • Mandatory field, cannot be null
Resistance Details	If the BSI Organism = Methicillin-resistant *Staphylococcus aureus*, this indicates the resistance pattern of the organism	• For all MRSA isolates record the sensitivity / resistance details listed in the data collection template. • Fields should not be blank if *Organism* = MRSA
Organism	Record organisms associated with the bloodstream infection episode	• List all identified significant organisms that fit the "Bloodstream Infection (BSI) episode" criteria. • Mandatory field, cannot be null
Comment	Record any relevant additional information	For example • MRO information • Associated criteria time period exceptions
Acquisition Ward	Patient's ward at time of acquisition	• Institution specific ward names are acceptable and are automatically assigned to ward groups on load to the database.

Flow Chart



For more information

Infection Control Service
Communicable Disease Control Branch
Telephone: 1300 232 272
www.sahealth.sa.gov.au/infectionprevention

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Government of South Australia
SA Health

BSI Appendix 1: BSI interpretive examples

The following table provides a guide to the interpretation of polymicrobial episodes of bloodstream infection for surveillance purposes only. Clinical designation of episodes may differ on occasions. NOTE: Ensure only significant organisms are reported.

Date	Organism	Focus	Attributes	Count	Comment
3/5 5/5	CNS *S. epidermidis*	IV IV	• same organism • same focus	single episode caused by *S. epidermidis*	If a common skin contaminant is identified to the species level from one blood culture, and a second culture can only be identified to the genus level, then it is assumed that the organisms are the same.
3/5 5/5	*S. aureus* *E. coli*	ST ST	• different organism • same focus • within 48 hours	single polymicrobial episode	Both organisms would usually be considered to be significant, especially from a surgical wound.
3/5 5/5	*S. aureus* *S. epidermidis*	ST ST	• different organism • same focus • within 48 hours	single episode caused by *S. aureus*	A potential skin contaminant (*S. epidermidis*) where the focus is skin or soft tissue is likely to be regarded as a contaminant unless it is identified in a second blood draw within 24 hours.
3/5 6/5	*S. aureus* *E. faecium*	ST UT	• different organism • different focus • > 48 hours	two episodes	Two organisms considered significant from two different foci
3/5 6/5	*P. aeruginosa* *P. aeruginosa*		• same organism • < 14 days apart	single episode	At least 14 days must pass without a positive blood culture with the same organism, for a new BSI episode to be recorded with that organism
3/5 8/5	*K. pneumoniae* *E. coli*	UT UT	• different organism • same focus • > 48 hrs apart	two episodes	Two organisms from same focus, but >48hr apart.
3/5	*P. aeruginosa* *E. faecium*	RT UT	• different focus	single polymicrobial episode	Report as disseminated (DIS) and include which site specific criteria have been met. IV line associated episodes are excluded from the DIS classification