AUSTRALIAN COMMISSION
ON SAFETY AND QUALITY IN HEALTH CARE

Implementation Guide for the Surveillance of *Staphylococcus aureus* Bloodstream Infection

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1. Introduction

Staphylococcus aureus[1] (*S. aureus)* bloodstream infection (SABSI) occurs when *S. aureus* enters an individual's bloodstream and causes infection.

Blood is normally a sterile environment and the presence of any microorganism in the blood may result in an infection. *S. aureus* can enter the bloodstream via an existing infection or wound, or during a procedure that requires penetration of the skin, such as surgery, or the insertion of an intravascular or invasive medical device.[1-3] Individuals who develop SABSI are more likely to experience medical complications, require complex treatment and longer hospital stays. SABSI infections can also result in death.[1, 4]

The nationally reported rate of SABSI has been relatively stable for several years, from 0.79 cases per 10,000 patient days in 2014-15 to 0.75 cases per 10,000 patient days in 2018-19.[1] However, higher rates are observed in large hospitals where higher acuity patients typically receive care. Treatment of SABSI caused by resistant organisms is often complex and is associated with a higher mortality risk.[1] Patterns of methicillin resistance continue to evolve and community-associated methicillin-resistant *S. aureus* (MRSA) has become prominent in remote and very remote regions.[5]

Healthcare-associated SABSI (HA-SABSI) is potentially preventable through implementation of infection prevention strategies such as compliance with the 5 Moments for Hand Hygiene, use of aseptic technique, ensuring skin antisepsis prior to invasive procedures, improved insertion and management of indwelling devices, effective antimicrobial stewardship and regular infection surveillance.[3, 6-9]

Continuous ongoing surveillance of healthcare-associated infections (HAIs), including HA-SABSI, is an important quality improvement activity that contributes to safer care and provides information on what strategies to use to improve clinical practice. Surveillance of HA-SABSI is considered a robust measure of the control of HAIs and the quality of infection prevention and control strategies, because the identification of *S. aureus* in a blood culture is rarely considered a contaminant. Surveillance of HA-SABSI has been well established in Australia since 2009, when the national HA-SABSI case definition and mandatory reporting was endorsed and implemented by all jurisdictions. Private hospitals also provide HA-SABSI data to the national dataset on a voluntary basis, or in line with their licensing requirements.

The Australian Health Ministers' Advisory Council endorsed a revised national benchmark for HA-SABSI, for the purpose of national reporting of public hospitals, of **1.0 per 10,000 patient days**. The new benchmark commenced on 1 July 2020, replacing the previous benchmark of 2.0 per 10,000 patient days.

The reporting of HA-SABSI rates in Australia occurs through a number of channels:

- The Australian Government Productivity Commission provides an annual Report on Government Services (RoGs), where each jurisdiction is required to submit annual HA-SABSI rates as a measure for patient safety
- The Australian Institute of Health and Welfare (AIHW) provides an annual HA-SABSI report on the rates within public hospitals and specific focus reports for private hospitals
- Individual hospital HA-SABSI rates are available on the MyHospitals website within patient safety and quality measures.

HA-SABSI are also included in the Hospital-Acquired Complications (HACs) list, which has been endorsed by all Australian Governments as part of a commitment to improving health outcomes for patients, and decreasing potentially

[1] Refers to the *Staphylococcus aureus* complex which is inclusive of *Staphylococcus argenteus, Staphylococcus aureus* and *Staphylococcus schweitzeri*.

avoidable demand for public hospital services. The HACs list specifically includes classification of healthcare-associated SABSI (U90.0 Healthcare associated *Staphylococcus aureus* bacteraemia in ICD-10-AM 10th edition and below; U92.0 Healthcare associated *Staphylococcus aureus* bacteraemia in ICD-10-AM 11th edition and above). HACs data are used to inform the National Health Reform Agreement funding for states and territories. For more information on the national health reform funding, see https://www1.health.gov.au/internet/main/publishing.nsf/Content/public-hospitals.

This Guide was developed by the Australian Commission on Safety and Quality in Health Care (the Commission) to support standardised national surveillance and reporting of HA-SABSI by Australian acute healthcare facilities (HCFs). This Guide does not replace or inform clinical assessment of suspected infections. A suspected SABSI, whether it is healthcare-associated or community-associated, requires appropriate clinical assessment and patient management.[6, 10]

This Guide supersedes the Commission's *2016 Implementation Guide for Surveillance of Staphylococcus aureus*. The case definition for HA-SABSI surveillance has been updated to further clarify the concept of infection being present or incubating on admission (See Box 1 – Criterion A1 and A2), to include the presence of a deep incisional/organ space surgical site infection ninety (90) days related to a surgically implanted device (See Box 1 - Criterion B2)[11] and to clarify the classification of infection associated with neutropenia and related to cytotoxic therapy (See Box 1 – Criterion B4).

The target audiences for this Guide are clinicians, infection prevention and control professionals and quality and safety managers who are responsible for HA-SABSI surveillance in their HCF.

Box 1: Healthcare-associated *Staphylococcus aureus* bloodstream infection (SABSI) case definition

A patient episode of a SABSI is a positive blood culture for *Staphylococcus aureus (S. aureus)*.

For surveillance purposes, only the first isolate per patient is counted, unless at least 14 days has passed without a positive culture, after which a subsequent episode is recorded.

A SABSI is healthcare-associated if **Criterion A1** or **2**, or **Criterion B1**, **2**, **3** or **4** are met.

CRITERION A
The patient's first *Staphylococcus aureus* positive blood culture was collected:

A1. More than 48 hours after admission, with no documented evidence that infection was present (including incubating) on admission

OR

A2. Less than 48 hours after discharge.

OR

CRITERION B

The patient's first positive *Staphylococcus aureus* blood culture was collected **less than or equal to 48 hours after admission and one or more of the following key clinical criteria** is met:

B1. SABSI is a complication of the presence of an indwelling medical device

B2. SABSI occurs within 30 days of a surgical procedure where the SABSI is related to the surgical site, or 90 days for deep incisional/organ space infections related to a surgically implanted device

B3. SABSI was diagnosed within 48 hours of a related invasive instrumentation or incision

B4. SABSI is associated with neutropenia* contributed to by cytotoxic therapy and is unrelated to the presence of an indwelling medical device.

If neither Criterion A1 or 2, nor Criterion B1, 2, 3 or 4 are met, then the SABSI is considered to be community-acquired for the purposes of surveillance.

*Neutropenia is defined as at least two separate calendar days with values of absolute neutrophil count (ANC) or total white blood cells count (WBC) <500 cells/mm^3 (<0.5 X 10^9/L) on or within a seven-day time period which includes the date the positive blood specimen was collected (Day 1), the three calendar days before and the three calendar days after.[11]

See Section 3 for information on the application of this definition.

2. Classification of *Staphylococcus aureus* bloodstream infections

The purpose of SABSI surveillance is to identify all SABSI related to the delivery of healthcare (i.e. healthcare-associated). Surveillance should capture both healthcare-associated infections where modifiable risk factors can be identified, as well as those infections where prevention may be more challenging.

Active surveillance should be undertaken by HCFs in order to identify every case of healthcare-associated SABSI. This process should include review of the patient by infection prevention and control staff or other staff trained in HAI surveillance. Where attribution of the SABSI is not clear, further investigation and consultation with the clinicians responsible for the patient's case management, including clinical microbiologists and/or infectious diseases physicians, may be necessary.

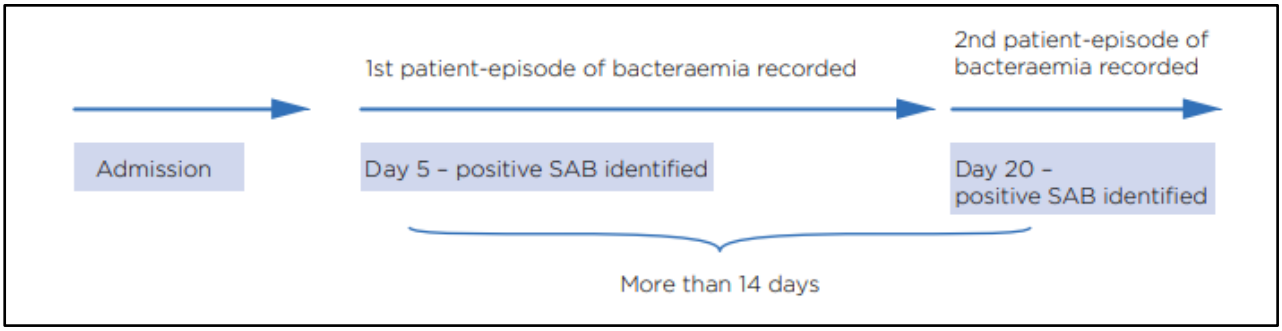
2.1 Classification of a subsequent SABSI episode

For surveillance purposes, a subsequent SABSI can only be recorded if 14 days or more has passed since the previous SABSI was detected. This is applicable in all settings, including haemodialysis settings.

Identifying and recording a subsequent SABSI

A patient has a positive set of blood cultures on Day 5 of admission. This is recorded as the patient's first SABSI. On Day 20 a second set of blood cultures is again positive for SABSI. As this is more than 14 days after the first SABSI, it is considered a subsequent SABSI (see Figure 1).

Figure 2. Classification of a subsequent SABSI



Resetting the clock

If a patient has positive blood cultures on Day 5 and Day 10 of their admission, the Day 10 result would be considered part of the initial SABSI and is not reported as a new infection.

The 14 day timeframe is then reset from Day 10. A new 14-day period must pass with no positive blood culture results before a subsequent SABSI can be recorded.

2.2 Classification of SABSI by antimicrobial susceptibility

When classifying a SABSI by antimicrobial susceptibility, classification should be based on cefoxitin susceptibility results and/or the presence of the mecA gene. A SABSI should be classified as either:

1. Methicillin-susceptible *S. aureus* (MSSA), or
2. Methicillin-resistant *S. aureus* (MRSA), which includes methicillin-resistant *S. aureus* defined as multi-resistant.

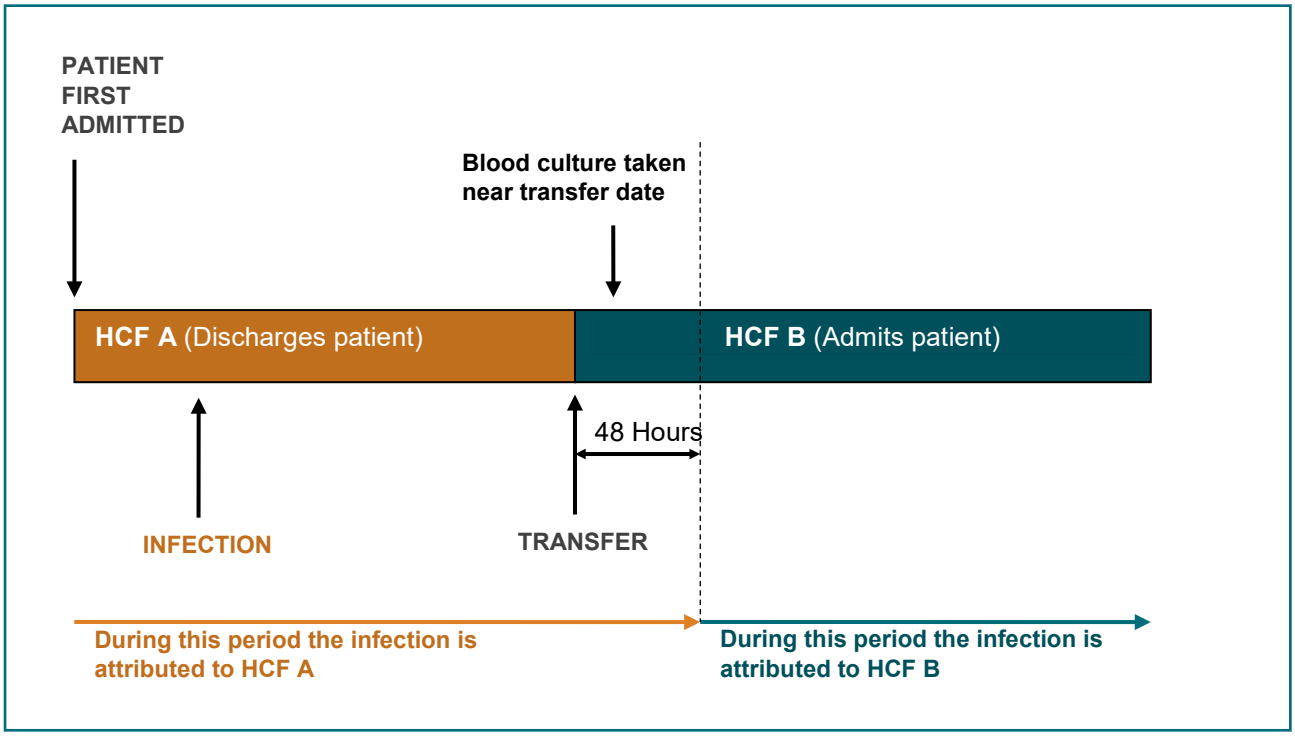
2.3 Determining location of attribution

The SABSI should be attributed to the location where the patient was assigned on the date of the positive blood culture, unless the Transfer Rule is applicable. The Transfer Rule is applicable if the SABSI occurred within 48 hours of transfer from another HCF (Figure 2). If the Transfer Rule is applied, the SABSI should be attributed to the HCF from which the patient was transferred. The principles of the Transfer Rule can also be applied at clinical unit or ward level.

If the patient was admitted to multiple HCFs within the Transfer Rule timeframe, the SABSI should be attributed to the first HCF to which the patient was admitted the day before the SABSI occurred. Receiving HCFs should share information with the transferring HCF to enable all SABSIs to be reported.

Accurate attribution is necessary to inform targeted review and improvement activities.

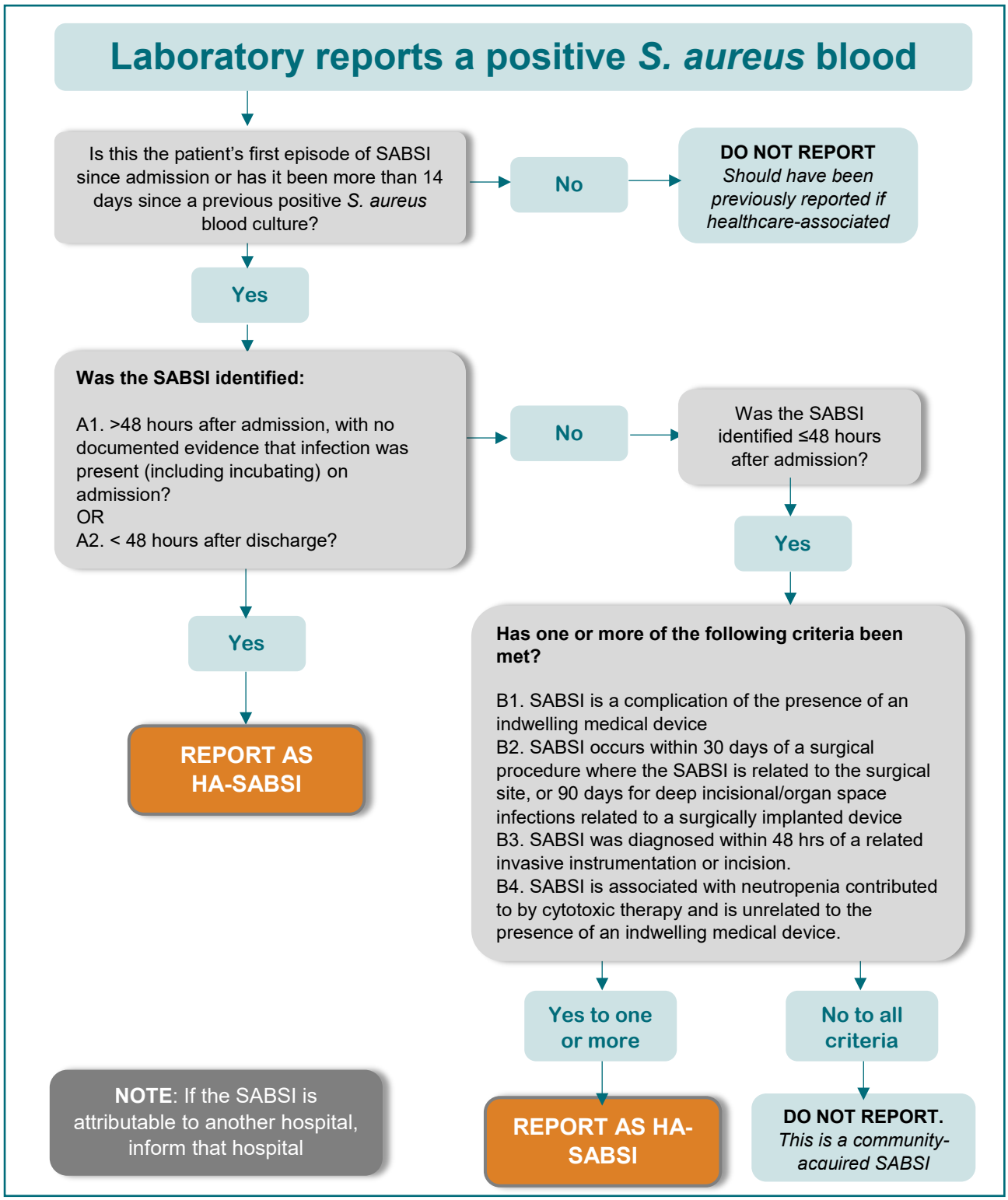
Figure 3. Diagrammatic representation of the Transfer Rule



3. Application of the healthcare-associated SABSI definition

The classification of SABSI as healthcare-associated requires strict application of the case definition. Figure 3 outlines the process of how to apply the HA-SABSI definition.

Figure 4. Flowchart of identification of HA-SABSI



3.1 Applying Criterion A

Present or incubating on admission

A SABSI should **not** be considered as a healthcare-associated infection if there were documented clinical signs or diagnostic evidence of an infection on admission, and there is no evidence of an association with a prior admission or medical procedure undertaken in a HCF (as per Criterion B).

Consultation with the patient's medical officer and/or a clinical microbiologist/infectious diseases physician may be required to determine if the patient was incubating on admission. If there is significant uncertainty, then the episode should be classified as HA-SABSI.

Occurs 48 hours or less after discharge

Every diagnosed SABSI, including those that occur within 48 hours of discharge from a HCF, will need to be investigated by appropriately trained staff.

In the event that a patient has received recent care in multiple HCFs, the Transfer Rule should be applied. Investigation is most effective when done contemporaneously (i.e. whilst the patient is admitted) and, as much as practically possible, should include information from the patient's healthcare records from all HCFs attended by the patient.

3.2 Applying Criterion B

Criterion B.1 Complication of indwelling medical device – an intravascular device or other device

A SABSI should be regarded as a complication of an **intravascular (IV) or non-IV indwelling device** (and therefore counted/reported as healthcare-associated) if the device was in place in the 48 hours prior to the SABSI being detected and there is no other identifiable focus of infection due to *S. aureus*. This does not require that the device was in place for the entire 48 hour period.

Non-IV indwelling devices include, but are not limited to, urinary catheters, percutaneous endoscopic gastrostomy (PEG) tubes, external ventricular drains, chest tubes and peritoneal dialysis catheters. If a SABSI is present 48 hours after the removal of the indwelling device, then there needs to be compelling evidence that the infection is related to the device in order for the SABSI to be classified under this criteria.

An introducer used in IV procedures (e.g. in angiograms) is considered an IV line according to the National Healthcare and Safety Network (NHSN) definitions.[11] A SABSI occurring within 48 hours of a procedure using an IV introducer should be attributed to this device unless there is an identifiable focus of infection likely due to *S. aureus* at another site.

If a patient has a haemodialysis access device in place, a SABSI should be attributed to the device if there is clinical evidence of infection at the vascular access site or there is no other identifiable source of infection due to *S. aureus.*

Patients who develop SABSI and are suspected of accessing or manipulating their own indwelling device should be reported as HA-SABSI.

Criterion B.2 Surgical procedure

A SABSI should be regarded as a complication of a surgical procedure (and therefore as a HA-SABSI) if there is a superficial or deep organ/space surgical site infection that is proven or suspected to be due to *S. aureus*.

A 90 day timeframe should be used to identify HA-SABSI associated with a deep organ/space surgical procedure (see Appendix 1).[11] This extended timeframe recognises the possibility for delayed presentation of infection in this context.

Deep organ/space surgical procedures may involve surgically implanted devices. Surgically implanted devices include, but are not limited to, permanent pacemakers, joint prostheses, nerve stimulators, breast implants and surgical mesh. Refer to the Therapeutic Goods Administration and jurisdictional guidance, where available, for further detail on what is considered an implanted device. For all other surgical procedures a 30 day timeframe should be used.

The SABSI should be allocated to the HCF where the surgical procedure was undertaken. Where multiple surgical procedures have occurred, even if for recurrent infection, a SABSI that meets the case definition should be allocated to the HCF where the most recent surgical procedure was undertaken.

Criterion B.3 Invasive instrumentation or incision within 48 hours

If there have been multiple incisions or instrumentation, and the source of the infection cannot be identified, the infection should be allocated to the most recent procedure, and the HCF where this was performed. Examples of invasive instrumentation include, but are not limited to pacing wires, endoscopic retrograde cholangiopancreatography, cardiac catheterisation and endoscope procedures with biopsy.

If the SABSI is present 48 hours after instrumentation or incision, then there needs to be compelling evidence that the infection is related to the instrumentation or incision in order for the SABSI to be classified under this criteria.

Criterion B.4 Associated with neutropenia caused by cytotoxic therapy and is unrelated to the presence of an indwelling medical device.

This criterion refers to drug-related neutropenia associated with the administration of cytotoxic therapy. It does not include neutropenia due to other causes, such as disease-related neutropenia.

Where the SABSI and neutropenia is related to the presence of an indwelling medical device (e.g. a central line), Criterion B.1, not Criterion B.4, should be applied.

See Appendix 2 for examples of the application of the SABSI case definition.

3.3 Community-acquired SABSI

If neither Criterion A or B are met, the SABSI should be considered a community-acquired infection.

3.4 Exclusions from the SABSI case definition

Only the first isolate per patient within a 14-day period is counted. A SABSI where a known previous positive blood culture has been obtained within the last 14 days should be excluded from reporting.

As the denominator does not account for patient days associated with unqualified neonates, hospital boarders or posthumous organ procurement, a SABSI related to these situations should not be counted.

4. Specimen collection considerations

4.1 Blood collection

A blood culture is required to confirm a SABSI.

Blood specimens for culture should ideally be obtained aseptically from at least two separate venepuncture sites, rather than through an intravascular device. It is recognised that this may be challenging in adults with difficult intravenous access and in the paediatric population. These blood draws should be collected on the same or consecutive calendar days.

Blood cultures drawn through intravascular devices can have a higher rate of contamination than blood culture collected through peripheral venepuncture, however all positive blood cultures, regardless of the sites from which they were collected, must be included when conducting SABSI surveillance.[12] When collecting from a peripheral cannula, blood collection should ideally be taken from one that has been newly inserted.

Ideally, blood from each access site is introduced into two separate specimen blood culture bottles (one aerobic, one anaerobic). Clinical assessment and local guidance should be considered where venous access or blood volume is a limiting factor.

The specimen bottles should be labelled with the site of collection (for example, left cubital fossa, CVC blue lumen).

When drawing blood for culture, aseptic technique must be used. This means using hand hygiene, gloves and ensuring the skin or device hub and culture bottle top are disinfected with an appropriate solution and allowed to dry before access. If key parts/sites are to likely be touched, sterile gloves should be worn.

4.2 The presence of contaminants

S. aureus is a rare contaminant in a blood culture. A positive culture of *S. aureus* will only be considered a contaminant, and therefore not reported in the surveillance data if:

- The clinical picture is unsupportive of infection AND a repeat blood culture is negative

AND / OR

- The clinical picture is unsupportive of infection, and no targeted *S. aureus* antimicrobial treatment has been given.

If blood culture results are inconsistent, the episode should be investigated to confirm whether it is a true bloodstream infection.

5. Calculation of *Staphylococcus aureus* bloodstream infection rate

5.1 Denominator

The nationally agreed denominator for calculating rates of HA-SABSI infections in Australian hospitals is patient days.[13] Patient days are calculated by counting the total number of patient days of those patients who separated during the specified period, including those admitted before the specified period. Patient days of those patients admitted during the specified period who did not separate until the following reference period are not to be counted.[14] For example, Patient A is admitted on 20 January and discharged on 20 February. Patient A generates zero patient days in the hospital's January record, and 31 patient days for February (11 days from the January period of the separation, and 20 days in February).

Patients admitted and separated on the same date (same-day patients) are to be given a count of one patient day.

HCFs that choose not to use the nationally agreed denominator may find it difficult to compare their HA-SABSI rates with HCFs that do use the agreed denominator.

Refer to jurisdictional surveillance units/arrangements for which HCFs should contribute patient days to the denominator. Where these arrangements are not in place, patient days from acute HCFs, as defined by the current METeOR definition, should contribute to the denominator.

Calculation of HA-SABSI rate

The rate of HA-SABSI is calculated as Figure 4 below.

The rate calculation can also be applied at the ward, unit, hospital, district, region or jurisdictional level as desired, and the numerator and denominator can be adjusted to aid analysis and interpretation as appropriate for specific settings (for example, to calculate rate for medical or surgical patients only, rates for teaching hospitals only etc.).

HCFs and jurisdictions should calculate and monitor their HA-SABSI rates over time in line with their HAI surveillance plans. When data from different HCFs and/or jurisdictions are compared, comparability may be affected by differences in admission practices, patient case mix and surveillance coverage.

Figure 5. Calculation for rate of HA-SABSI

Numerator:	Number of episodes of HA-SABSI X10,000
Denominator:	Number of patient days at the facility (including same-day admissions)

Glossary

Term	Definition
Acute healthcare facility	Establishments which provide at least minimal medical, surgical or obstetric services for inpatient treatment and/or care, and which provide round-the-clock comprehensive qualified nursing service as well as other necessary professional services. They must be licensed by the state health department, or controlled by government departments. Most of the patients have acute conditions or temporary ailments and the average stay per admission is relatively short. Hospitals specialising in dental, ophthalmic aids and other specialised medical or surgical care are included in this category. Establishments providing palliative care to terminally ill patients that are freestanding and do not provide any other form of acute care are classified are not included. See https://meteor.aihw.gov.au/content/index.phtml/itemId/619594
Admission	The process whereby the hospital accepts responsibility for the patient's care and/or treatment. Admission follows a clinical decision based upon specified criteria that a patient requires same-day or overnight care or treatment. An admission may be formal or statistical. • Formal admission: The administrative process by which a HCF records the commencement of treatment and/or care and/or accommodation of a patient. • Statistical admission: The administrative process by which a HCF records the commencement of a new episode of care, with a new care type, for a patient within one stay.
Aseptic technique	Aseptic technique is a set of practices aimed at minimising contamination and is particularly used to protect the patient from infection during procedures.
Blood culture	For adults, a blood culture set comprises two specimen bottles (aerobic and anaerobic); the usual sample volume is 8–10 millilitres (mLs) per bottle; for paediatric patients one aerobic bottle is required per sampling; the usual sample volume is 1–3mLs. For neonates, usual sampling is 0.5–1mL. Best practice recommends that two sets of blood cultures be collected from separate sites on the patient for identification of the SABSI. However, if the results are inconsistent, the episode should be investigated to confirm it is a true bacteraemia.
Healthcare-associated infection (HAI)	Healthcare-associated infections (HAIs) are infections acquired as a direct or indirect result of healthcare.
Hospital boarder	A person who is receiving food and/or accommodation but not medical care including newborns ≥10 days of age.
MRSA	Methicillin/oxacillin resistant *Staphylococcus aureus* based on cefoxitin susceptibility results and/or the presence of the mecA gene.
MSSA	Methicillin/oxacillin susceptible *Staphylococcus aureus* based on cefoxitin susceptibility results and/or the presence of the mecA gene.
Neutropenia (caused by cytotoxic therapy)	Defined as at least two separate calendar days with values of absolute neutrophil count (ANC) or total white blood cell count (WBC) <500 cells/mm^3 (<0.5 × 10^9 / L) on or within a 7-day time period which includes the date the positive blood specimen was collected (day 1), the 3 calendar days before and the three calendar days after. [11]

Term	Definition
Non-acute healthcare facility	A facility which provides services other than 'acute care' including hostels and hospices, residential aged care, alcohol and drug treatment centres, community health centres. See https://meteor.aihw.gov.au/content/index.phtml/itemId/619594
Patient days	Calculated by counting the total patient days of those patients separated during the specified period, including those admitted before the specified period. Patient days of those patients admitted during the specified period who did not separate until the following reference period are not counted. For example, Patient A is admitted on 20 January and discharged on 20 February. Patient A generates 0 patient days in the HCF's January record, and 31 patient days for February (11 days from the January period of the separation, and 20 days in February).
***Staphylococcus aureus* complex**	*Staphylococcus aureus* complex is inclusive of *Staphylococcus argenteus, Staphylococcus aureus* and *Staphylococcus schweitzeri.*
Unqualified neonate	A newborn is considered unqualified if the infant does not meet any of the below criteria: • is the second or subsequent live born infant of a multiple birth, whose mother is currently an admitted patient • is admitted to an intensive care facility in a hospital, being a facility approved by the Commonwealth Minister for the purpose of the provision of special care • is admitted to, or remains in hospital without its mother. https://meteor.aihw.gov.au/content/index.phtml/itemId/327254

References

1. Australian Institute of Health and Welfare. Bloodstream infections associated with hospital care 2018–19. Australian Institute of Health and Welfare; 20 Feb 2020; Available from: https://www.aihw.gov.au/reports/health-care-quality-performance/bloodstream-infections-associated-with-hospital-care/contents/what-are-staphylococcus-aureus-bloodstream-sab-infections.

2. Roberts S, Grae N, Muttaiyah S, Morris AJ. Healthcare-associated *Staphylococcus aureus* bacteraemia: time to reduce the harm caused by a largely preventable event. N Z Med J. 2020 Feb 7;133(1509):58-64.

3. Kok J, O'Sullivan MV, Gilbert GL. Feedback to clinicians on preventable factors can reduce hospital onset *Staphylococcus aureus* bacteraemia rates. J Hosp Infect. 2011 Oct;79(2):108-14.

4. Bassetti M, Peghin M, Trecarichi EM, Carnelutti A, Righi E, Del Giacomo P, et al. Characteristics of *Staphylococcus aureus* Bacteraemia and Predictors of Early and Late Mortality. PLoS One. 2017;12(2):e0170236.

5. Australian Commission on Safety and Quality in Health Care. AURA 2019: Antimicrobial Resistance. 2019; Available from: https://www.safetyandquality.gov.au/sites/default/files/2019-06/AURA-2019-Information-Sheet-AMR%20%281%29.pdf.

6. Morris AK, Russell CD. Enhanced surveillance of *Staphylococcus aureus* bacteraemia to identify targets for infection prevention. J Hosp Infect. 2016 Jun;93(2):169-74.

7. Newitt S, Myles PR, Birkin JA, Maskell V, Slack RC, Nguyen-Van-Tam JS, et al. Impact of infection control interventions on rates of *Staphylococcus aureus* bacteraemia in National Health Service acute hospitals, East Midlands, UK, using interrupted time-series analysis. J Hosp Infect. 2015 May;90(1):28-37.

8. Grayson ML, Stewardson AJ, Russo PL, Ryan KE, Olsen KL, Havers SM, et al. Effects of the Australian National Hand Hygiene Initiative after 8 years on infection control practices, health-care worker education, and clinical outcomes: a longitudinal study. Lancet Infect Dis. 2018 Nov;18(11):1269-77.

9. Rhodes D, Cheng AC, McLellan S, Guerra P, Karanfilovska D, Aitchison S, et al. Reducing *Staphylococcus aureus* bloodstream infections associated with peripheral intravenous cannulae: successful implementation of a care bundle at a large Australian health service. J Hosp Infect. 2016 Sep;94(1):86-91.

10. Oever J, Jansen, J., van der Vaart, T. et al. Development of quality indicators for the management of *Staphylococcus aureus* bacteraemia. Journal of Antimicrobial Chemotherapy. 2019;74: 3344–3351.

11. National Healthcare Safety Network (NHSN) Centers for Disease Control and Prevention. Patient Safety Component Manual. January 2020; Available from: https://www.cdc.gov/nhsn/pdfs/pscmanual/pcsmanual_current.pdf.

12. National Health and Medical Research Council, Australian Commission on Safety and Quality in Health Care. Australian Guidelines for the Prevention and Control of Infection in Healthcare. Canberra: NHMRC; 2019; Available from: https://www.nhmrc.gov.au/about-us/publications/australian-guidelines-prevention-and-control-infection-healthcare-2019.

13. Australian Institute of Health and Welfare. National *Staphylococcus aureus* Bacteraemia Data Collection, 2018–19: Quality Statement. 2020; Available from: https://meteor.aihw.gov.au/content/index.phtml/itemId/724058.

14. Australian Institute of Health and Welfare. Establishment—number of patient days, total N[N(7)]. 2005; Available from: https://meteor.aihw.gov.au/content/index.phtml/itemId/270045.

Appendix 1: Surveillance periods for SSI following selected operative procedure categories.

Day 1 = the date of the procedure.

30 day Surveillance			
Category	**Operative Procedure**	**Category**	**Operative Procedure**
AAA	Abdominal aortic aneurysm repair	LAM	Laminectomy
AMP	Limb amputation	LTP	Liver transplant
APPY	Appendix surgery	NECK	Neck surgery
AVSD	Shunt for dialysis	NEPH	Kidney surgery
BILI	Bile duct, liver or pancreatic surgery	OVRY	Ovarian surgery
CEA	Carotid endarterectomy	PRST	Prostate surgery
CHOL	Gallbladder surgery	REC	Rectal surgery
COLO	Colon surgery	SB	Small bowel surgery
CSEC	Caesarean section	SPLE	Spleen surgery
GAST	Gastric surgery	THOR	Thoracic surgery
HTP	Heart transplant	THYR	Thyroid and/or parathyroid surgery
HYST	Abdominal hysterectomy	VHYS	Vaginal hysterectomy
KTP	Kidney transplant	XLAP	Exploratory laparotomy

90 day Surveillance	
Category	**Operative Procedure**
BRST	Breast surgery
CARD	Cardiac surgery
CBGB	Coronary artery bypass graft with both chest and donor site incisions
CBGC	Coronary artery bypass graft with chest incision only
CRAN	Craniotomy
FUSN	Spinal fusion
FX	Open reduction of fracture
HER	Herniorrhaphy
HPRO	Hip prosthesis
KPRO	Knee prosthesis
PACE	Pacemaker surgery
PVBY	Peripheral vascular bypass surgery
VSHN	Ventricular shunt

Notes:

- Superficial incisional SSIs are only followed for a 30-day period for all procedure types.
- Secondary incisional SSIs are only followed for a 30-day period regardless of the surveillance period for the primary site.

Source: https://www.cdc.gov/nhsn/pdfs/pscmanual/9pscssicurrent.pdf

Appendix 2: Examples of the application of the SABSI case definition

Since commencing SABSI data collection in Australia, jurisdictions identified several scenarios that required clarification. See Table 1 below for commonly encountered scenarios and application of current definitions.

For each scenario, the following coding has been applied:

- HCF A = Acute Healthcare Facility A
- HCF B = Acute Healthcare Facility B
- NA-HCF = Non-acute healthcare facility e.g. aged care; residential aged care; rehabilitation or a private external service provider.

Table 1. Examples of the application of SABSI case definition

No.	Details	SAB Criteria that apply	Attributable HCF / Community	Rationale for Classification
1	**SABSI detected on admission to HCF A** • Patient discharged from HCF A for less than 48 hours • Patient has intravascular line in situ associated with a previous episode of care in HCF A	**Criterion A.2 or B.1** – Healthcare-associated: SAB less than 48 hours after discharge	HCF A	• HCF A reports SABSI as per Criterion A.2 and B.1
2	**Patient in HCF A for greater than 48 hours, no blood cultures collected** • Patient with IV in situ transferred to HCF B, blood culture collected on admission – SABSI detected	**Criterion A.1** – Healthcare-associated: SABSI greater than 48 hours after admission	HCF A	• HCF B infection control professional obligated to inform HCF A infection control professional of SABSI • HCF A required to report SABSI as per Criterion A.1
3	**Patient in HCF A for greater than 48 hours, SABSI detected day 5 (AV fistula insitu – endocarditis)** • Patient transferred to HCF B, blood cultures on admission negative • Subsequent blood culture (within 14 days of the SABSI in HCF A, identified on day 5) SABSI detected	**Criterion A.1** – Healthcare-associated: SABSI greater than 48 hours after admission	HCF A	• HCF A required to report initial SABSI as per Criterion A.1 • HCF B not required to report because case was a known previous SAB within last 14 days • **Note**: this example highlights the importance of accurate clinical notes in transfer summaries, and collaboration between HCFs A and B infection control professionals

No.	Details	SAB Criteria that apply	Attributable HCF / Community	Rationale for Classification
4	**Patient presents to ED in HCF A within 48 hours of an invasive radiological procedure at HCF A – blood culture collected & SABSI detected** • Patient directly transferred to HCF B for further management (not admitted to HCF A), no further blood cultures collected	**Criterion B.3** – Healthcare-associated: SABSI less than or equal to 48 hours after admission and one of the key clinical criteria met	HCF A	• HCF A is required to report SABSI as per Criterion B.3. • HCF B not required to report SABSI
5	**SABSI detected in ED and patient admitted to HCF A.** • Patient had Total Hip Replacement (implant) 2 months ago in HCF A – SABSI related to deep incisional /organ space infection	**Criterion B.2** – Healthcare-associated: SABSI less than or equal to 48 hours after admission and one of the key clinical criteria met	HCF A	• HCF A required to report SABSI as per Criterion B.2 • Less than 48 hours after admission and SABSI related to deep wound infection within 90 days of implant surgery
6	**Patient in NA-HCF for greater than 48 hours, blood culture collected & SABSI detected** • Patient transferred to HCF A, no blood culture collected	Community-associated	Community	• SABSI does not meet Criteria A or B • NA-HCF's are not required to report SABSI. • Recommend investigation and collection for own QI purposes
7	**Patient in HCF A greater than 48 hours with PICC in situ.** • Transfer to HCF B, failed vascath insertion on admission • Blood culture collected 8 hours after vascath attempt – SABSI detected • No signs of infection at PICC insertion site	**Criterion B.3** – Healthcare-associated: SABSI less than or equal to 48 hours after admission and one of the key clinical criteria met	HCF B	• HCF B required to report SABSI as per Criterion B.3 • SABSI occurred following invasive instrumentation, the most recent of which occurred in HCF B • Does not meet Criterion B1 as no signs of infection at PICC insertion site
8	**Patient in HCF A admitted with a leg ulcer colonised with *S. aureus*** • Patient has no clinical signs of sepsis on admission • Blood cultures taken 4 days after admission and SABSI detected • SABSI antibiotic susceptibilities same as wound swab	**Criterion A.1** – Healthcare-associated: SABSI greater than 48 hours after admission	HCF A	• HCF A required to report SABSI as per Criterion. A.1

No.	Details	SAB Criteria that apply	Attributable HCF / Community	Rationale for Classification
9	**Patient in HCF A fractured pelvis. SABSI detected 24 hours after admission. PICC inserted and treated for 14 days. No surgical intervention** • Admitted to HCF B 30 days after discharge from HCF A with infected pelvic fracture site • SABSI detected on admission	Community-associated: SABSI less than or equal to 48 hours after admission and none of the key clinical criteria met	Community	• Both episodes of SAB are within 48 hours of admission and neither meet Criteria A or B • Both HCF A and B note community-associated SABSI
10	**Patient had aortic valve replacement and coronary artery bypass graft at HCF A – May** • Admitted to HCF B 6 weeks later with deep sternal wound infection growing *S. aureus* and SABSI detected on admission. • SABSI antibiotic susceptibilities same as wound swab. • Aortic valve normal on echocardiography	**Criterion B.2** - Healthcare-associated: SABSI less than or equal to 48 hours after admission and one of the key clinical criteria met	HCF A	• HCF A required to report SAB as per Criterion B.2 • HCF B not required to report • Deep wound infection greater than 90 days and not related to implant. HCF B to notify HCF A of SABSI as per Criterion B.2
11	**Patient admitted to HCF A for drainage of ascites via catheter. Catheter remained insitu for 24 hours and removed. Patient discharged 1 day later** • Patient readmitted HCF A 36 hours later with septic shock, SABSI on admission • Ascites grows *S. aureus* • Insertion site inflamed • SABSI antibiotic susceptibilities same as ascites specimen	**Criterion B.1** – Healthcare-associated: SABSI less than or equal to 48 hours after admission and one of the key clinical criteria met	HCF A	• HCF A required to report SABSI as per Criterion B.1 • Invasive instrumentation with compelling evidence that the infection was related to the invasive procedure (*S. aureus* in ascites fluid)
12A	**Patient admitted HCF A for Total Hip Replacement – July** • Patient admitted HCF B for deep incisional / organ space wound infection, SABSI on admission – August • Transfer to HCF A for revision of Total Hip Replacement	**Criterion B.2** – Healthcare-associated: SABSI less than or equal to 48 hours after admission and one of the key clinical criteria met	HCF A	• HCF A required to report SABSI as per Criterion B.2 • Deep wound infection within 90 days of implant surgery • HCF B should ensure HCF A is aware of the event

No.	Details	SAB Criteria that apply	Attributable HCF / Community	Rationale for Classification
12B	**80 days after revision surgery admitted HCF A with deep Total Hip Replacement infection, SABSI detected on admission**	**Criterion B.2** – Healthcare-associated: SABSI less than or equal to 48 hours after admission and one of the key clinical criteria met	HCF A	• HCF A required to report SABSI as per Criterion B.2 • Deep wound infection within 90 days of implant surgery
13	**An outpatient from HCF A who has finished their last course of oral chemotherapy 10 days ago and has no recent history of an indwelling medical device being present has been admitted to HCF B with febrile neutropenia (meets neutropenia criteria) and a SABSI**	**Criterion B.4** – Healthcare-associated: SABSI less than or equal to 48 hours after admission and one of the key clinical criteria met	HCF A	• HCF A required to report SABSI as per Criterion B.4
14	**Patient undergoing haemodialysis via AV fistula at HCF A** • Three days after last haemodialysis admission presents with fever and SABSI	**Criterion B.1** – Healthcare-associated: SABSI less than or equal to 48hours after admission and one of the key clinical criteria met	HCF A	• HCF A required to report SABSI as per Criterion B.1 • Haemodialysis access device (fistula) considered an indwelling device

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