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 **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 (e.g. coagulase negative staphylococcus, micrococcus, diphtheroid, etc), the patient must have at least one of the following signs and symptoms within 24 hours of the blood cultures being collected: (period includes 24 hrs before the first BC and up to 24 hrs after the second BC)

<table>
<thead>
<tr>
<th>patients aged &gt;1 year</th>
<th>patients aged ≤1 year</th>
</tr>
</thead>
<tbody>
<tr>
<td>fever (&gt;38°C)</td>
<td>fever (&gt;38°C core)</td>
</tr>
<tr>
<td>chills, rigors</td>
<td>hypothermia (&lt;36°C core)</td>
</tr>
<tr>
<td>hypotension</td>
<td>apnoea or bradycardia</td>
</tr>
</tbody>
</table>

*The same organism(s) is isolated from two or more blood cultures# drawn on separate occasions^ within a 48 hour period.

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: 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 can be obtained from the laboratory for clarification if required.

^ 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-haï-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 an additional 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.
- PCR positive blood (serology) results are not a substitute for positive blood cultures.
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
- within 48 hours of 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 occurred

- < 48 hours after admission and one or more of the “Associated Clinical Criteria” have been met (see below).

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).

NOTES:
- Criterion B.1 does not have a maximum timeframe
- Excludes surgical implants, these are captured under criterion B.2. Surgical implants include (but are not limited to) permanent pacemakers, joint prostheses, nerve stimulators, breast implants, surgical mesh.

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 include, but are not limited to: pacing wires, endoscopic retrograde cholangiopancreatography (ERCP), cardiac catheterisation

B.4 NEUTROPENIA = BSI is associated with neutropenia. White Cell Count (WCC) or Absolute Neutrophil Count (ANC)* <0.5 x 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 for National reporting.
- 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 along 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” along with the name of the related Device or Procedure.
ICU Associated
(AICU=Adult, PICU=Paediatric, or NICU=Neonatal Intensive Care Units)
The episode occurs
- > 48 hours after ICU admission, or
- within 48 hours of 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.

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”.

Focus of infection
Please use one of the following body site codes:

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>BJ</td>
<td>Bone and joint</td>
<td>IA</td>
<td>Intra-abdominal</td>
</tr>
<tr>
<td>CNS</td>
<td>Central nervous system</td>
<td>LA</td>
<td>IV line-associated</td>
</tr>
<tr>
<td>CV</td>
<td>Cardiovascular system</td>
<td>MAT</td>
<td>Maternally-acquired</td>
</tr>
<tr>
<td>DIS</td>
<td>Disseminated</td>
<td>OTH</td>
<td>Other body site</td>
</tr>
<tr>
<td>GEN</td>
<td>Genital tract</td>
<td>RT</td>
<td>Respiratory tract</td>
</tr>
<tr>
<td>GIT</td>
<td>Gastrointestinal tract</td>
<td>ST</td>
<td>Skin and soft tissue</td>
</tr>
<tr>
<td>HB</td>
<td>Hepatobiliary</td>
<td>UT</td>
<td>Urinary tract</td>
</tr>
<tr>
<td>HN</td>
<td>Head and neck</td>
<td>UNK</td>
<td>Unknown</td>
</tr>
</tbody>
</table>

1. **IV line-associated**
   - Identified organism is not associated with any other identifiable site/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).

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 GIT associated (e.g. due to mucositis).
   - For a description of mucositis-related BSI definitions see the NHSN guidelines (Mucosal

4. **Disseminated**
   - Spread throughout the body, with two or more potential sites of infection*
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 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) and
- the BSI is not related to an infection at another site/focus*.

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).

NOTE:
- 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.

### 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.

<table>
<thead>
<tr>
<th>Field Name</th>
<th>Description and Details</th>
<th>Details</th>
</tr>
</thead>
</table>
| 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                                                                        | • 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  
• Field should not be null |
| Date of Birth    | The patient’s 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  
• Field should not 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. |
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.

<table>
<thead>
<tr>
<th>Date</th>
<th>Organism</th>
<th>Focus</th>
<th>Attributes</th>
<th>Count</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>3/5</td>
<td>CNS S. epidermidis</td>
<td>IV</td>
<td>• same organism</td>
<td>single episode caused by S. epidermidis</td>
<td>If a common skin contaminant is identified to the species level from one blood culture, and a second culture is identified with only a descriptive name (i.e. to the genus level), then it is assumed that the organisms are the same.</td>
</tr>
<tr>
<td>5/5</td>
<td></td>
<td>IV</td>
<td>• same focus*</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• within 48 hours</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3/5</td>
<td>S. aureus E. coli</td>
<td>ST</td>
<td>• different organism</td>
<td>single polymicrobial episode</td>
<td>Both organisms would usually be considered to be significant, especially from a surgical wound.</td>
</tr>
<tr>
<td>5/5</td>
<td></td>
<td>ST</td>
<td>• same focus*</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• within 48 hours</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3/5</td>
<td>S. aureus S. epidermidis</td>
<td>ST</td>
<td>• different organism</td>
<td>single episode caused by S. aureus</td>
<td>A potential skin contaminant (S. epidermidis) where the focus is skin or soft tissue is likely to be regarded as a contaminant.</td>
</tr>
<tr>
<td>5/5</td>
<td></td>
<td>ST</td>
<td>• same focus*</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• within 48 hours</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3/5</td>
<td>S. aureus E. faecium</td>
<td>ST</td>
<td>• different organism</td>
<td>two episodes</td>
<td>Two organisms considered significant from two different foci</td>
</tr>
<tr>
<td>6/5</td>
<td></td>
<td>UT</td>
<td>• different focus*</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• &gt; 48 hours</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3/5</td>
<td>P. aeruginosa P. aeruginosa</td>
<td>UT</td>
<td>• same organism</td>
<td>two episodes</td>
<td>Same organism but from different foci.</td>
</tr>
<tr>
<td>6/5</td>
<td></td>
<td>RT</td>
<td>• different focus*</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• &gt; 48 hrs apart</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3/5</td>
<td>K. pneumoniae E. coli</td>
<td>UT</td>
<td>• different organism</td>
<td>two episodes</td>
<td>Two organisms from same focus, but &gt;48hr apart.</td>
</tr>
<tr>
<td>8/5</td>
<td></td>
<td>UT</td>
<td>• same focus*</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• &gt; 48 hrs apart</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3/5</td>
<td>P. aeruginosa E. faecium</td>
<td>RT</td>
<td>• different focus*</td>
<td>single polymicrobial episode</td>
<td>Report as disseminated (DIS).</td>
</tr>
<tr>
<td></td>
<td></td>
<td>IV</td>
<td>• within 48 hours</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*fits NHSN site specific criteria for both foci.*