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HISWA

Healthcare Infection Surveillance Western Australia

Surveillance Manual

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Foreword

Healthcare associated infections (HAIs) are one of the most common causes of unintended harm suffered by health consumers. These infections cause the patient unnecessary pain and suffering and utilise significant human and financial resources within healthcare systems. It is increasingly recognised that HAIs are preventable adverse events rather than an inevitable complication of medical care.

Establishment of baseline HAI rates and ensuring ongoing monitoring is essential to measure the effectiveness of infection prevention strategies implemented to reduce the occurrence of HAIs.

Both private and public healthcare facilities (HCFs) in Western Australia (WA) voluntarily commenced contributing data to the Healthcare Infection Surveillance WA (HISWA) program in 2005. The introduction of mandatory indicators for all public HCFs and private HCFs contracted to provide care for public patients commenced in 2007. Private HCFs continue to contribute data voluntarily. The indicators collected for HISWA are described in Table 1.

The goals of the HISWA program are to:

- Ensure all WA hospitals utilise standardised definitions and methodology.
- Ensure the validity of data through formal and informal validation exercises.
- Identify trends and engage clinicians to review clinical care to minimise infection risks and thus reduce the incidence of HAIs.
- Ensure activities are aligned, where possible, with Australian and international surveillance programs to allow for relevant external benchmarking.
- Provide support to surveillance personnel contributing data to HISWA.

HISWA data is analysed by staff at the Healthcare Associated Infection Unit (HAIU). Aggregated data and detailed hospital specific reports are produced and distributed. All contributors are encouraged to internally review their own data to identify issues and trends in a timely manner. This surveillance manual contains the technical information to allow standardised definitions and methodology to be utilised by surveillance personnel reporting data to HISWA. If any hospital requires assistance with their surveillance program, the HAIU team are available to provide support.

Table 1 HISWA Indicators

HISWA INDICATORS	DATA COLLECTION COMMENCED	FREQUENCY FOR REPORTING	REQUIREMENTS FOR DATA SUBMISSION	STATUS (MANDATORY STATUS ASSIGNED)	COMMENTS Any private HCF can voluntarily submit data to HISWA where indicator is relevant to their facility.
Surgical site infection following hip and knee arthroplasty	July 2005	Monthly	Within 30 days from the end of the reporting month	Mandatory (October 2007)	Mandatory for all public metropolitan, regional resource centres and integrated district hospitals and private hospitals funded to provide care to public patients where arthroplasty procedures are performed.
Surgical site infection following caesarean section	April 2011	Monthly	Within 30 days from the end of the reporting month	Voluntary	Any public or private HCF performing the procedure
Healthcare associated bloodstream infection due to <i>Staphylococcus aureus</i> (MSSA and MRSA)	October 2007	Monthly	Within 30 days from the end of the reporting month	Mandatory* (October 2007)	*Requirement under National Healthcare Agreements 2009 Mandatory for all public metropolitan, regional resource centres and integrated district hospitals and private hospitals funded to provide care to public patients.
Central line associated bloodstream infections in intensive care units	July 2005	Monthly	Within 30 days from the end of the reporting month	Mandatory (October 2009)	Mandatory for all public hospitals and private hospitals funded to provide care to public patients with intensive care units.
Central line associated bloodstream infections in Haematology/ Oncology/	July 2005	Monthly	Within 30 days from the end of the reporting month	Voluntary	Any public or private HCF where the indicator is relevant.
Haemodialysis access-associated bloodstream infections (AV fistula, AV graft, Non-cuffed and cuffed catheters)	July 2005	Monthly	Within 30 days from the end of the reporting month	Mandatory (July 2009)	Mandatory for all public metropolitan, regional and integrated district hospitals and private HCFs funded to provide care to public patients for renal dialysis. It includes all licensed private satellite day dialysis facilities.

HISWA INDICATORS	DATA COLLECTION COMMENCED	FREQUENCY FOR REPORTING	REQUIREMENTS FOR DATA SUBMISSION	STATUS (MANDATORY STATUS ASSIGNED)	COMMENTS Any private HCF can voluntarily submit data to HISWA where indicator is relevant to their facility.
Healthcare associated infections due to methicillin-resistant <i>Staphylococcus aureus</i> (MRSA)	July 2005	Monthly	Within 30 days from the end of the reporting month	Mandatory (October 2007)	Mandatory for all public metropolitan, regional resource centres and integrated district hospitals and private hospitals funded to provide care to public patients.
Hospital-identified <i>Clostridium difficile</i> infection	January 2010	Monthly	Within 30 days from the end of the reporting month	Mandatory* (January 2010)	*Requirement under National Healthcare Agreements 2009 Mandatory for all public metropolitan, regional resource centres and integrated district hospitals and private hospitals funded to provide care to public patients.
Sterile site vancomycin-resistant enterococci (VRE) healthcare and community associated infections	January 2012	Monthly	Within 30 days from the end of the reporting month	Mandatory (January 2012)	Mandatory for all public metropolitan, regional resource centres and integrated district hospitals and private hospitals funded to provide care to public patients
Occupational exposure to blood and/or body fluids	January 2008	Monthly	Within 30 days from the end of the reporting month	Mandatory (January 2008)	Mandatory for all public metropolitan, regional and integrated district hospitals, Graylands Hospital and private hospitals funded to provide care to public patients.

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Module 1

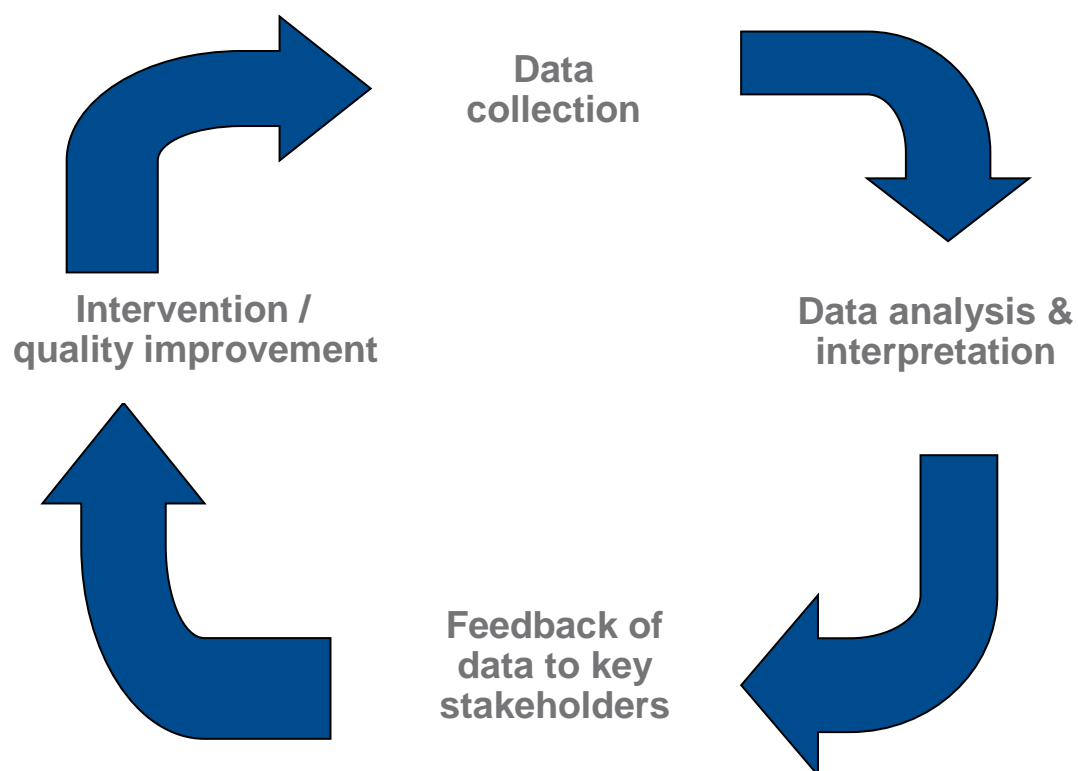
Surveillance of Healthcare Associated Infections

Surveillance of Healthcare Associated Infections

1. Surveillance Overview

Surveillance is the systematic collection, management, analysis, interpretation and reporting of data for use in the planning, implementation and evaluation of the provision of healthcare. The purpose of collecting and analysing surveillance data is to improve the quality and safety of patient care within a healthcare facility (HCF). Data should not be collected just for the purpose of collecting data – the data needs to be used to make change. Effective surveillance systems are the drivers for change and make it possible to evaluate the effectiveness of interventions. An effective surveillance system is one that provides timely feedback to HCF clinicians and managers to enable change to happen.¹

Figure 1 Essential components of the surveillance cycle



2. Rationale for Surveillance

Surveillance of HAIs provides objective data on which to base decisions.

Surveillance data allows determination of whether a problem exists, identification of the size of the problem and observation of trends over time. A sound surveillance system should help to:

- Determine baseline rates of HAI.
- Detect changes in rates or distribution of HAI.
- Facilitate investigation of significant increases in HAI rates.
- Assist in determining the effectiveness of infection prevention measures.
- Monitor compliance with established infection prevention practices.
- Evaluate interventions and change in practice.
- Identify areas where research would be beneficial.²

3. Types of HAI Surveillance

3.1 Outcome surveillance

Outcome surveillance involves measuring adverse healthcare events. Data may be expressed as:

- Rates: time-series of HAI counts or proportions.
- Point prevalence: the proportion of patients with HAIs at the time of the survey.
- Incidence over time: the number of patients who develop a new HAI.³

3.2 Process surveillance

Process surveillance involves auditing actual practice against evidence-based infection prevention strategies that are linked to improved outcomes e.g. auditing of compliance with surgical antibiotic prophylaxis. Improved processes should result in lower infection rates.³

3.3 Signal infection surveillance

Signal infection surveillance has been specifically developed to provide small and medium sized HCFs with a framework to investigate HAIs using a root cause analysis approach and to identify potential systemic issues requiring improvement.⁴

4. Selection of Surveillance Indicators

- In a HCF, infection prevention and control teams need to identify surveillance activities that will meet their facility's priorities and objectives. The traditional

hospital-wide surveillance, where data were collected on every infection identified, has been largely replaced by targeted surveillance that focuses on specific HAIs, organisms, medical devices or high-risk populations.

- Jurisdictional surveillance allows aggregation of data from many HCFs, leading to a larger dataset with increased statistical value. State-wide trends can be identified to inform priorities for state infection prevention policies.
- Indicators selected for jurisdictional HAI surveillance are generally:
 - procedures that are high volume or high risk for infection and are associated with high morbidity and mortality e.g. hip and knee arthroplasty
 - medical device use in high risk groups e.g. central venous catheters used in intensive care unit (ICU) patients
 - significant organisms associated with antibiotic resistance and high morbidity and mortality.

5. Surveillance Methodology

The value of surveillance is enhanced by providing high quality comparative data. For participating hospitals to make a valid comparison of their infection rates, the methodology used must be similar. HISWA aims for high sensitivity and specificity of reported HAIs. Sensitivity is based on false negative HAIs i.e. true HAI that are not reported and specificity is based on false positive HAIs i.e. reported infections that do not meet the HAI surveillance definitions.

Processes are required to ensure that surveillance personnel automatically receive copies of all microbiology reports, in real-time, for patients presenting to their facility, including outpatient and emergency presentations. HISWA requires surveillance personnel to implement active, prospective, patient-based surveillance.

The use of the flow charts for each indicator is recommended to assist case review.

5.1 Active, prospective case-finding

- Active case-finding processes are required to identify patients who develop HAIs from the time of their admission until discharge, and on readmission with infection.
- All microbiological results relevant to a surveillance indicator should be investigated and interpreted in conjunction with information from clinical sources.

- Each case-finding method has some merit and limitations, therefore, in addition to the review of all relevant laboratory reports, a combination of case-finding methods that can be applied to eligible patients should be in place that include:
 - total chart review for clinical data i.e. medical records, wound management plan, temperature chart, diagnostic and imaging reports e.g. x-ray, bone scan, ultrasound, biopsy and medication chart (antibiotics)
 - liaison with ward or clinical staff and regular ward rounds
 - use of patient management systems for admission histories
 - formal notification from clinical staff e.g. infection notification forms
 - administration and coding reports e.g. ICD-10-AM
 - pharmacy dispensing reports
 - medical referrals e.g. for microbiologist or infectious disease physician.

5.2 Patient-based surveillance

- Patient-based surveillance requires identification of all eligible patients for inclusion in the surveillance indicator. For example, in a reporting period:
 - all patients undergoing a specific surgery must be counted for SSIs
 - all patients that have had a central line in situ in ICU must be counted for ICU central line-associated bloodstream infection (CLABSI) surveillance.
- Surveillance personnel are required to determine the optimal method for obtaining denominator data for each surveillance indicator at their HCF. This may include the utilisation of :
 - theatre management systems / theatre booking slips / coding reports
 - medical records systems / business administration systems
 - ward staff on wards relevant to the surveillance indicator.

5.3 Definitions

Standardised surveillance definitions are essential for successful data collection and analysis. The definitions developed by the National Healthcare Surveillance Network (NHSN) within the Centers for Disease Control and Prevention (CDC) in the United States of America are the most comprehensive and widely used definitions for HAI surveillance. Adoption of these definitions allows for benchmarking opportunities with large international datasets. Data collection for many of the HISWA indicators is based on the NHSN definitions in addition to those developed for the Australian Council for Healthcare Standards (ACHS).

To improve the inter-rater reliability of HAI classification, contributors should:

- Ensure surveillance personnel are trained in the use of surveillance definitions.
- Ensure surveillance personnel apply consistent methodology for data collection and application of definitions.
- Classify infections strictly according to the definition and only include HAI that fulfil the criteria in the definition.
- Liaise with appropriate medical / surgical teams to assist in determining the source of the infection.
- Investigate the patient's history to identify the attributable HCF
- Refer any queries or ambiguities in relation to the application of the surveillance definitions to the HAIU.
- Complete classification scenarios developed by the HAIU.

6. Data Validation

All HISWA contributors need to have internal validation processes in place to ensure the data they are submitting is reliable and valid. Surveillance personnel should:

- Ensure, before submission of data, that the clinical, laboratory and other diagnostic information collected meets the criteria in the definition and communication has occurred with relevant stakeholders e.g. review of all SSI with a designated member of the surgical team.
- Generate appropriate facility-specific reports to enable cross checking of cases admitted for procedures and with infections e.g. ICD-10-AM reports.
- Use HISWA hospital level raw data report i.e. data entered in the HISWA database, to cross check with internal records prior to submission.
- Use consolidated laboratory reports and cross check to ensure all relevant cases have been investigated.
- Ensure administrators providing bed-day data are informed of the data requirements outlined in Module 8.
- Cross check denominator data received from administrators and other external departments with data from previous months to identify potential outliers.

7. Data Entry to HISWA

Prior to utilising the HISWA database, contributors should ideally meet with a member of the HAIU team for an introductory training session. A username and password is assigned to each hospital to allow login to the database.

All contributors have access to the *HISWA Database Manual* to assist with the technical details of data entry to the HISWA database. This can be accessed from the menu page of the database following login. All contributors need to ensure they:

- Enter data accurately into the HISWA database.
- Save each record after data entry.
- Use the *Raw Data Report* in the *Reports* module to check both numerator and denominator data prior to finalising data.
- Ensure HAIs are entered in the appropriate modules when they meet the definition for multiple indicators e.g. an MRSA BSI needs to be entered in the *Specific Organism* module and the *Specific Organism Bloodstream* module.
- Use the *Finalisation Page* and finalise data monthly for the previous month e.g. April data must be finalised by the last day of May.

8. Data Analysis

Data analysis is an essential component of the surveillance cycle so that HAIs can be described and communicated in a meaningful way.

8.1 Calculation of rates

- A rate indicates a relationship between two measurements with different units of measure and is used in HAI surveillance to describe HAIs in patient populations of different sizes and in different time periods.
- A rate has three components:
 - numerator: the number of infections
 - denominator: the number of patients at risk
 - constant: a multiple of 10 that results in a number greater than zero.
- Mathematically, the rate is calculated as: $\text{numerator} \div \text{denominator} \times \text{constant}$.
- Rates are generally expressed according to the denominator and the constant used e.g. per 100 surgical procedures or per 1000 central line days.

8.2 The p value

- The p value determines the probability that the difference between two rates has arisen by chance.
- If the probability is low (<0.05 or 5%) then the difference in rates is considered to be unlikely due to chance alone and therefore represents a significant difference.

8.2 Confidence intervals

- HISWA rates are calculated with 95% confidence intervals (CI) which provides an indication of the true infection rate.
- The CI displays the lowest and highest values that the true infection rate is likely to fall between 95% of the time.
- As a general rule, a larger sample size results in a narrower CI and thus gives a better indication of the true rate.

8.3 Risk stratification

- Risk stratification categorises patients at risk of infection into homogenous groups so that comparisons of infection rates can be made between groups with similar risk factors.
- Examples of risk stratification used by HISWA include:
 - a risk index score for surgical patients based on their estimated risk of infection relative to other patients undergoing the same surgery
 - categorisation of MRSA infections according to ICU and non-ICU settings
 - categorisation of haemodialysis access device associated infections according to the type of access device
 - categorisation of surgical procedures by elective or emergency status.

8.4 Benchmarking

- Benchmarking involves comparing an infection rate with another point of reference which gives an indication of performance.
- Benchmarking should only be used as a guide and interpreted with caution due to potential variability in case mix, size of population and surveillance practice.

9. Interpretation of reports

The following information further assists with the interpretation of specific HISWA reports produced by the HAIU e.g. the hospital quarter report.

9.1 WA Aggregate rate

- This is an infection rate calculated from combined data submitted to HISWA from all contributing hospitals in WA for a specified period.
- It provides a useful benchmark with which individual hospitals can compare their infection rate for the same period.

9.2 Cumulative WA Aggregate rate

- The cumulative aggregate rate is the overall rate for WA since data collection commenced for that indicator.
- The cumulative aggregate rate is the total number of infections (numerator) divided by the total relevant denominator for WA since reporting commenced.

9.3 Cumulative hospital infections and rate

- The cumulative number of infections for a hospital is the total number of infections that have been reported for an indicator since their inclusion in the HISWA program.
- The cumulative hospital rate is the total number of infections divided by the total relevant denominator since reporting commenced.

9.4 Rate previous two quarters

- This measure provides an internal benchmark to determine short term trends in the infection rate over time.
- It is the number of infections over the previous two quarters divided by the relevant denominator over the previous two quarters.

9.5 Trend

- Trend is a term used to describe the general movement in rates over time. HISWA reports describe trends in terms of quarterly rates.
 - rate this quarter greater than previous quarter and indicated by ↑
 - rate this quarter less than previous quarter and indicated by ↓
 - rate this quarter equal to previous quarter and indicated by ⇔

9.6 Comparator rate

- Where possible, a comparator rate from another Australian state or overseas country will be used for external benchmarking.
- Comparators are selected based on the use of the same definitions and methodology to HISWA and the sample size is sufficiently large to calculate a valid infection rate.

9.7 Infection rates from small hospitals

- High infection rates and wide confidence intervals may be reported when there are small denominator numbers reported from small hospitals.
- This also means that a small increase in the number of infections can result in a large increase in the infection rate. Therefore rates should always be interpreted carefully and in conjunction with other information.

10. Reporting and Feedback

Feedback of analysed data in a timely manner to key stakeholders is an important requirement of surveillance programs to drive change and improve outcomes and has been demonstrated to be effective in reducing infections when provided to clinicians.³

Surveillance results need to be communicated to appropriate committees and to the executive management who are accountable for patient safety and quality and have the ability to make change within the facility.

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Module 2

Surgical Site Infection

Surgical Site Infection

A surgical site infection (SSI) is an infection that develops as a result of an operative procedure. They are associated with increased morbidity and mortality, prolonged hospital stay and increased healthcare costs. Surveillance of SSIs, coupled with prompt feedback of data to surgeons and key stakeholders, has been shown to be an important strategy to reduce SSI.¹

1. HISWA Operative Procedures

- A HISWA operative procedure is a procedure that is included in Appendix 1 **and** takes place during an operation where at least one incision (including laparoscopic approach) is made through the skin or mucous membranes, or reoperation via an incision that was left open during a prior procedure **and** takes place in an operating room (OR).
- Both emergency and elective operative procedures are to be included for each procedure listed.
- Specific requirements for HISWA procedures are described in Section 6.0.

1.1 Primary and non-primary closure

- Primary closure: is defined as closure of all tissue levels during the original surgery, regardless of the presence of wires, wicks, drains, or other devices or objects extruding through the incision. This category includes surgeries where any portion of the incision is closed at skin level (by any manner) and those described as “loosely closed” at skin level.
- Non-primary closure: is defined as closure other than primary where the incision is not closed at all tissue levels i.e. surgeries in which some of the tissue layers (deep or superficial) are left open.

1.2 Emergency and elective procedures

- Elective: a planned procedure at a time to suit the patient and surgical team.
- Emergency: a non-elective, unscheduled operative procedure that does not allow for the standard preoperative preparation normally done for a scheduled operation e.g. stabilisation of vital signs, pre-operative showering, adequate antiseptic skin preparation.
- For emergency caesarean section refer to section 6.2 for specific definition.

2. Methodology

For participating hospitals to make a valid comparison of their SSI rates the methodology must be similar and infection definitions consistently applied. Therefore, active, prospective, patient-based surveillance is required and needs to be performed by trained infection prevention and control personnel. Refer to Module 1 for an introduction to surveillance of HAIs.

2.1 Denominator data

- Patient-based surveillance requires identification of all eligible patients undergoing the selected operative procedure.
- Eligible patients can be determined in liaison with operating theatre management systems / theatre bookings / theatre coding / medical record systems and notifications from theatre staff.

2.2 Numerator data

- Patient-based surveillance requires monitoring of all patients undergoing a HISWA procedure for identification of a SSI within the designated follow-up period for that specific procedure.
- Active, prospective case-finding is required to monitor SSIs from the time of the surgical procedure and during the post-operative stay until discharge.
- Processes are required to detect patients who are readmitted to hospital for treatment of SSIs.

2.3 Classification of SSI

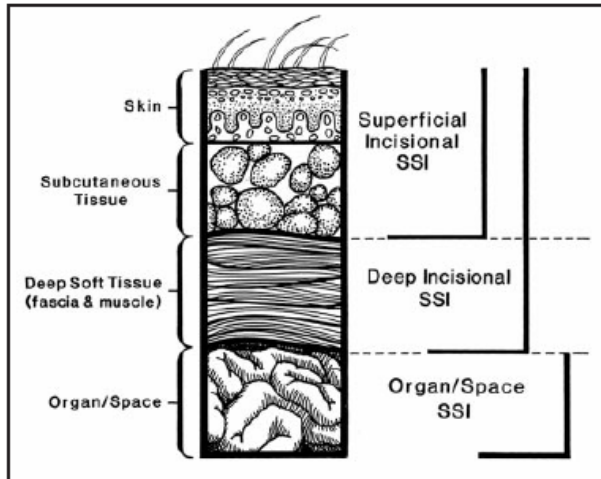
- To improve the classification inter-rater reliability, contributors should:
 - classify SSI strictly according to definitions
 - liaise with the surgical team, other contributors and the HAIU for difficult classifications.

3. Definitions

3.1 Types of SSI

A surgical site infection can be classified as either a superficial incisional, deep incisional or an organ / space infection (Figure 2)². HISWA data combines deep incisional and organ / space infections to allow for more meaningful statistical analysis and align with published reports from other jurisdictions.

Figure 2 Schematic of SSI anatomy and classification



3.1.1 Superficial SSI

A superficial incisional SSI involves only the skin and subcutaneous tissue of the incision.

3.1.2 Deep SSI

A deep incisional SSI involves deep soft tissues e.g. fascia and muscle layers.

3.1.3 Organ / space SSI

An organ / space SSI involves any part of the body, excluding the skin incision, fascia or muscle layers that is opened or manipulated during the operative procedure.

3.2 Criteria for SSI

The criteria for each type of SSI are outlined in Tables 2, 3 and 4.

Note for Tables 1,2 and 3: * The Surgeon or attending physician includes surgeon(s), infectious diseases or emergency physician, other physician on the case or physician's designee e.g. nurse practitioner or physician's assistant or other designee. Note: The prescription of antimicrobials alone is not sufficient evidence of diagnosis of SSI. These cases need to be carefully evaluated by the surveillance personnel to ensure the definition of a SSI has been met. If the reason for treatment has not been documented the case requires discussion with the surgeon or attending physician.

Table 2 Criteria for superficial incisional SSI

<p>To classify as a superficial incisional SSI the following criteria must be met:</p>
<p>Infection occurs within 30 days after the operative procedure (where day 1 = the procedure date) and involves only skin or subcutaneous tissue of the incision and the patient has at least <u>one</u> of the following:</p> <ul style="list-style-type: none"> a) purulent discharge from the superficial incision b) organisms isolated from an aseptically-obtained culture of fluid / tissue from the superficial incision i.e. obtained in a manner to prevent introduction of organisms from surrounding tissues into the specimen being collected c) a superficial incision that is deliberately opened by a surgeon or attending physician* resulting in a positive specimen culture or a specimen is not obtained for culture <p>and</p> <p>patient has at least one of the following signs or symptoms:</p> <ul style="list-style-type: none"> – pain or tenderness; localised swelling; redness or heat <p>Note: A negative culture result from a specimen does not meet this criterion.</p> <ul style="list-style-type: none"> d) diagnosis of superficial incisional SSI by the surgeon or attending physician*
<p>Comments</p>
<ul style="list-style-type: none"> ■ Do not report the following as a SSI: <ul style="list-style-type: none"> – a stitch abscess (minimal inflammation and discharge confined to the points of suture penetration). – a localised stab wound (e.g. drain incision site) or pin site infection – superficial incisions that are shown to be colonised with microorganisms by the collection of a wound swab (in contrast to a wound aspirate) and that are without clinical signs of infection – diagnosis of “cellulitis” by itself, does not meet criterion d) ■ Classify SSIs that involve both superficial and deep incisional sites as deep incisional. ■ * Refer to Section 3.2.

Table 3 Criteria for deep incisional SSI

To classify as deep incisional SSI the following criteria must be met:
<p>Infection occurs within 30 or 90 days of operative procedure (where day 1 = the procedure date) depending on the type of procedure (See Section 3.6) and involves deep soft tissues of the incision e.g. fascial and muscle layers and the patient has at least <u>one</u> of the following:</p> <ul style="list-style-type: none"> a) purulent drainage from the deep incision b) a deep incision that spontaneously dehisces or is deliberately opened by a surgeon or attending physician* resulting in a positive specimen culture or a specimen is not obtained for culture <p>and</p> <p>patient has at least one of the following signs or symptoms :</p> <ul style="list-style-type: none"> – fever (> 38⁰C); localised pain or tenderness. <p><i>Note: A negative culture result from a specimen does not meet this criterion.</i></p> <ul style="list-style-type: none"> c) an abscess or other evidence of infection involving the deep incision that is detected on direct examination, during invasive procedure, or by histopathologic examination or imaging test.
Comments
<ul style="list-style-type: none"> ▪ Classify SSIs that involve both superficial and deep incisional sites as deep incisional ▪ Classify SSIs that involve both deep incisional sites and organ/space as organ/space SSI. ▪ * Refer to Section 3.2.

Table 4 Criteria for organ / space SSI

To classify as organ / space SSI the following criteria must be met:
<p>Infection occurs within 30 or 90 days of the operative procedure (where day 1 = the procedure date) depending on the type of procedure (See Section 3.6) and involves any part of the body , excluding the skin incision, fascia, or muscle layers, that is opened or manipulated during the operative procedure and the patient has at least <u>one</u> of the following:</p> <ul style="list-style-type: none"> a) purulent drainage from a drain that is placed into the organ /space b) organisms isolated from an aseptically- obtained culture of fluid or tissue in the organ / space c) an abscess or other evidence of infection involving the organ / space that is detected on direct examination, during invasive procedure, or by histopathologic examination or imaging test <p>and</p> <p>Meets at least one criterion for a specific organ/space infection site (Refer to Appendix 2)</p>
Comments
<ul style="list-style-type: none"> ▪ Because an organ/space SSI involves any part of the body, excluding the skin incision, fascia, or muscle layers, that is opened or manipulated during the procedure, the criterion for infection at these body sites must be met in addition to the organ/space SSI criteria. Examples of specific organ/space infection sites are endometritis following a caesarean section or osteomyelitis following an arthroplasty procedure. Refer to Appendix 2 for infection criterion for body sites relevant to HISWA operative procedures. ▪ If a patient has an infection in the organ/space being operated on, subsequent continuation of this infection type during the remainder of the surveillance period is considered an organ/space SSI if organ/space SSI and site-specific infection criteria are met. ▪ Classify SSIs that involve superficial and /or deep incisional sites and organ/space as organ/space SSI. ▪ * Refer to Section 3.2.

3.3 Specimen classification

Classification of a specimen as either sterile or non-sterile assists in interpreting the clinical significance and determining if the criteria for classification as a SSI are met.

3.3.1 Sterile specimen

Wound aspirates and tissue biopsies that are aseptically obtained i.e. obtained in a manner to prevent introduction of organisms from surrounding tissues into the specimen being collected e.g. specimens collected intra-operatively. Sterile specimens are unlikely to be contaminated with skin micro-organisms and therefore positive results are significant evidence of infection.

3.3.2 Non-sterile specimen

Non-sterile specimens are potentially contaminated with skin micro-organisms and therefore positive results require further clinical assessment to determine if infection is present e.g. swabs of the incision, dehisced and debrided tissue.

3.4 Point of detection of SSI

Infections may be detected at three possible points and are reported accordingly.

3.4.1 Detected during initial admission

Detected during the initial hospitalisation following the procedure and prior to discharge from the hospital or hospital in-the-home (HITH).

3.4.2 Detected on readmission

Detected on readmission to hospital or to a HITH service for treatment of the SSI e.g. intravenous antimicrobial therapy, surgical washout, removal of prosthesis and includes readmission to another hospital.

3.4.3 Detected and treated as an outpatient and other post-discharge surveillance

Detected and treated as an outpatient, and the patient is not admitted to a hospital or a HITH service for treatment of the SSI. This information may be identified by active post-discharge surveillance (PDS) or by notification from outpatient departments (clinic, emergency department) or general practitioners. Due to the lack of uniformity for PDS between HCFs, this data should be recorded by the facility and reported to HISWA but is not included in calculations of HISWA SSI rates used for benchmarking purposes.

3.5 Surveillance period

All eligible patients under surveillance for SSI must be followed up during the initial admission period until discharge and monitored for readmission. To detect a SSI, procedures are to be monitored for the following periods:

- 30 days for superficial SSI for all procedures and either 30 or 90 days for deep and organ/space infections depending on the procedure:
 - **Caesarean section:** follow-up period post-procedure is 30 days
 - **Hip and knee arthroplasty:** follow-up period post-procedure is 90 days.

4. SSI Risk Index

The risk index is recommended by the NHSN as a method of stratification of risk for infection associated with surgery^{2, 4}. The higher the patient's risk index score, the higher the risk the patient has of developing an SSI. Risk-adjusted rates allow statistical adjustment for differences across participating hospitals.

4.1 Calculation of risk index

- The risk index consists of three risk factors (host and procedure related).
- Risk index = ASA¹ class + duration of surgery + surgical wound classification.
- A score is assigned for each risk factor and the total score is calculated by adding the three scores together.
- If an operative procedure is performed through the same incision within 24 hours e.g. for complications, combine the procedure duration times and report the higher wound class and ASA score, if they have changed.
- Risk index factors and scores are described in detail in Appendix 3.

4.2 Reporting of risk index

- Hospitals performing more than 100 of each procedure type per year are required to calculate risk index for all eligible patients.
- Hospitals performing less than 100 of each procedure type per year are not required to calculate the risk index, however, risk index classification is encouraged to allow for more meaningful data analysis. Under the risk index exemption, all eligible patients are classified as *All*. Do not submit a mixture of risk index and *All* data.

¹ ASA =American Society of Anaesthesiology

5. HISWA Dataset

5.1 Numerator data fields

Data described in Table 5 is required to be entered in the HISWA database.

Table 5 SSI numerator data fields and descriptors for HISWA database

Data field	Descriptor
Patient ID	Unique patient identifier <ul style="list-style-type: none"> Public hospital: medical record number Private hospital: patient initials or medical record number
Date of birth	Patient date of birth
Procedure	Select correct operative procedure from drop down list e.g. primary hip arthroplasty revision knee arthroplasty emergency caesarean section
Date of procedure	Date the operative procedure was performed
Date infection identified	Date the SSI infection criterion were met
Risk index	Patient risk index classified as 0, 1, 2, 3, N/A (not available) For hospitals performing less than 100 of each procedure per annum, risk index classification = 'all' with option to classify 0,1,2,3,N/A but not both
Point of detection	<ul style="list-style-type: none"> Initial admission Readmission Outpatient and other post discharge
Infection classification	<ul style="list-style-type: none"> Superficial Deep or organ space
Specimen	<ul style="list-style-type: none"> Sterile Non-sterile Not obtained
Organism 2	The 2 nd pathogenic organism isolated from a specimen
Organism 3	The 3 rd pathogenic organism isolated from a specimen

5.1.1 Numerator reporting instructions

- If a patient has several procedures performed on different dates, e.g. primary followed by revision, attribute the SSI to the procedure performed closest to the date of infection onset, unless there is evidence that the infection was associated with a different operation.
- If during the post-operative period the surgical site has an invasive manipulation for diagnostic or therapeutic purposes e.g. needle aspiration and following this manipulation a SSI develops, this infection is not attributed to the operation. This does not apply to closed manipulation e.g. closed reduction of a dislocated hip or wound packing.
- If the SSI is detected at a HCF that did not perform the initial procedure, contributors must inform the HAIU. The SSI will be assigned to the HCF where the initial procedure was performed.
 - SSI detected at another HCF following transfer during the primary hospitalisation period are to be reported as an 'Initial admission SSI' for the HCF that performed the procedure.
 - SSI detected on readmission to another HCF are to be reported as a 'readmission SSI' for the HCF that performed the procedure.

5.1.2 Numerator reporting instructions for specific post-operative infection scenarios

- A SSI that meets the definitions should be reported without regard to post-operative accidents, falls, inappropriate showering or bathing practices, or other occurrences that may or may not be attributable to patients' intentional or unintentional postoperative actions.
- SSI should be reported regardless of the presence of certain skin infections e.g. dermatitis, blister, impetigo that occur near an incision
- SSI should be reported regardless of the possible occurrence of a "seeding" event from an unrelated procedure e.g. dental work.

5.2 Denominator data fields

Table 6 describes the denominator data to be entered into the HISWA database.

- The total number of eligible patients meeting each risk index score for each type of procedure is required.
- Risk index reporting requirements are outlined in section 4.2. Refer also to section 6 for HISWA specific procedures. The risk index descriptors and score calculations are described in Appendix 3.
- If risk index scores are entered, the “All” category is not required.

Table 6 SSI denominator data fields for HISWA database

Procedure names are listed	Risk 0	Risk1	Risk 2	Risk 3	All	N/A
e.g. Revision hip arthroplasty						
Elective caesarean section						

5.2.1 Denominator reporting instructions

- If a patient returns to the operating room within 24 hours from the original procedure for another procedure through the same incision, only one procedure is counted in the denominator. Combine the duration time for both procedures and use the wound class that reflects the highest degree of contamination.
- Bilateral procedures performed during the same trip to the operating room, are counted as two separate procedures.
- If a patient dies in the operating room, do not count in the denominator.

6. Specific Information for HISWA Operative Procedures

6.1 Hip and knee arthroplasty

- Procedure inclusions (denominator)
 - all total, partial, primary and revision procedures that have an ICD-10 code listed in the HISWA operative procedures (Appendix 1)
 - both elective and emergency procedures are to be included
 - revision procedures for both mechanical and infective reasons
 - bilateral hip or knee procedures performed during the same trip to the operating room, are counted as two separate procedures.

- Procedure exclusions (denominator)
 - procedures that do not have an ICD-10 code listed in the HISWA operative procedures, e.g. hip-resurfacing procedures, hemiarthroplasty of fractured neck of femur.
- SSI inclusions (numerator)
 - superficial SSI detected up to 30 days after the procedure
 - deep or organ / space SSI detected within 90 days of the procedure
 - SSI detected following a revision for infective reasons, where the infecting organism is the same or different than the organism causing the original SSI and there is a new infective episode i.e. SSI definitions are met again.
- SSI exclusions (numerator)
 - superficial SSI that are detected more than 30 days after the procedure
 - deep and organ / space SSI detected more than 90 days after the procedure.
- SSI risk index
 - length of surgery
 - duration cut point for hip and knee arthroplasty procedures is 120 minutes for hips and 103 minutes for knees
 - for bilateral procedures: if performed concurrently, calculate the duration for the entire procedure. If performed sequentially, calculate using the procedure with the longest duration.
 - wound class
 - wound classification for primary and revision arthroplasty for mechanical reasons is 'clean' unless other factors are present
 - wound classification for revision arthroplasty for infective reasons is classified as 'dirty or infected.' Refer Appendix 3.

6.2 Caesarean section

- Procedure inclusions (denominator)
 - classical and lower uterine segment caesarean section (LUSCS)
 - emergency and elective procedures.
- SSI inclusions (numerator)
 - superficial and deep or organ / space SSI that are detected up to 30 days after the procedure date.

- SSI exclusions (numerator)
 - superficial and deep or organ / space SSI detected more than 30 days after the procedure.
- SSI risk index
 - length of surgery
 - duration cut point for caesarean section is 48 minutes (skin incision to skin closure).
 - wound class
 - wound classification for caesarean section , with or without pre-rupture of membranes or labour, is 'clean-contaminated' unless other factors are present
 - if membranes have been ruptured for more than 6 hours then classify as contaminated.⁶ Refer Appendix 3.
- Emergency procedures:
 - an unplanned procedure for reasons determined as compromising to the mother or fetus requiring earlier than planned delivery⁶. Refer to Appendix 1: ICD-10-AM codes for emergency and elective procedures.

7. Calculation of SSI Rate

- The SSI rate for each procedure is expressed per 100 procedures and is stratified according to risk index.
- HISWA rates do not include SSI detected as outpatient or other post-discharge surveillance.
- The SSI is included in the numerator of a rate, based on the date the operative procedure was performed, not the date the SSI was identified.
- Rate = $\frac{\text{Number of SSI} \times 100}{\text{Number of procedures}}$

8. References

1. Haley, R, Culver D, White J, Morgan W, Emori, T, Munn, V. The efficacy of infection surveillance and control programs in preventing nosocomial infection in US hospitals. *Am J Epidemiology* 1985; 121:182-205.
2. The National Healthcare Safety Network (NHSN), Centers for Disease Control (CDC). Procedure-associated events. Surgical Site Infection (SSI). January 2014. <http://www.cdc.gov/nhsn/pdfs/pscmanual/9pscscssicurrent.pdf>
3. Centres for Disease Control and Prevention. CDC/NHSN surveillance definitions for specific types of infections. January 2014. Accessed 18 Jun 2014. http://www.cdc.gov/nhsn/pdfs/pscmanual/17pscnosinfdef_current.pdf
4. National Healthcare Safety Network Report (NHSN), Data summary for 2006 through 2008, reported December 2009. <http://www.cdc.gov/nhsn/PDFs/dataStat/2009NHSNReport.pdf>
5. Australian Council on Healthcare Standards (ACHS), Infection Control Clinical Indicators User Manual 2014.
6. The Royal Australian and New Zealand College of Obstetricians and Gynaecologists – College Statement C-obs 14. November 2009.

Appendix 1 HISWA Operative Procedures and ICD-10-AM Codes

Specialty	ICD-10-AM Code	Description
Orthopaedic	Hip Arthroplasty	
	4931800	Total arthroplasty of hip, unilateral
	4931900	Total arthroplasty of hip, bilateral
	4932400	Revision of total arthroplasty of hip
	4932700	Revision of total arthroplasty of hip with bone graft to acetabulum
	4933000	Revision of total arthroplasty of hip with bone graft to femur
	4933300	Revision of total arthroplasty of hip with bone graft to acetabulum and femur
	4933900	Revision of total arthroplasty of hip with anatomic specific allograft to acetabulum
	4934200	Revision of total arthroplasty of hip with anatomic specific allograft to femur
	4934500	Revision of total arthroplasty of hip with anatomic specific allograft to acetabulum and femur
	4931500	Partial arthroplasty of hip
	4934600	Revision of partial arthroplasty of hip; liner / spacer exchange
	Knee Arthroplasty	
	4951700	Hemiarthroplasty of knee
	4951800	Total arthroplasty of knee, unilateral
	4951900	Total arthroplasty of knee, bilateral
	4952100	Total arthroplasty of knee with bone graft to femur, unilateral
	4952101	Total arthroplasty to knee with bone graft to femur, bilateral
	4952102	Total arthroplasty to knee with bone graft to tibia, unilateral
	4952103	Total arthroplasty to knee with bone graft to tibia, bilateral
	4952400	Total arthroplasty of knee with bone graft to femur and tibia, unilateral
	4952401	Total arthroplasty of knee with bone graft to femur and tibia, bilateral
	4952700	Revision of total arthroplasty of knee
	4953000	Revision of total arthroplasty of knee with bone graft to femur
	4953001	Revision of total arthroplasty of knee with bone graft to tibia
	4953300	Revision of total arthroplasty of knee with bone graft to femur and tibia
	4953400	Total replacement arthroplasty of patello-femoral joint of knee
	4955400	Revision of total arthroplasty of knee with anatomic specific allograft
Obstetrics	Elective Caesarean Section	
	1652002	Elective lower segment caesarean section
	1652000	Elective classical caesarean section
	Emergency Caesarean Section	
	1652001	Emergency classical caesarean section
	1652003	Emergency lower segment caesarean section

*International Classification of Diseases and Related Health Problems, 10th Revision, Australian Modification.

Exclusions:

4752200 Hemiarthroplasty of femur- Austin Moore arthroplasty

9060700 Resurfacing of hip, unilateral

9060701 Resurfacing of hip, bilateral

Appendix 2 Specific Classifications of an Organ / Space SSI

Specific criteria must be met to be classified as an organ / space SSI event. The full listing of site specific organ / space SSI and criteria are outlined in the *CDC/NHSN Surveillance Definitions for Specific Types of Infections*³ available at:

http://www.cdc.gov/nhsn/pdfs/pscmanual/17pscnosinfdef_current.pdf

The criteria for some of the specific organ / space SSI sites relevant to HISWA operative procedures are described below.

Osteomyelitis must meet at least one of the following criteria:

Criterion 1: Organisms cultured from bone.

Criterion 2: There is evidence of osteomyelitis on direct examination of the bone during an invasive procedure or histopathological examination.

Criterion 3: The patient has at least two of the following signs or symptoms:

- fever ($>38^{\circ}\text{C}$), localised swelling, tenderness*, heat*, or drainage at suspected site of bone infection (* with no other recognised cause) **and** at least one of the following:
organisms cultured from blood; positive blood antigen test e.g. *H.influenzae*, *S. pneumoniae*
- imaging evidence of infection e.g. abnormal findings on x-ray, CT scan, MRI, radiolabel scan.

Joint or bursa infections must meet at least one of the following criteria:

Criterion 1: Patient has organisms cultured from joint fluid or synovial biopsy.

Criterion 2: Patient has evidence of joint or bursa infection seen during a surgical operation or histopathological examination.

Criterion 3: Patient has at least two of the following signs or symptoms with no other recognised cause:

- joint pain, swelling, tenderness, heat, evidence of effusion or limitation of motion **and** at least one of the following:
organisms and white blood cells seen on a gram stain of joint fluid
- positive antigen test on blood, urine, or joint fluid
- cellular profile and chemistries of joint fluid compatible with infection and not explained by an underlying rheumatologic disorder
- radiographic evidence of infection e.g. abnormal findings on x-ray, CT scan, MRI, radiolabel scan (e.g. gallium, technetium)

Endometritis must meet at least one of the following criteria:

Criterion 1: Organisms cultured from fluid (including amniotic fluid) or endometrial tissue from endometrium obtained during a invasive procedure or biopsy.

Criterion 2: Patient has at least two of the following signs and symptoms with no other recognised cause:

- fever ($>38^{\circ}\text{C}$), abdominal pain, uterine tenderness, or purulent drainage from uterus.

Report postpartum endometritis as a healthcare associated infection unless the amniotic fluid is infected at the time of admission or the patient was admitted >48 hrs after rupture of the membranes.

Other infections of the female reproductive tract including vagina, ovaries, uterus or other deep pelvic tissues (excluding endometritis and vaginal cuff), must meet at least one of the following criteria:

Criterion 1: Patient has organisms cultured from tissue or fluid from the affected site.

Criterion 2: Patient has an abscess or other evidence of infection of the affected site seen during a surgical operation or histopathologic examination.

Criterion 3: Patient has two of the following signs or symptoms with no other recognized cause:

- fever ($>38^{\circ}\text{C}$), nausea, vomiting, pain tenderness or dysuria
- and** at least one of the following:
- organisms cultured from blood
 - physician's diagnosis.

Appendix 3 Risk Index Score Calculation for SSI

1. ASA Classification

The American Society of Anaesthesiology (ASA) classification system is a numerical quantification of disease severity in patients undergoing general anaesthesia. Studies have demonstrated that ASA class is a useful indicator of host susceptibility to infection for epidemiological purposes. A score of 0 can be entered when the ASA score cannot be established.

ASA class	Description	Risk index score
1	A normal healthy patient	0
2	A patient with mild systemic disease	0
3	A patient with severe systemic disease	1
4	A patient with incapacitating systemic disease that is a constant threat to life	1
5	A moribund patient who is not expected to survive for 24 hours with or without the operation	1

NB: Patients with an ASA score of 6 (organ retrieval in brain dead patients) are not included.

2. Duration of operative procedure

The interval in hours and minutes between time of skin incision and surgery finish time i.e. the time when all instrument and sponge counts are completed and verified as correct, all postoperative radiological studies in the OR are completed, all dressings and drains are secured, and the surgeons have completed all procedure-related activities on the patient. Duration cut points approximate the 75th percentile of the duration of surgery. Australian data (VICNISS) is used to determine the cut points. If a procedure is longer than the reported duration cut point then 1 risk point is scored.

Procedure	Duration cut point
Hip arthroplasty	120 minutes
Knee arthroplasty	103 minutes
Caesarean section	48 minutes

3. Wound Classification

Is an assessment of the degree of contamination of a surgical wound at the time of the operation.

Surgical wound classification	Description	Risk index score
Clean	An uninfected operative wound in which no inflammation is encountered and the respiratory, alimentary, genital, or uninfected urinary tract is not entered. In addition, clean wounds are primarily closed (closure of all tissue levels) and, if necessary, drained with closed drainage. Operative incisional wounds that follow non-penetrating (blunt) trauma (injury) should be included in this category if they meet the criteria.	0
Clean-contaminated	An operative wound in which the respiratory, alimentary, genital or urinary tracts are entered under controlled conditions and without unusual contamination. Specifically, operations involving the biliary tract, appendix, vagina, and oropharynx are included in this category, provided no evidence of infection or major break in technique is encountered.	0
Contaminated	Open, fresh, accidental wounds. In addition, operations with major breaks in sterile technique e.g. open cardiac massage or gross spillage from the gastrointestinal tract, and incisions in which acute, non-purulent inflammation is encountered are included in this category.	1
Dirty / infected	Old traumatic wounds with retained devitalized tissue and those that involve existing clinical infection or perforated viscera suggest that the organisms causing postoperative infection were present in the operative field before the operation	1

Appendix 3 Risk Index Score Calculation (continued)

The wound class should be assigned by a person involved in the surgical procedure e.g. surgeon, circulating nurse.

Examples for wound classification scoring

- Primary procedures will have a wound classification of 'clean' and the wound classification score will be 0. If there is a major breach in sterile technique during the surgery the wound classification is 'contaminated' and the wound classification score will be 1.
- Revision procedures for non-infective reasons i.e. mechanical will have a wound classification of clean and the wound class score will be 0. If there is a major breach in sterile technique during the surgery the wound classification is contaminate and the wound class score will be 1.
- Revision for infective reasons: will have a wound classification of 'dirty / infected' and the wound class score will be 1.
- Caesarean sections: will have a wound classification of clean-contaminated, with a wound class score of 0. If the membranes have ruptured > 6hrs, then classify as contaminated with a wound class score of 1, unless other factors are present as per wound class definition.

Module 3

Methicillin-resistant *Staphylococcus aureus* Healthcare Associated Infection

Methicillin-resistant *Staphylococcus aureus* Healthcare Associated Infection

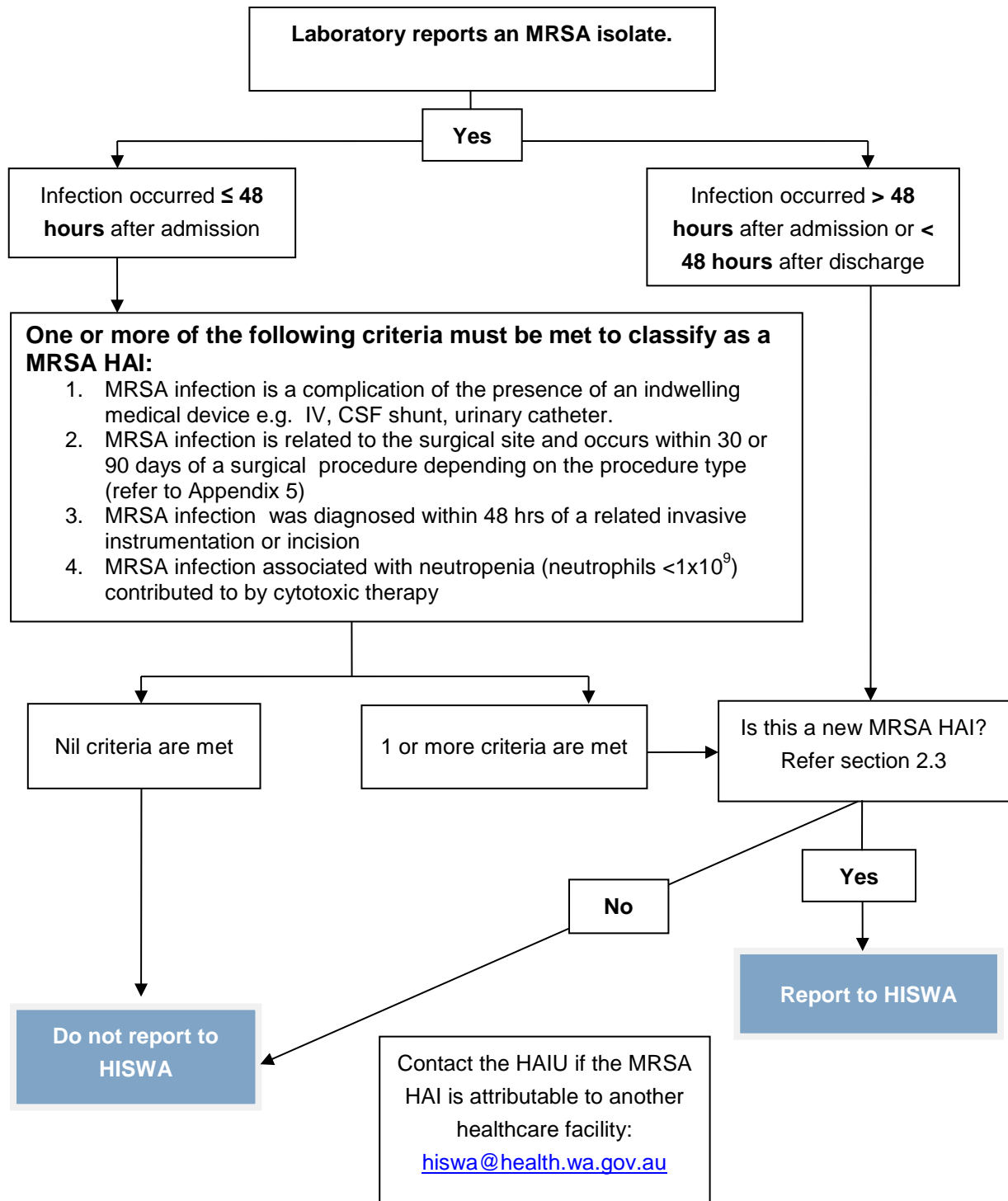
Infections caused by methicillin-resistant Staphylococcus aureus (MRSA) cause significant morbidity and mortality, prolong hospital stay and contribute to increased healthcare costs.¹ MRSA HAIs are an indicator of compliance, by healthcare workers, with appropriate hand hygiene, skin antisepsis and aseptic techniques for invasive procedures.² The risk of developing an MRSA HAI may be reduced if patients known to be colonised with MRSA receive decolonisation treatment prior to any invasive procedure.³

1. Methodology

For participating HCFs to make a valid comparison of their MRSA HAI rates the methodology must be similar and definitions consistently applied. Surveillance personnel are required to:

- Implement processes to ensure that all MRSA positive laboratory reports of specimens obtained at their HCF are received from the laboratory.
- Review and investigate all MRSA positive laboratory reports, including those from emergency and outpatient departments, to determine if the infection is healthcare associated and identify the attributable HCF.
- The methodology to assist with the classification of MRSA isolates is described in Figure 3. Refer to Module 1 for an introduction to HAI surveillance.

Figure 3 Flowchart for surveillance of MRSA HAI



Note: Ensure MRSA HAIs are entered into other relevant modules e.g. the MRSA HAI is a BSI, therefore it must also be entered into the specific organism bloodstream infection module.

2. Definitions

2.1 MRSA infection

- An MRSA infection is when MRSA is isolated from either:
 - a sterile site or
 - a non-sterile site **and** MRSA-specific antibiotic therapy (refer Appendix 4) is administered by a clinician.²

Note: Patients that are given empirical treatment for a suspected MRSA infection, even if they are a known MRSA carrier, should not be included in the surveillance.

2.2 MRSA HAI

An MRSA infection is considered to be a healthcare associated event if either criterion A or B is met:

- Criterion A: an infection acquired more than 48 hours after hospital admission or less than 48 hours after discharge and the infection was not present or incubating on admission i.e. no signs or symptoms of the MRSA infection are evident.
- Criterion B: an infection acquired 48 hours or less after admission and at least one of the following criteria is met:
 1. Is a complication of the presence of an indwelling medical device e.g. intravascular line, CSF shunt, urinary catheter and no other focus of infection is identified.
 2. The infection is related to the surgical site and occurs within 30 or 90 days of a surgical procedure depending on the procedure type (refer to Appendix 5).
 3. An invasive instrumentation or incision related to the infection was performed within 48 hours. If longer than 48 hours, there must be compelling evidence that the MRSA infection was related to the procedure.
 4. Is associated with neutropenia (neutrophils $< 1 \times 10^9 / L$) contributed to by cytotoxic therapy.

2.3 New MRSA HAI

- Only the first new MRSA HAI event for a single admission period is reported.
- The intention of this definition is to exclude ongoing episodes of infection that have been previously reported. Therefore, if the admission period is prolonged e.g. > 1month, count additional MRSA HAIs if a new infective event occurs and it is unrelated to a previously reported MRSA HAI event.
- If a patient develops a non-sterile site infection and a sterile site infection during the same admission, then the sterile site HAI takes precedence and the non-sterile site HAI is not reported. If the non-sterile infection occurred in a previous admission, then it remains reported for that period. If a BSI and another sterile site occur, report the BSI only.
- Exception: the definition of a BSI requires that an additional MRSA BSI is reported if it is had been more than 14 days since a previous positive MRSA blood culture.

2.4 Community-associated MRSA infection

These events are when the infection manifests within 48 hours of admission and do not meet criterion A or B for classification as an HAI (section 2.2).

2.5 Maternally-acquired MRSA infection

Infections that arise in neonates < 48 hours after delivery are not considered HAI unless there is compelling evidence that the infection was related to an intervention during passage through the birth canal e.g. wound secondary to vacuum extraction.

2.6 Colonisation

Colonisation refers to MRSA isolated from a non-sterile site without clinical infection and the person is not treated with MRSA-specific antibiotic therapy.

2.7 Site of infection

MRSA infections are stratified by HISWA as sterile or non-sterile sites depending on which body site the specimen was obtained from and how it was collected.

Sterile sites are body sites that do not normally contain microorganisms.

Non-sterile sites are body sites that are exposed to microorganisms in the external environment and may contain normal flora.

2.7 Site of infection

Infections are stratified by HISWA as sterile or non-sterile sites depending on which body site the specimen was obtained from and how it was collected.

Sterile sites are body sites that do not normally contain microorganisms.

Non-sterile sites are body sites that are exposed to microorganisms in the external environment and may also be colonised with normal flora.

2.7.1 Specimens

Specimens that are collected intraoperatively, aspirates and biopsies are considered **aseptically-obtained specimens** as generally these procedures prevent introduction of organisms from surrounding tissues into the specimen being collected and therefore if organisms are isolated the site is considered infected.

Specimens obtained from superficial wounds/skin swabs, drain fluid, sputum and urine can represent colonisation or potentially be contaminated with skin organisms from surrounding tissue and therefore require investigation and clinical judgement to determine if an infection is present.

2.7.2 Sterile site

HISWA categorisations for sterile sites are:

- Bloodstream
- Cerebrospinal fluid
- Peritoneum, pleural, pericardial (includes fluid from these sites)
- Aseptic tissue e.g. bone, muscle, fascia, joint fluid (synovial) or other tissue from internal body sites where the specimen is aseptically-obtained (Refer to 2.7.1).
- Wound-surgical / sterile. The wound infection is related to a surgical procedure and the tissue specimen is aseptically-obtained and meets Criterion A or B (Refer to section 2.2). These should be entered as *specimen site: wound-surgical, specimen: sterile*.

2.7.3 Non-sterile site

HISWA categorisations of a non-sterile site are:

- Sputum, including bronchial washings and endotracheal tube specimens
- Urine (see text box below)

- Wound-surgical / non-sterile. The wound infection is related to surgery or invasive instrumentation and meets Criterion A or B (Refer to section 2.2) and the specimen is obtained from a wound swab, drain site or other external surgical device e.g. external fixation site. These should be entered as *specimen site: wound-surgical, specimen: non-sterile*.
- Note: this includes infections related to surgery that don't meet the criteria for a SSI but are HAIs e.g. an inpatient develops superficial MRSA infection of surgical incision > 30 days post-procedure i.e. not a SSI by definition, but it is an HAI.
- Wound - all other includes:
 - all non-surgical wounds or skin and soft tissue infections e.g. decubitus ulcers
 - infections of breast tissue due to mastitis i.e. MRSA isolated in breast milk
 - infections of the mucous membranes e.g. conjunctivitis, vagina (by HVS)
 - device exit site infections e.g. IV, CAPD, suprapubic catheter
 - infected burns (includes infections post surgical debridement).

Note: MRSA in urine is rarely a cause of primary urinary tract infection. If MRSA is isolated from urine it may reflect contamination from perineal flora or colonisation of a catheter. Discussion with a clinician may be necessary to ascertain if the isolate represents MRSA infection.

3. Place of Acquisition

MRSA HAI are categorised according to where the infection was likely acquired i.e. inpatient or non-inpatient healthcare settings. For non-inpatient settings the MRSA infections are associated with healthcare received as an outpatient, and meet Criterion B for a MRSA HAI (Refer to section 2.2).

3.1 ICU or non-ICU (inpatient)

- MRSA HAI acquired as inpatients are stratified as ICU or non-ICU (wards/units outside of the ICU).
- ICU MRSA HAIs are those detected more than 48 hours after ICU admission or within 48 hours of discharge from ICU.

- Non-ICU MRSA HAI are associated with healthcare during a multi-day admission to non-ICU wards or HITH or within 48 hours of discharge.
- Inpatient MRSA HAI also include infections that meet Criterion B and are associated with a multi-day admission but detected following discharge e.g. a surgical patient develops a SSI caused by MRSA detected on readmission.

3.2 Non-inpatient higher-risk units – renal, haematology, oncology

- MRSA HAIs, in patients receiving care under these specialty units and who are not under the care of HITH, that are acquired at home or following admission for day care at hospital outpatient settings or attendance at outpatient clinics e.g. haemodialysis, chemotherapy day-wards, day surgery.

3.3 Non-inpatient – other units

- MRSA HAIs acquired following admissions for day care in hospital outpatient settings or attendance at outpatient clinics who are not under the care of HITH or the higher-risk units e.g. an MRSA SSI in a general surgery patient following day surgery or a MRSA HAI following a facet joint injection at an outpatient clinic.

3.4 MRSA infections following care at another healthcare facility

- If a HCF identifies that a MRSA HAI is a result of care at another HCF or develops within 48 hrs of a transfer, contact the HAIU so that the infection can be attributed to the correct HCF.

4. Previous Colonisation Status

- Patients colonised with MRSA are at an increased risk of developing MRSA infections associated with healthcare interventions. This risk may be reduced if these patients receive decolonisation or suppression treatment.
- Report patients who have been previously identified with colonisation or infection with the infecting strain of MRSA prior to the HAI occurring e.g. patient is a known carrier of UK 15 and develops an HAI caused by UK 15.
- Report no or unknown if : it is the first time the patient has been identified with MRSA or their previous MRSA status is unknown, or the infecting MRSA strain is different to a strain previously identified from that patient.

5. HISWA Dataset

5.1 Numerator data fields

Data described in Table 7 is required to be entered in the HISWA database.

5.1.1 Inclusions

- All strains of MRSA causing HAIs
- Patients previously colonised with MRSA who develop a new MRSA HAI.

5.1.2 Exclusions

- Community associated MRSA infections
- Maternally-acquired MRSA infections
- Patients who are colonised only.

Table 7 MRSA HAI data fields and descriptors for HISWA database

Data field	Descriptor
Patient ID	Unique patient identifier
Date of birth	Patient date of birth
Patient postcode	Postcode of patients home address
Laboratory specimen number	Laboratory number assigned to the specimen
Specimen date	Date the specimen was obtained
Organism	MRSA (MRSA strain data will be entered by the HAIU)
Infection/colonisation	<ul style="list-style-type: none">▪ new infection
Previously colonised	<ul style="list-style-type: none">▪ yes (known to be colonised with infecting MRSA strain prior to infection)▪ no or unknown
Specimen site	<ul style="list-style-type: none">▪ sterile sites - bloodstream, CSF, peritoneum, pleural, pericardial, aseptic tissue (includes wound -surgical /sterile)▪ non-sterile sites - sputum, urine, wound- surgical (non sterile only), wound - all other▪ Note: <i>faeces</i> is to be used for <i>C.difficile</i> only
Specimen	Sterile or non sterile specimen (as above)
Place of acquisition	<ul style="list-style-type: none">▪ ICU▪ non-ICU▪ Non-inpatient – renal▪ Non-inpatient – haematology/oncology▪ Non-inpatient – other/unknown

5.2 Denominator data fields

The denominator that is utilised is bed-days. Both multi-day and same-day bed-days are collected to allow for different rate calculations.

5.2.1 Inclusions

HISWA bed-day data for MRSA HAI includes:

- Inpatient admissions to rehabilitation and aged care areas in an acute HCF.
- HITH bed-days.
- Same-day admissions e.g. haemodialysis units, day-surgery / procedure units.

5.2.2 Exclusions

HISWA bed-day data for MRSA HAI excludes:

- Psychiatric wards/units.
- Unqualified newborns i.e. newborn who is 9 days of age or less and does not require admission to a neonatal ICU and whose mother is the admitted patient.
- Boarders i.e. a person who is receiving food and/or accommodation but not medical care including newborns ≥ 10 days of age.
- Residential Aged Care Reporting Establishments co-located with public hospitals within the Western Australian Country Health Services.

5.2.3 Outpatient clinic settings and emergency department

Patients who attend outpatient clinics or emergency departments without admission to hospital are not counted in bed-days. However, MRSA HAIs that occur as a result of healthcare in these settings will be included in numerator data if criterion B of the MRSA HAI definition is met (Section 2.2) e.g. a patient develops an MRSA HAI following a facet joint injection given at an outpatient clinic of a hospital.

6. Calculation of MRSA HAI Rate

6.1 Inpatient MRSA HAI rate

- The inpatient MRSA HAI rate is expressed per 10,000 multi-day bed-days.

$$\text{Inpatient MRSA HAI rate} = \frac{\text{Number of inpatient MRSA HAI} \times 10,000}{\text{Number of multi-day bed-days.}}$$

6.2 Total MRSA HAI rate

- This rate reflects the total number (inpatient and non-inpatient) of MRSA HAIs

$$\text{Total MRSA HAI rate} = \frac{\text{Number of MRSA HAI} \times 10,000}{\text{Number of multi-day and same-day bed-days.}}$$

7. References

1. Christensen K, Coombs G, Ferguson J, Redell J, Marshall C, Nimmo G et al. Multi-resistant organisms. In: Cruickshank M and Ferguson J, editors. Reducing harm to patients from healthcare associated infection: the role of surveillance. Australian Commission on Safety and Quality in Healthcare; 2008. P.129-168.
2. Australian Council on Safety and Quality in Health Care and Australian Infection Control Association (AICA) Health Care Associated Infections Advisory Committee. September 2004. Multi-resistant organism (MRO) surveillance indicator definitions. In: Australian Council for Healthcare Standards, 'ACHS Infection Control Clinical Indicators Users Manual 2014.
3. Calfee DP, Salgado CD, Classen D, Milstone Am, Harris AD, Kuhar DT et al. Strategies to prevent transmission of methicillin-resistant *staphylococcus aureus* in acute care hospitals. Supplement article: SHEA/IDSA Practice Recommendation. Infect Control Hosp Epidemiol. 2014; 35 (7):772-796.

Appendix 4 Clarification of MRSA-Specific Antibiotic Therapy

MRSA-specific antibiotic therapy is the use of antimicrobials that are clinically effective in the treatment of MRSA infections. MRSA antibiotic sensitivities may vary between strains and must always be checked from the laboratory report.

■ **MRSA-specific antibiotic therapy**

- vancomycin
- teicoplanin
- linezolid
- quinupristin-dalfopristin (Synercid®)
- daptomycin
- ceftaroline

■ **Possible MRSA-specific antibiotic therapy - depending on sensitivity results**

- fusidic acid
- rifampicin
- clindamycin
- co-trimoxazole
- quinolones (ciprofloxacin, moxifloxacin)
- doxycycline

■ **Antibiotics that are not MRSA-specific antibiotic therapy**

All strains of MRSA are resistant to these groups of antibiotics and they are not suitable for treating MRSA infections. They include:

- all penicillin-based antibiotics e.g. benzylpenicillin, flucloxacillin, amoxycillin, Timentin®, Augmentin®
- all cephalosporins (except ceftaroline) e.g. cephalothin, cephalexin, cefotaxime, ceftazadine, ceftriaxone, cephazolin, cefepime, cefaclor
- carbapenems e.g. imipenem, meropenem
- others e.g. metronidazole, aztreonam.

■ **Antibiotics that are reported as sensitive on laboratory testing, but are not likely to be clinically effective against MRSA infection. They include:**

- gentamicin, tobramycin, amikacin - as single therapy
- erythromycin, roxithromycin, clarithromycin and azithromycin.

Appendix 5 MRSA SSI

An MRSA infection is considered an HAI related to the surgical site (Figure 3) when criteria for classification as a SSI are met (Refer to SSI module).

SSIs are followed for the following periods where day 1 = the date of the procedure:

- 30 day period for superficial SSI for all procedures and 30 or 90 day period for deep and organ/space infections depending on the procedure

Surveillance period for deep or organ/space SSI following surgical procedures

30-day Surveillance	
Abdominal aortic aneurysm repair	Laminectomy
Limb amputation	Liver transplant
Appendix surgery	Neck surgery
Shunt for dialysis	Kidney surgery
Bile duct, liver or pancreatic surgery	Ovarian surgery
Carotid endarterectomy	Prostate surgery
Gallbladder surgery	Rectal surgery
Colon surgery	Small bowel surgery
Caesarean section	Spleen surgery
Gastric surgery	Thoracic surgery
Heart Transplant	Thyroid and/or parathyroid surgery
Abdominal hysterectomy	Vaginal hysterectomy
Kidney transplant	Exploratory laparotomy
	Other surgery not listed
90-day Surveillance	
Breast surgery	Cardiac surgery
Coronary artery bypass graft with both chest and donor site incisions	Coronary artery bypass graft with chest incision only
Craniotomy	Spinal fusion
Open reduction of fracture	Herniorrhaphy
Hip arthroplasty	Pacemaker surgery
Knee arthroplasty	Peripheral vascular bypass surgery
Refusion of spine	Ventricular shunt

Module 4

Clostridium difficile Infection

***Clostridium difficile* Infection**

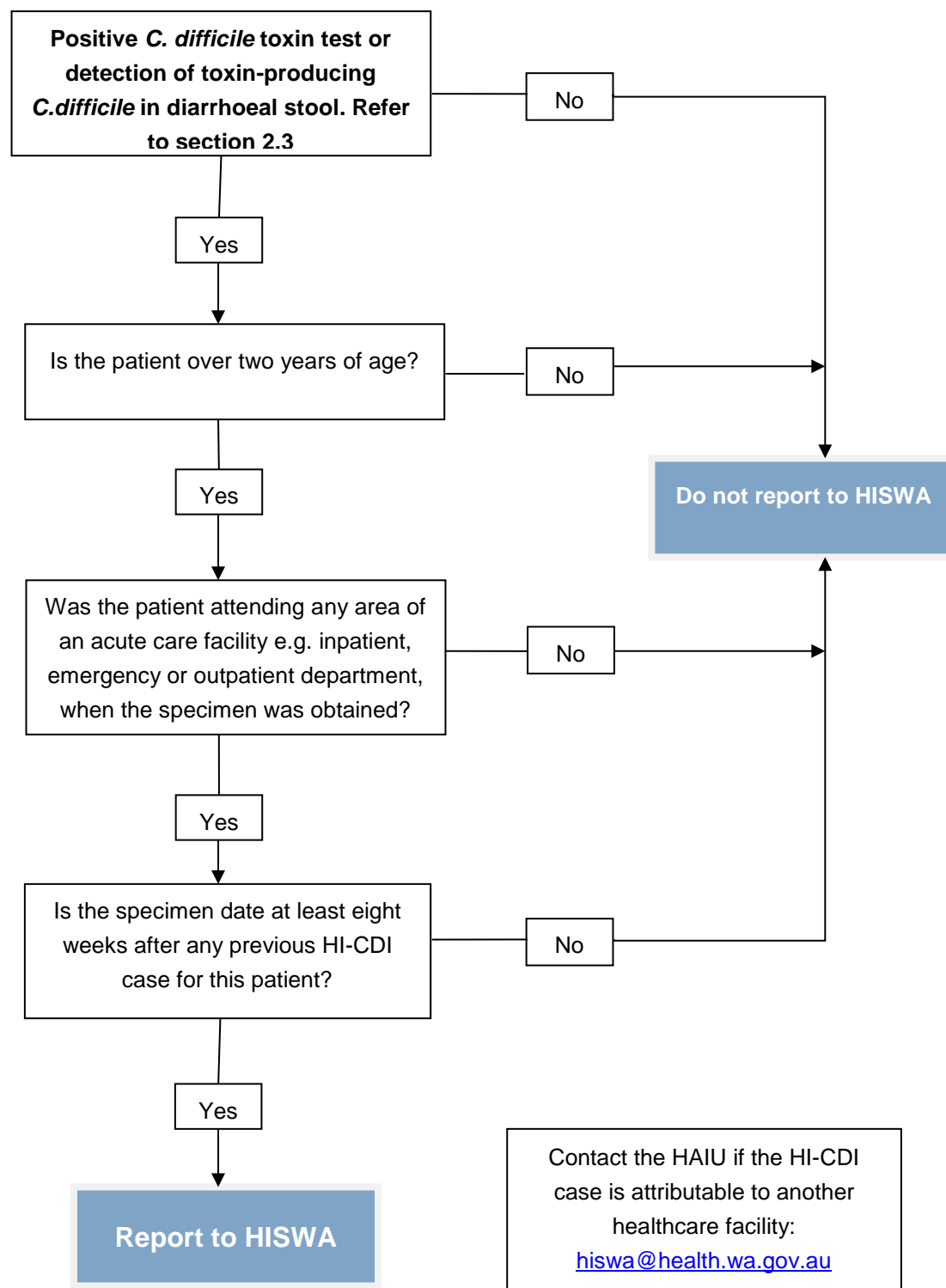
Clostridium difficile is the most common cause of healthcare associated and antibiotic-associated diarrhoea. The severity of infection varies from mild diarrhoea to pseudomembranous colitis, toxic megacolon and death. Hypervirulent strains that are associated with epidemic spread and high rates of severe disease and death have recently been identified in Australia.² Identification of hospitalised patients with Clostridium difficile infection (CDI) by optimal surveillance systems and prompt implementation of contact precautions are the key to preventing transmission. Antimicrobial stewardship programs are an essential CDI prevention strategy to minimise the frequency and duration of antimicrobial use and to promote narrow spectrum antibiotic prescribing.^{1, 2}

1. Methodology

Surveillance of hospital-identified CDI (HI-CDI) is the minimum requirement for national and HISWA surveillance. The methodology to assist with the classification of HI-CDI is described in figure 4. Surveillance personnel are required to:

- Implement processes to ensure they receive all laboratory reports that detect *C.difficile* from specimens of diarrhoeal stools obtained at their HCF, including from the emergency department and all other outpatient settings.
- Classification of HI-CDI cases is intended to be derived from laboratory reports and does not require case review by surveillance personnel.
- Apply the definition of a HI-CDI case consistently. Refer to Module 1 for an introduction to HAI surveillance.
- Additional surveillance of severe CDI, and healthcare or community-associated CDI cases, is recommended, however, it is optional for HISWA hospitals (Refer section 5).

Figure 4 Flowchart for determining a hospital-identified CDI case



2. Definitions

2.1 Hospital-identified CDI

- A HI-CDI is a CDI case identified in a patient attending any area of a hospital i.e. admitted patients and those attending emergency and outpatient departments.
- A HI-CDI case reflects the burden of CDI on a hospital and describes healthcare-associated infections, community-associated infections, as well as CDI of indeterminate or unknown origin (Refer to section 5.2).

2.2 CDI case

- A CDI case is defined as a case of diarrhoea i.e. an unformed stool that takes the shape of the container, in a person greater than two years of age at date of admission, that meets the following criteria:
 - the stool sample yields a positive result in a laboratory assay for *C.difficile* toxin A and / or B

OR

- a toxin-producing *C.difficile* organism is detected in the stool sample by culture or other means.

And Excludes

- cases where a known previous positive test has been obtained within the last 8 weeks i.e. only include cases once in an 8 week period.
- patients less than two years old at date of admission.

Note: An additional positive test obtained from a specimen collected from the same patient more than 8 weeks since the last positive test is regarded as a new case.

2.3 Diarrhoea descriptors

- Diarrhoeal stools that take the shape of the container are described in laboratory reports as semi-formed, watery, loose, liquid or fluid.

3. HISWA Dataset

3.1 Numerator data fields

The numerator data fields for HI-CDI cases required to be entered into the HISWA database are described in Table 8.

Table 8 CDI numerator data fields and descriptors for HISWA database

Data field	Descriptor
Patient ID	Unique patient identifier
Date of birth	Patient date of birth
Patient postcode	Postcode of patients home address
Lab specimen number	Laboratory number assigned to the specimen
Specimen date	Date the specimen was obtained
Organism	<i>Clostridium difficile</i>
Infection/colonisation	For every case enter: new infection
Previously colonised	For every case enter: no / unknown
Specimen site	For every case enter: Faeces
Specimen	For every case enter: <i>Non-sterile</i>
Place of acquisition	For every case enter: Hospital CDI

3.1.1 Exclusions

- Formed stools, i.e. do not take the shape of the container, even if toxin positive.
- Recurrent cases in an 8 week period.
- Patients less than 2 years old at date of admission.

3.2 Denominator data fields

The denominator that is utilised is bed-days and includes same-day bed-days.

3.2.1 Inclusions

HISWA bed-day data for HI-CDI includes:

- All inpatient wards or units within the acute hospital including psychiatric, rehabilitation and aged care.
- HITH admissions.
- Same-day admission wards or units e.g. haemodialysis units, day of surgery or procedure units.

3.2.2 Exclusions

- Boarders.
- Patients less than 2 years of age.
- Emergency and outpatient clinic attendance data is not included in bed-day counts provided to HISWA.

4. Calculation of Hospital-Identified CDI Rate

4.1 HISWA rate

- The HI-CDI rate reflects the burden of CDI presenting at a HCF.
- CDI rates will be calculated and reported to HISWA using bed-days and expressed per 10,000 bed-days.
- Bed-days include both multi-day and same-day bed-days.
- $$\text{HI-CDI rate} = \frac{\text{Total number of HI-CDI cases}}{\text{Total number of bed-days at the hospital}} \times 10,000$$

5. Enhanced Surveillance (Optional)

- National surveillance does not require classification of healthcare and community-associated CDI cases or severe and non-severe CDI. Surveillance of these classifications is optional, however, it is recommended for HISWA hospitals.
- Enhanced surveillance requires an individual case review in addition to the routine review of laboratory reports required for HI-CDI surveillance.
- HCFs may be requested to undertake enhanced surveillance for target periods and also if the rate of HI-CDI is high or increasing significantly at their facility.
- HISWA definitions for enhanced surveillance align with recommended international definitions and are described in section 5.1 and 5.2.^{3,4,5}

5.1 Severe CDI case

- A severe CDI case is defined as a CDI case that meets any of the following criteria within 30 days of symptom onset:
 - history of admission to an intensive care unit (ICU) for treatment of complications from CDI e.g. vasopressor therapy for shock
 - history of surgery for treatment of toxic megacolon, perforation or refractory colitis
 - death caused by CDI within 30 days of symptom onset.
- Clinical criteria that have been associated with severe CDI include:
 - greater than sixty years of age
 - temperature greater than 38.3°C
 - serum albumin <25g/L
 - peripheral white blood cell count >15,000 cells/microL
 - deteriorating renal function
 - elevated serum lactate
 - endoscopic evidence of pseudomembranous colitis or treatment in the ICU
 - subtotal colectomy procedure or diagnosis of toxic megacolon.

5.1.1 Calculation of incidence of severe CDI

- For HCFs monitoring severe disease, this should be expressed as the proportion of total HI-CDI cases in the reporting period that were severe.
- The raw numbers as well as the proportion should be reported to aid interpretation.
- The proportion should be calculated for the reporting period as follows:

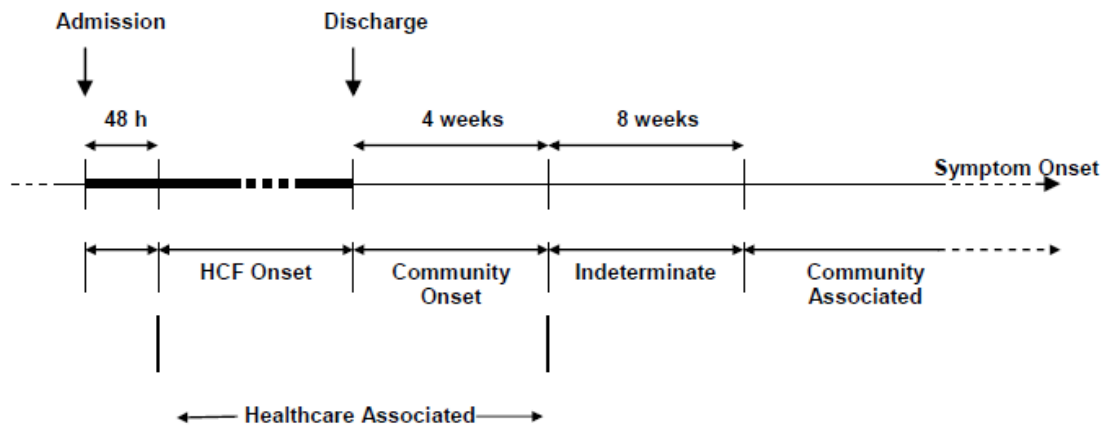
Patient episodes of HI-CDI - severe disease
Patient episodes of HI-CDI (total hospital-identified CDI cases)

5.2 Definitions of healthcare or community-associated CDI cases

Each CDI case is classified according to the place of probable exposure described below and in figure 5.

- Healthcare-associated CDI are classified as HCF onset or community onset.
 - HCF onset: symptom onset or date and time of stool specimen collection is greater than 48 hrs after admission to a HCF.
 - community onset: symptom onset was in the community or within 48 hrs of admission to a HCF, and symptom onset was less than 4 weeks after the last discharge from a HCF.
- Community-associated CDI cases
 - symptom onset or date and time of stool specimen was in the community or within 48hrs of admission to a HCF provided the symptom onset was more than 12 weeks after the last discharge from a HCF.
 - record if the CDI case was admitted to a HCF from a residential care facility.
- Indeterminate onset
 - criteria for community or healthcare-associated are not met e.g. CDI case with symptom onset in the community between 4 and 12 weeks of the last discharge from a HCF.
- Unknown
 - exposure setting cannot be determined because of a lack of data to classify.

Figure 5 Time line for healthcare or community-associated CDI definitions



- Rates for healthcare-associated CDI cases will be expressed per 10, 000 bed-days (excluding same-day bed-days).
- Rate =
$$\frac{\text{Total number of HI-CDI cases} \times 10,000}{\text{Total number of bed-days}}$$

Note: Healthcare-associated community onset cases should be:

- **Attributed to the reporting period during which, the case was discharged from the HCF before CDI symptom onset e.g. if the case was discharged on the 28 May and readmitted with CDI on 5 June, the case should be assigned to May.**
- **Attributed to the HCF from which the case was discharged, providing they were an inpatient at that HCF for more than 48 hours.**

5.3 Recurrent CDI cases

A recurrent CDI case is an episode that occurs within 8 weeks or less after the onset of a previous CDI episode, provided that CDI symptoms from the earlier episode have resolved with or without therapy. These cases are not included in the HI-CDI case definition and calculation, and monitoring is optional.

6. References

1. Stuart R L and Marshall C. *Clostridium difficile* infection: a new threat on our doorstep. Med J Aust 2011; 194 (7):331-332.
2. Cheng A C, Ferguson J K, Richards M J et al. Australasian Society for Infectious Diseases guidelines for the diagnosis and treatment of *Clostridium difficile* infection. Med J Aust 2011; 194 (7): 353-358.
3. Australian Commission on Safety and Quality in Health Care. Implementation Guide for Hospital Surveillance of *Clostridium difficile* Infection, 2013.
4. Clinical Practice Guidelines for *Clostridium difficile* Infection in Adults: 2010 Update by the Society for Healthcare Epidemiology of America (SHEA) and the Infectious Diseases Society of America (IDSA). Infection Control and Hospital Epidemiology 31(5): 431-455.
5. McDonald LC, Coignard B et al. 2007. Recommendations for surveillance of *Clostridium difficile*-associated disease. Infection Control and Hospital Epidemiology 28: 140-145.

Module 5

Vancomycin-Resistant Enterococci Sterile Site Infection

Vancomycin-Resistant Enterococci Sterile Site Infection

Bloodstream and other sterile site infections caused by vancomycin-resistant enterococci (VRE) have been associated with significant mortality and morbidity for critically ill or immunocompromised patients. Surveillance of sterile site infections allows evaluation of strategies to reduce the spread of VRE and colonisation of patients receiving care in higher-risk units.

1. Methodology

- Review all VRE positive laboratory reports, including those from emergency and outpatient departments.
- Report new VRE infections from sterile sites that are HAIs or CAIs.
- If the VRE sterile site infection is an HAI, identify the attributable HCF.
- A HISWA VRE surveillance form is available from the HAIU. When a new sterile site infection is identified complete the form and send via e-mail to hiswa@health.wa.gov.au

2. Definitions

2.1 VRE sterile site infection

- A VRE sterile site infection is when VRE is isolated from a specimen obtained from a sterile site.¹ **Sterile sites** are body sites that do not normally contain microorganisms. **Non-sterile sites** are body sites that are exposed to microorganisms in the external environment and may also be colonised with normal flora.
- HISWA categorisations for sterile sites are:
 - Bloodstream
 - Cerebrospinal fluid
 - Peritoneum, pleural, pericardial (includes fluid from these sites)
 - Aseptic tissue e.g. bone, muscle, fascia, joint fluid (synovial) or other tissue from internal body sites where the specimen is aseptically-obtained.
- Do not report VRE isolated from a specimen obtained from a non-sterile site e.g. wound, urine, and sputum.

2.2 VRE sterile site HAI

The VRE infection is considered to be a HAI event if either criterion A or B is met.

- Criterion A: an infection acquired > than 48 hours after hospital admission or < than 48 hours after discharge and the infection was not present or incubating on admission i.e. no signs or symptoms of the VRE infection are evident.
- Criterion B: an infection acquired 48 hours or less after admission and at least one of the following criteria is met:
 1. Is a complication of the presence of an indwelling medical device e.g. intravascular line, CSF shunt, and no other focus of infection is identified.
 2. VRE is isolated from aseptic tissue from the surgical site and occurs within 30 or 90 days of a surgical procedure depending on the procedure type (refer to Appendix 6)
 3. An invasive instrumentation or incision related to the infection was performed within 48 hours. If longer than 48 hours, there must be compelling evidence that the VRE infection was related to the procedure.
 4. Is associated with neutropenia (neutrophils: $<1 \times 10^9 / L$) contributed to by cytotoxic therapy.¹

Note: Patients that are given empirical treatment for a suspected VRE infection, even if a known VRE carrier should not be included in the surveillance.

2.3 Inpatient or non-inpatient HAI

A VRE infection that is classified as an HAI, is further categorised as:

2.3.1 Inpatient HAI

- associated with healthcare during a multi-day admission to hospital or hospital-in-the-home (HITH).
- ICU-associated VRE infections are detected > than 48 hours after admission to ICU or within 48 hours of discharge from ICU.

2.3.2 Non-inpatient HAI:

- meets Criterion B for a HAI and is associated with healthcare received in hospital outpatient settings e.g. haemodialysis, peritoneal dialysis, chemotherapy day-wards, apheresis, day surgery.

2.4 VRE sterile site community-associated infection

- The VRE infection manifests within 48 hours of admission and does not meet either criterion A or B for classification as an HAI.
- VRE sterile site infections, identified at the acute care HCF that occur in a patient who has been admitted from a residential care facility (RCF) are reported as VRE CAIs.
- A RCF refers to all private and public facilities registered to provide 24 hour non-acute care to persons who are not able to live independently. This includes nursing homes, hostels, hospices psychiatric and rehabilitation facilities.

2.5 New VRE sterile site infection

- Only the first new VRE infection for a single admission period is reported, however, if a BSI and another sterile site occur in a patient during an admission report the BSI only.
- If the admission period is prolonged, count additional VRE sterile site infections if it is evident that it is a new infection i.e. unrelated to a previous event.
- Exception: the definition of a BSI requires that an additional VRE BSI is reported if it has been more than 14 days since a previous positive VRE blood culture. This rule applies to HAIs and CAIs.

2.6 Colonisation

- Colonisation refers to VRE isolated from a non-sterile site without clinical signs or symptoms of infection and the person is not being treated for VRE infection.
- Cases of VRE colonisation are not reported.

3. Place of Acquisition

- Report all community and healthcare acquired VRE sterile site infections.
 - VRE sterile site infections are further stratified by units that are higher-risk for VRE infection and include:
 - ICU (includes high-dependency units)
 - recipients of renal dialysis (haemodialysis and peritoneal dialysis)
 - medical oncology
 - haematology
 - transplant recipients (solid organ [e.g. liver, lung, kidney], bone marrow).

4. Attributable Healthcare Facility

- If a HCF identifies that a VRE sterile site infection is a result of care at another HCF or develops within 48 hrs of a transfer, contact the HAIU so that the infection can be attributed to the correct HCF.

5. Previous VRE Colonisation

- Report patients known to be colonised with the infecting strain of VRE prior to the VRE infection occurring.

6. HISWA Dataset

6.1 Numerator data fields

Table 9 describes the numerator data fields for VRE sterile site infection required to be entered into the surveillance spreadsheet provided for HISWA contributors.

6.1.1 Inclusions

- Patients previously colonised with VRE who develop a VRE sterile site infection.
- Healthcare and community-associated VRE sterile site infections.

6.1.2 Exclusions

- VRE infections from non-sterile sites e.g wound, urine, sputum.
- Patients who are colonised with VRE only.

6.2 Denominator data fields

The HAIU will utilise multi-day and same-day bed-day denominator data to calculate infection rates as required.

Table 9 VRE sterile site infection data fields and descriptors

Data field	Descriptor
Hospital / Private Haemodialysis Unit	Name of hospital or private haemodialysis unit
Patient identifier	Unique patient identifier
Date of birth	Patient date of birth
Admission date	Date of admission to hospital
Discharge date	Date of discharge from hospital
Laboratory service provider	Name of laboratory reporting the VRE infection
Laboratory specimen number	Laboratory number assigned to the specimen
Specimen date	Date the specimen was obtained
VRE species / classification	e.g. vanB <i>E. faecium</i> Typing will be added by the HAIU
Sterile specimen site	<ul style="list-style-type: none"> ▪ bloodstream, CSF, peritoneum, pleural, pericardial space, aseptic tissue
HAI or CAI	<ul style="list-style-type: none"> ▪ HAI - inpatient ▪ HAI - non-inpatient ▪ CAI
Higher-risk unit	<ul style="list-style-type: none"> ▪ ICU (includes high-dependency area), haemodialysis (include peritoneal dialysis here), haematology, medical oncology, transplant (solid organ and bone marrow), ▪ NA= not applicable (i.e. not a higher-risk unit patient)
Admission from a RCF	<ul style="list-style-type: none"> ▪ yes ▪ no ▪ unknown
Previous VRE colonisation	<ul style="list-style-type: none"> ▪ yes (known to be colonised with infecting VRE strain prior to infection) ▪ no (not previously colonised) ▪ unknown

7. References

1. Australian Infection Control Association (AICA) Health Care Associated Infections Advisory Committee. September 2004. Multi-resistant Organism (MRO) Surveillance Indicator Definitions. In Australian Council for Healthcare Standards, ACHS Infection Control Clinical Indicators Users Manual 2013.

Appendix 6 VRE sterile site infection related to an SSI

VRE isolated from aseptic tissue obtained from a surgical site is considered a sterile site infection when criteria for classification as a SSI are met (Refer to SSI module).

SSIs are followed for the following periods where day 1 = the date of the procedure:

- 30 day period for superficial SSI for all procedures and 30 or 90 day period for deep and organ/space infections depending on the procedure.

Surveillance period for deep or organ/space SSI following surgical procedures

30-day Surveillance	
Abdominal aortic aneurysm repair	Laminectomy
Limb amputation	Liver transplant
Appendix surgery	Neck surgery
Shunt for dialysis	Kidney surgery
Bile duct, liver or pancreatic surgery	Ovarian surgery
Carotid endarterectomy	Prostate surgery
Gallbladder surgery	Rectal surgery
Colon surgery	Small bowel surgery
Caesarean section	Spleen surgery
Gastric surgery	Thoracic surgery
Heart Transplant	Thyroid and/or parathyroid surgery
Abdominal hysterectomy	Vaginal hysterectomy
Kidney transplant	Exploratory laparotomy
	Other surgery not listed
90-day Surveillance	
Breast surgery	Cardiac surgery
Coronary artery bypass graft with both chest and donor site incisions	Coronary artery bypass graft with chest incision only
Craniotomy	Spinal fusion
Open reduction of fracture	Herniorrhaphy
Hip arthroplasty	Pacemaker surgery
Knee arthroplasty	Peripheral vascular bypass surgery
Refusion of spine	Ventricular shunt

Module 6

Staphylococcus aureus Bloodstream Infection

Staphylococcus aureus Bloodstream Infection

Staphylococcus aureus bloodstream infections cause significant illness and serious complications such as osteomyelitis, endocarditis and septic arthritis. Even with advanced medical care, mortality remains high. The majority of healthcare associated Staphylococcus aureus bloodstream infections (HA-SABSI) are related to the presence of intravascular devices and these events are increasingly viewed as preventable adverse events. Quality improvement programs that have involved surveillance and implementation of preventative measures and policies, have resulted in sustained reductions in HA-SABSI.¹

1. Methodology

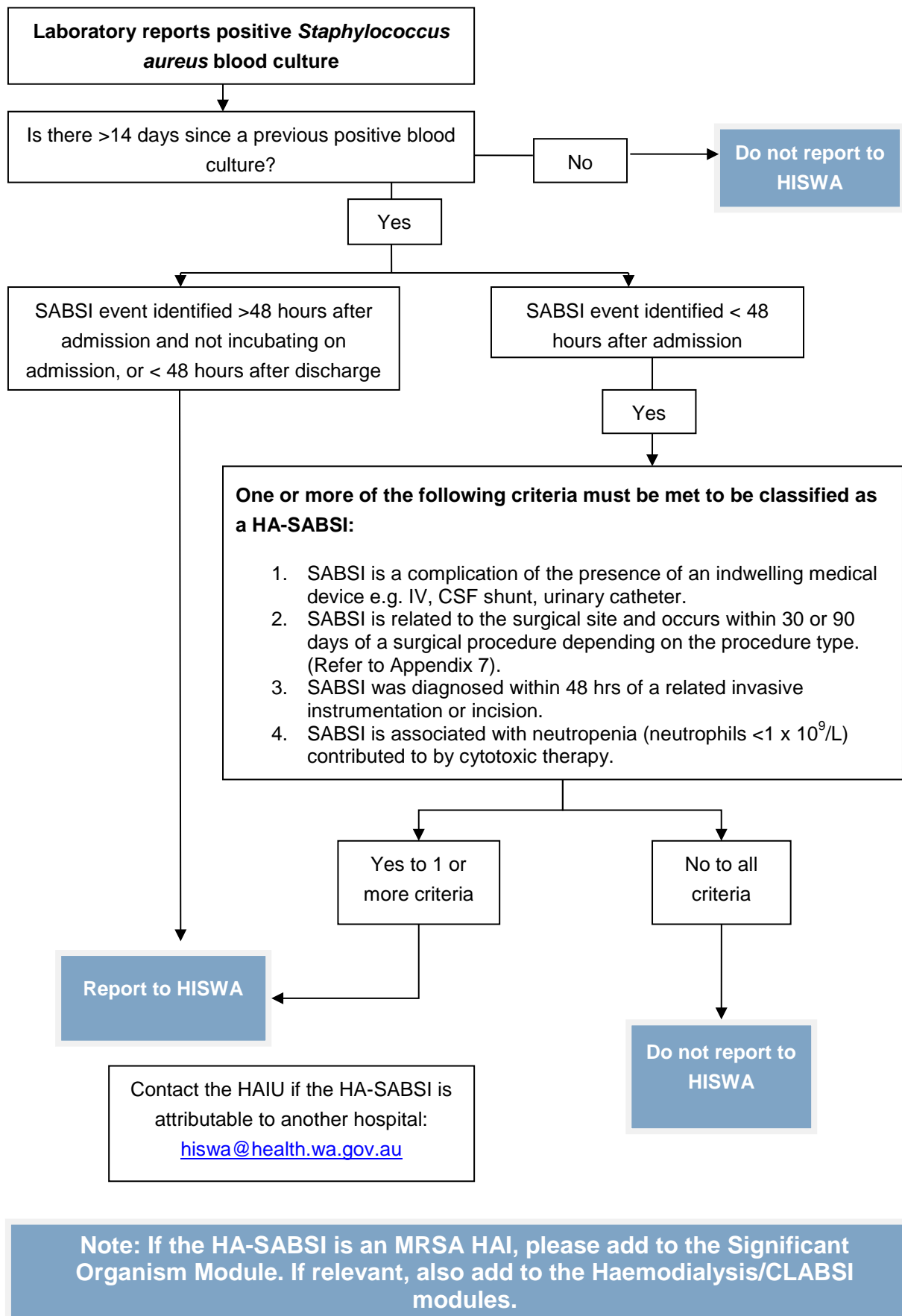
For participating hospitals to make a valid comparison of their HA-SABSI rates, the methodology must be similar and definitions consistently applied. Surveillance personnel are required to:

- Implement processes to ensure that all positive laboratory reports are received.
- Investigate all positive *S.aureus* blood culture laboratory reports, including those from emergency and outpatient departments, to determine if the SABSI is healthcare associated and the attributable facility.
- Liaise with key stakeholders, clinical microbiologists / infectious diseases physicians to assist with the classification of SABSI episodes.
- The methodology to assist with the classification of SABSI is outlined in Figure 6. Refer to Module 1 for an introduction to HAI surveillance.

Note: Surveillance personnel should take opportunities to promote best practice for blood culture collection to optimise BSI detection and classification as potential contaminants i.e..blood specimens drawn for culture should be obtained from 2 - 4 blood draws from separate venipuncture sites, within a few hours of each other and not through an intravascular catheter.

Collection must be conducted using aseptic technique i.e. by using sterile gloves, ensuring the skin and the top of the culture bottle are disinfected prior to access with an alcohol-based disinfectant and

Figure 6 Flowchart for surveillance of HA-SABSI



2. Definitions

2.1 *Staphylococcus aureus* bloodstream infection

- A patient episode of SABSI is defined as a positive blood culture for *S.aureus*.
- Only the first isolate per patient within a 14 day period is counted. If the same patient has a further positive blood culture reported greater than 14 days after the last positive blood culture then an additional episode is recorded (14-day rule).²
- The 14-day rule is to be applied to SABSI that occur in haemodialysis patients (not the 21 days specified for haemodialysis access-associated bloodstream infection surveillance).³

Examples of the 14 day rule: if a patient has 4 sets of positive S.aureus blood cultures over the initial 3 days of the admission, only one episode of SABSI is recorded. If the same patient had a further set of positive blood cultures on day 5 of the admission, these would not be counted.

A further positive S.aureus blood culture on day 20 of the admission is recorded as a second patient episode of SABSI i.e. it is greater than 14 days since the positive culture on day 5.

2.1.1 Contaminants

- *S.aureus* is an uncommon blood culture contaminant and thus there will be few false positive isolates.⁴
- *S.aureus* positive blood culture will only be considered a contaminant, and 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 antimicrobial treatment is given.

2.2 Healthcare associated SABSI (HA-SABSI)

A patient episode of SABSI is considered to be healthcare associated if either criterion A or B are met:

- Criterion A: the patient's first positive blood culture is collected more than 48 hours after hospital admission or less than 48 hours after discharge and a staphylococcal infection was not present or incubating on admission.

Note: incubating on admission means if there were documented clinical signs of staphylococcal infection on admission and provided there is no evidence of an association with a prior admission or medical procedure received in a HCF, then the episode was likely incubating on admission and is not counted as an HAI. If there is uncertainty, then the episode should be classified as healthcare associated.

- Criterion B: the patient's first positive blood culture is collected less than or equal to 48 hours after admission and one or more of the following clinical criteria was met :
 1. The SABSI is a complication of the presence of an indwelling medical device e.g. intravascular line, haemodialysis vascular access, cerebrospinal fluid shunt, urinary catheter.
 2. The SABSI is related to a surgical site infection that occurs within 30 or 90 days of the procedure depending on the type of procedure. Refer to Appendix 7.
 3. An invasive instrumentation or incision related to the SABSI was performed within 48 hours.
 4. The SABSI is associated with neutropenia (neutrophils $< 1 \times 10^9 / L$) contributed to by cytotoxic therapy ².
- If none of these criteria are met, then the episode of SABSI is considered to be community-associated.

2.3 Maternally-acquired SABSI

SABSI that arise in neonates less than 48 hours after delivery are not considered HAIs unless there is compelling evidence that it is related to a procedure or intervention during the birth.

3. Focus of Infection

HA-SABSI are categorised according to the likely source of the infection. The following section can be used to clarify the application of criterion B.

3.1 Intravascular device (IVD) related (clarifies criterion B1)

- For central lines, refer to CLABSI definitions (Module 7). For all other IVD, the IVD was present within 48 hours of the SABSI event and is not related to infection at another body site.²
- For haemodialysis patients. a HA-SABSI is haemodialysis access-associated if there is either clinical infection at the vascular access site or the source of the SABSI is unknown.³
- An introducer used in intravascular procedures e.g. angiography, is considered an IVD.⁵ Therefore, a HA-SABSI occurring within 48 hours of these procedures is IVD related unless there is an infection at another site related to the HA-SABSI.

3.2 Non intravascular device related (clarifies criterion B1)

- The device was in situ within 48 hours of the HA-SABSI episode and there was clinical or microbiological evidence that the HA-SABSI arose from the insertion site or an associated organ. Examples of non IV devices include shunts, suprapubic catheters, chest tubes, urinary catheters, peritoneal catheters, gastrostomy / jejunostomy feeding tubes.

3.3 Procedure related (clarifies criterion B2 and B3)

- A SABSI is related to a SSI that fulfils the surveillance criteria of a SSI (Refer Module 2) and occurs within 30 or 90 days of the procedure depending on the type of procedure (Refer Appendix 7). Note: The type of procedures in the 90 day list include those where surgically implanted devices are permanently placed, such as, joint prostheses, permanent pacemakers, breast implants, stents, grafts, surgical mesh, pins or wire.
- There is invasive instrumentation or incision performed within the previous 48 hours e.g. cardiac catheterisation, pacing wires (not implanted). If the time interval was longer, there must be compelling evidence that the HA-SABSI was related to the procedure.

3.4 Organ site focus

- There is clinical or bacteriological evidence that the HA-SABSI is a result of infection at a specific organ site e.g. skin & soft tissue, respiratory tract, urinary tract, gastrointestinal tract, and is not related to a procedure or an indwelling medical device.
- To diagnose infection at a specific body site, refer to the CDC/NHSN *Surveillance Definitions for Specific Types of Infection*.⁶
- An organ site focus of infection is classified as “Other” for HISWA purposes.

3.5 Unknown / disseminated focus

- The source of the HA-SABSI cannot be determined or there are multiple organ site foci of *S. aureus* infection i.e. disseminated infection.

3.6 Neutropenia

- The SABSI is associated with neutropenia (neutrophils $<1 \times 10^9/L$) contributed to by cytotoxic therapy.

4. Place of Acquisition

HA-SABSI are categorised according to healthcare settings where the infection was likely to have been acquired.

4.1 Inpatient

- An inpatient HA-SABSI event is associated with healthcare provided during a multi-day admission (overnight stay) to a HCF and meets either criterion A or B of the HA-SABSI definition. These include HITH patients.
- These events may occur during the multi-day admission or are detected on readmission following a multi-day admission e.g. HA-SABSI caused by a surgical site infection detected on readmission.

4.2 Non-inpatient

- A non-inpatient HA-SABSI event is associated with healthcare received as an outpatient and meets criterion B of the HA-SABSI definition (section 2.2).
- Non-inpatient HA-SABSI are related to the presence of indwelling medical devices, procedures, day surgery or treatments such as haemodialysis, apheresis, chemotherapy and IV therapy provided in outpatient setting.

- Outpatient settings include day wards, day of surgery units, outpatient clinics, hospital home healthcare services (not HITH) or emergency departments.

5. Healthcare Facility Attribution

- If the HA-SABSI event develops 48 hours or less after transfer from one HCF to another, it is attributed to the transferring HCF.
- When a patient is transferred between HCFs with a peripheral IV line in situ and subsequently develops a HA-SABSI, it is attributed :
 - to the transferring HCF if either the SABSI or an IV site infection occurs within 48 hours of transfer, unless there is other compelling evidence
 - to the receiving hospital if the SABSI or an IV site infection occurs greater than 48 hours after transfer, unless there is other compelling evidence.
- A HA-SABSI associated with a central venous catheter or haemodialysis access device is attributed to the HCF or haemodialysis unit where the device was previously accessed prior to developing signs and symptoms of infection.
- If a surgical procedure or invasive instrumentation is the source of the HA-SABSI, it will be attributed to the hospital where the initial procedure was performed. If there have been recurrent procedures, the HA-SABSI will be attributed to the HCF where the most recent procedure occurred.

6. Classification of *Staphylococcus aureus*

- *S.aureus* infections are commonly treated with beta-lactam antibiotics that include penicillins, cephalosporins, carbapenems and monobactams.
- Beta-lactam resistance is due to the production of a beta-lactamase enzyme by some strains of *S. aureus* and is detected in the laboratory using methicillin or oxacillin.
- *S.aureus* isolates are classified according to methicillin sensitivity:
 - methicillin-sensitive *S.aureus* (MSSA). *S.aureus* isolates that are sensitive to methicillin and therefore sensitive to flucloxacillin
methicillin-sensitive = flucloxacillin sensitive
 - methicillin-resistant *S.aureus* (MRSA). *S.aureus* isolates that are resistant to methicillin and therefore resistant to flucloxacillin
methicillin-resistant = flucloxacillin resistant

7. HISWA Dataset

7.1 Numerator data fields

The numerator data fields and information required to be entered into the HISWA database are described in Table 10.

Table 10 HA-SABSI numerator data fields and descriptors for HISWA database

Data field	Descriptor
Patient ID	Unique patient identifier
Date of birth	Patient date of birth
Patient postcode	Postcode of patients home address
Laboratory specimen number	Laboratory number
Specimen date	Date the specimen was obtained
Organism	MSSA MRSA MRSA and MSSA (isolated from the same specimen)
Acquisition	Inpatient Non-inpatient
Focus of infection	IV line related Procedure related Non-IV device related Other (organ site focus) Unknown / disseminated

7.2 Denominator data fields

The denominator that is utilised is bed-days. Both multi-day and same-day bed-days are collected to allow for different rate calculations.

7.2.1 Inclusions

HISWA bed-day data for HA-SABSI includes:

- All inpatients including those admitted to HITH, rehabilitation, aged care areas and psychiatric units/wards within an acute HCF.
- All same-day patients e.g. haemodialysis units, day surgery or procedure units.
- Psychiatric units / wards associated with acute psychiatric hospitals.
- Unqualified newborns i.e. a newborn who is 9 days of age or less and does not require admission to a neonatal ICU and whose mother is the admitted patient.

7.2.1 Exclusions

HISWA bed-day data for HA-SABSI excludes:

- Boarders i.e. a person who is receiving food and/or accommodation but for whom the hospital does not accept responsibility for treatment and/or care including newborns of 10 days of age or greater who do not require an admitted patient level of care.
- Residential Aged Care Reporting Establishments that are co-located with public hospitals within the Western Australia Country Health Services.

7.2.3 Outpatient clinic settings and emergency department

Patients who attend outpatient clinics or emergency departments without admission to hospital are not counted in bed-days. However, HA-SABSI events that occur as a result of healthcare received in these settings will be included in numerator data if criterion B of the HA-SABSI definition is met (section 2.2) e.g. a patient develops a SABSI following a facet joint injection given at an outpatient clinic of a hospital and there was *S.aureus* infection at the injection site.

8. Calculation of HA-SABSI Rates

8.1 Calculation of total HA-SABSI

- The HA-SABSI rate is expressed per 10,000 bed-days
$$\text{HA-SABSI rate} = \frac{\text{Inpatient and non-inpatient SABSI} \times 10,000}{\text{Number of bed-days (multi-day and same-day)}}$$

8.2 Calculation of inpatient only HA-SABSI

- The inpatient HA-SABSI rate is expressed per 10,000 bed-days (multi-day only)
$$\text{Inpatient SABSI rate} = \frac{\text{Number of inpatient SABSI} \times 10,000}{\text{Number of multi-day bed-days}}$$

9. References

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Appendix 7 SABSI related to a SSI

A SABSI is considered an HAI related to the surgical site when criteria for classification as a SSI are met (Refer to SSI module) .

SSI are followed for the following periods where day 1 = the date of the procedure:

- 30 day period for superficial SSI for all procedures and 30 or 90 day period for deep and organ/space infections depending on the procedure

Surveillance period for deep or organ/space SSI following surgical procedures

30-day Surveillance	
Abdominal aortic aneurysm repair	Laminectomy
Limb amputation	Liver transplant
Appendix surgery	Neck surgery
Shunt for dialysis	Kidney surgery
Bile duct, liver or pancreatic surgery	Ovarian surgery
Carotid endarterectomy	Prostate surgery
Gallbladder surgery	Rectal surgery
Colon surgery	Small bowel surgery
Caesarean section	Spleen surgery
Gastric surgery	Thoracic surgery
Heart Transplant	Thyroid and/or parathyroid surgery
Abdominal hysterectomy	Vaginal hysterectomy
Kidney transplant	Exploratory laparotomy
	Other surgery not listed
90-day Surveillance	
Breast surgery	Cardiac surgery
Coronary artery bypass graft with both chest and donor site incisions	Coronary artery bypass graft with chest incision only
Craniotomy	Spinal fusion
Open reduction of fracture	Herniorrhaphy
Hip arthroplasty	Pacemaker surgery
Knee arthroplasty	Peripheral vascular bypass surgery
Refusion of spine	Ventricular shunt

Module 7

Central Line-Associated Bloodstream Infection

Central Line-Associated Bloodstream Infection

Central lines, also referred to as central venous catheters (CVCs), serve a vital role in the management of critically ill patients. However, central line-associated bloodstream infections (CLABSI) significantly increase morbidity, mortality and contribute to increased healthcare costs. In the era of “zero tolerance”, CLABSI are viewed as preventable adverse events if evidence-based infection prevention practices are followed and integrated with monitoring and feedback of rates to key stakeholders.^{1,2} This approach should be taken by every healthcare facility (HCF) to achieve and maintain a zero CLABSI rate.

1. Methodology

HISWA definitions are based on the CDC/NHSN CLABSI definitions³. For participating hospitals to make a valid comparison of their CLABSI rates the methodology must be similar and definitions consistently applied. Surveillance personnel are required to:

- Implement processes to ensure that all positive blood culture reports are received.
- Investigate all reported bloodstream infections (BSIs) to determine if definition criteria for a CLABSI are met and the attributable facility.
- Liaise with key stakeholders, clinical microbiologist / infectious diseases physicians to assist with the classification of CLABSI events.
- The methodology to assist with classification of CLABSI is described in Figure 7. Refer also to Module 1 for an introduction to surveillance of HAls.

Note: Surveillance personnel should take opportunities to promote best practice for blood culture collection to optimise BSI detection and classification as potential contaminants i.e. blood specimens drawn for culture should be obtained from 2 - 4 blood draws from separate venipuncture sites (within a few hours of each other) and not through an intravascular catheter.

Collection must be conducted using aseptic technique i.e. by using sterile gloves, ensuring the skin and the top of the culture bottle are disinfected prior to access with an alcohol-based disinfectant and

2. Central Lines

- A central line is defined as an intravascular catheter where the tip of the catheter terminates at or close to the heart or in one of the great vessels which is used for infusion, blood withdrawal or haemodynamic monitoring. The site of insertion or the type of catheter does not determine if a line qualifies as a central line.
- The following are considered great vessels for CLABSI surveillance: aorta, pulmonary artery, superior/inferior vena cava, brachiocephalic veins, internal jugular veins, subclavian veins, external iliac veins, common femoral veins.

2.1 Types of central line

- The main types of central lines are:
 - **non-tunnelled CVCs:** these are central lines placed in either the internal jugular or subclavian vein with the distal tip lying in the superior vena cava
 - **tunnelled CVCs:** the central line is tunnelled subcutaneously between the skin insertion site and the point where the catheter enters the blood vessel. Some have a cuff which sits in the subcutaneous tunnel and are referred to as cuffed catheters. These catheters are suitable for long term use
 - **peripherally inserted central catheters (PICCs):** these are central lines that are inserted percutaneously into peripheral veins e.g. basilica, brachial, cephalic. They are suitable for short, intermediate and long term use
 - **implanted ports:** these central lines are surgically inserted, placed under the skin and accessed with specific port needles. They are for long term use.
- An introducer is considered an intravascular catheter, and depending on the location of its tip, may be a central line.
- Central lines are sometimes described as permanent or temporary, however, HISWA do not stratify CLABSI by these terms.

2.2 Intravascular devices not included

- The following are not considered central lines:
 - pacemaker wires and other non-lumened devices inserted into central blood vessels or the heart, because fluids are not infused, pushed, nor withdrawn
 - femoral arterial catheters, extracorporeal membrane oxygenation (ECMO), haemodialysis reliable outflow (HeRO) dialysis catheters and intra-aortic balloon pump (IABP) devices.

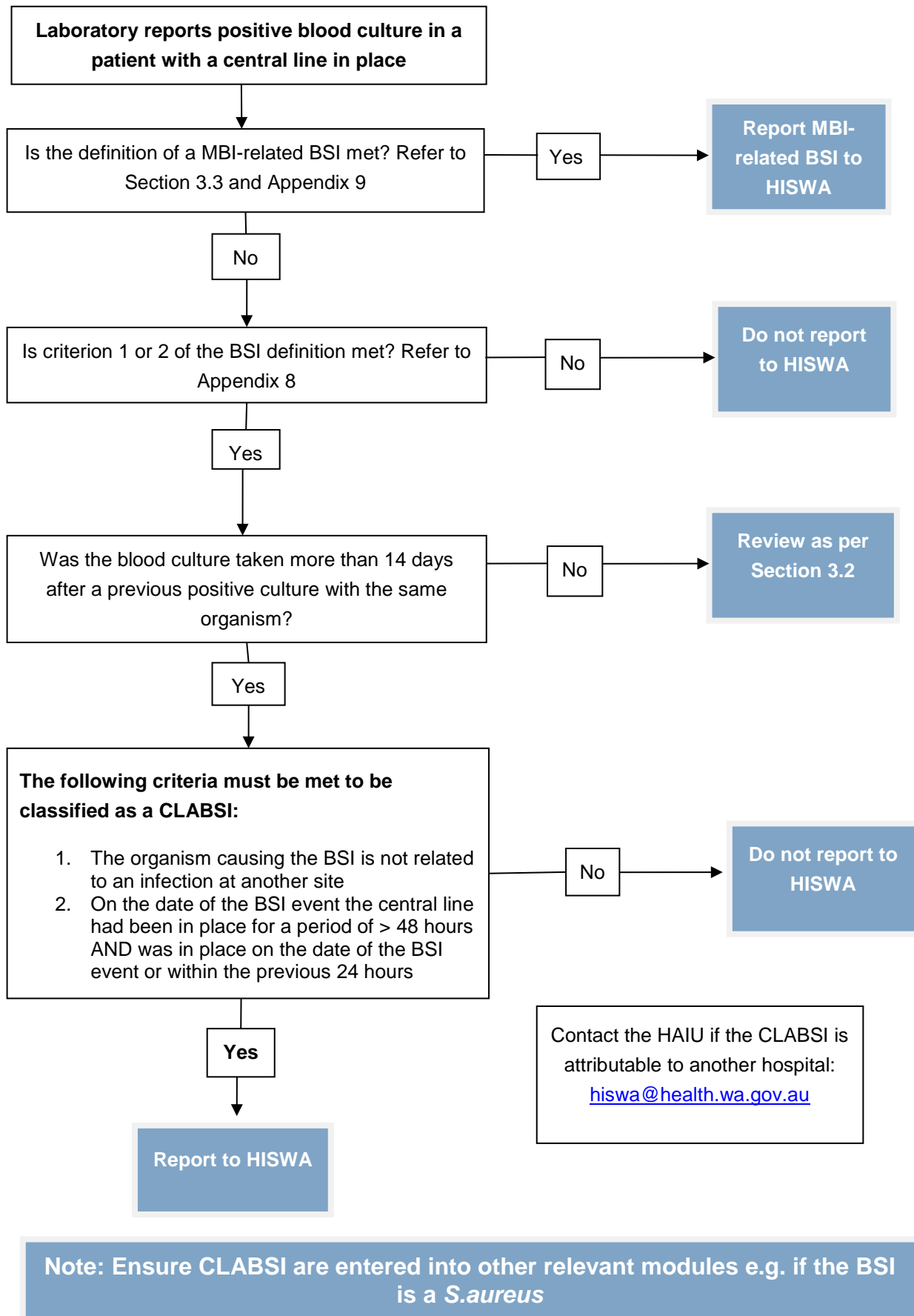
2.3 Stratification by insertion site

- Central lines are stratified by the insertion site for reporting and analysis.
 - centrally-inserted (CI): the skin entry point is on the trunk of the patient
 - peripherally-inserted (PI): the line is inserted through a limb vein e.g. PICC.
- A higher risk of infection with CI lines is reported in some patient settings.⁵

3. Definition of a CLABSI

- First, the criteria for classification as a laboratory-confirmed BSI event must be met (Refer to Appendix 8).
- The date of the CLABSI event is the date the first positive blood culture was collected. For 'same' potential contaminants this is the date the first of two blood culture sets was collected.
- A CLABSI is defined as a BSI, that is not related to an infection at another site, and on the date of the BSI event the central line had been in place for a period of > 48 hours AND was in place on the date of the BSI event or within the previous 24 hours.
 - If a central line was in place for > 48 hours and then removed, the CLABSI criteria must be fully met on the day the line was removed or within 24 hours of removal.
- CLABSI may occur as inpatients or non-inpatients and both are included in surveillance. Non-inpatient CLABSI are present on admission or develop less than 48 hours after admission.

Figure 7 Flowchart for CLABSI surveillance



3.1 Focus of infection

- The BSI definition requires that the organism cultured from the blood is *not related to an infection at another site*. A clinical assessment is required to determine if a focus of infection is present that is the likely cause of the BSI. This includes a review of medical records, laboratory, diagnostic and imaging reports. If an infection at another site is identified it must fulfil the infection criteria outlined in *Surveillance Definitions for Specific Types of Infection* (examples provided in Appendix 1).⁴
- If a patient with both peripheral and central lines develops a BSI that can clearly be attributed to the peripheral line (e.g. pus at the insertion site and the same pathogen from pus and BSI), it should not be reported as a CLABSI.
- Patients suspected or known to have accessed their own central lines that may have contributed to the CLABSI are not excluded from CLABSI surveillance. A facility must implement prevention efforts to protect the line.

3.2 CLABSI recurring within 14 days

- If the CLABSI criteria are met again within 14 days and the same organism(s) is identified, a clinical review should be undertaken to determine if the CLABSI is the same event or a new event. The clinical review should include consultation with a clinical microbiologist or infectious diseases physician and consider the following: completion of antimicrobial therapy, resolution of signs and symptoms with negative blood cultures, and central line change.
- If the original infection has resolved, and a new central line has been inserted and the CLABSI criteria are met again, a new CLABSI event should be reported.
- If the new CLABSI event occurs more than 14 days after the previous event then it is always classified as a new event.

3.3 Mucosal Barrier Injury

- Oral and gastrointestinal mucosal barriers may break down as a result of chemotherapy and radiation treatment regimens. This mucosal barrier injury (MBI) can range from inflammation to ulceration and enables translocation of bacteria from the oral cavity or intestinal tract into the bloodstream and may cause a bloodstream infection.

- MBI-related BSI may occur in patients who are either:
 - severely neutropenic*, or
 - a recipient of allogeneic haemopoietic stem cell transplant with either gastrointestinal graft versus host disease (GI GVHD) or diarrhoea.
 - refer to Appendix 9 for the definition of MBI-related BSI .The list of MBI organisms can be accessed at <http://www.cdc.gov/nhsn/PS-Analysis-resources/>.
- *Neutropenia is defined as at least 2 separate days with values of total white blood cell count (WBC) or absolute neutrophil count (ANC) < 500 cells/mm³ (0.5 x 10⁹/L) within a 7 day time period which includes the date of the BSI (Day 1), the 3 calendar days before and the 3 calendar days after. For examples refer to Appendix 10.

A BSI, that occurs in a neutropenic or allogeneic haemopoietic stem cell transplant patient with GI GVHD who has a central line in place, that is caused by a MBI organism (with no other organism isolated), and is not related to an infection at another site, should not be reported as a CLABSI. The likely source of the BSI is due to MBI and not the central line. Report MBI-related BSI to HISWA stratified by unit for monitoring, however MBI-related BSI will not be included in CLABSI rate calculations.

4. Stratification by Unit

CLABSI events are stratified according to specific higher- risk specialty units.

4.1 Adult haematology or oncology

- Patients managed by these units often have central lines in situ following discharge from hospital. Therefore all CLABSI events that occur either during a hospital admission or as an outpatient are reported.

4.2 Adult ICU

- A CLABSI event that occurs more than 48 hours after admission to an adult ICU or within 48 hours of discharge from ICU are reported as ICU-associated.

- High dependency unit, or step down unit, patients should only be included if they are co-located within the ICU and managed by the same medical and nursing staff.
- When paediatric patients are admitted to an adult ICU on an ad-hoc basis, they should be included in the adult ICU surveillance.

5. Healthcare Facility Attribution

- If all elements of a CLABSI are present within 48 hours of transfer from one location to another in the same facility or a new facility, the CLABSI is attributed to the transferring location. This is called the transfer rule.
- If a patient is transferred into a facility, with one central line in place, the date and time of the first access as an inpatient is considered when applying the transfer rule (not the date and time of transfer). “Access” is defined as line placement, infusion or withdrawal through the line.
- If a CLABSI develops in a non-inpatient setting, it will be attributed to the facility where the device was last accessed prior to the event.

6. HISWA Dataset

6.1 Numerator data fields

The numerator data fields and information required to be entered into the HISWA database are described in Table 11.

6.1.1 Inclusions

- CLABSI occurring as inpatient and non-inpatients in ICU, Haematology and Oncology Units

6.1.2 Exclusions

- MBI-related BSIs in patients who are neutropenic or a recipient of allogeneic haemopoietic stem cell transplant with either gastrointestinal graft versus host disease (GI GVHD) or diarrhoea. MBI-related BSIs are reported to HISWA but not included in CLABSI counts.

Table 11 CLABSI numerator data fields and descriptors for HISWA database

Data field	Descriptor
Patient ID	Unique patient identifier
Date of birth	Patient date of birth
Lab specimen number	Lab number assigned to the specimen
Specimen date	Date the specimen was obtained
Type of central line	The type of central line that was inserted in the patient <ul style="list-style-type: none"> centrally-inserted (CI) central line peripherally-inserted (PI) central line
Place acquired	Unit associated with the CLABSI and Unit associated with the MBI-related BSI <ul style="list-style-type: none"> ICU Haematology unit Oncology unit MBI- BSI ICU MBI- BSI Haematology MBI- BSI Oncology
Organism 1	The pathogenic organism isolated from a blood culture
Organism 2	The 2nd pathogenic organism isolated from a blood culture
Organism 3	The 3rd pathogenic organism isolated from a blood culture

6.2 Denominator data fields

The denominator that is utilised is central line-days and these are calculated either by tracking or tally methodologies.

6.2.1 Calculating central line-days in Haematology/Oncology units

- A tracking method that counts central line days from the insertion date to the removal date, or to the end of reporting period, whichever comes first i.e. count central line days during hospital admissions and as outpatients.
- If a line remains in situ at the end of a reporting period, start counting the same line anew from the first day of the next reporting period.

6.2.2 Calculating central line days in ICU

- A tally method that counts the number of patients in ICU that have a CI line or a PI central line in situ at approximately the same time each day. Totals are tallied at the end of the month.
- Patients with two or more CI central lines in situ are counted as one CI central line.

- Patients with two or more PI central lines in situ are counted as one PI-central line.
- If there is a PI and CI line in situ, count the CI line only.
- Central line data obtained from electronic databases may be used if it is validated for a minimum of 3 months and the difference is not greater of less than 5% from manual counts.
- A central line tally tool template is available on the HAIU website.⁶

6.2.3 Sampling of central line days in ICU

- Sample-based estimates of central line days using the tally method have been shown to yield results that are valid for surveillance of CLABSI.⁷
- Central line days must be counted on a minimum of 3 non-consecutive days per week and a monthly calculation is extrapolated from the sample count (refer to Appendix 11).
- A central line day sampling tool and a excel format template which calculates line days from sampled data is available on the HAIU website.⁸

7. Calculation of Rates

7.1 CLABSI rate

- The CLABSI rate is expressed per 1,000 central line-days

$$\text{CLABSI rate} = \frac{\text{Number of CLABSI} \times 1,000}{\text{Number of central line-days}}$$

7.2 Adult ICU central line utilisation ratio

- The central line utilisation ratio (CLUR) provides an indication of the degree to which ICU patients are exposed to the risk of CLABSI.
- It enables ICUs to determine whether their unit is comparable to other similar units in terms of CI and PI central line utilisation.
- The CLUR is expressed as a percentage

$$\text{CLUR} = \frac{\text{Number of line days} \times 100}{\text{Number of bed-days (multi and same-day bed-days)}}$$

8. References

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Appendix 8 Definition of a Laboratory-confirmed BSI

A laboratory-confirmed BSI must meet either Criterion 1 or 2:

Criterion 1: recognised pathogen
<ul style="list-style-type: none"> The patient has a recognised pathogen isolated from one or more positive blood cultures <p>Comments for Criterion 1</p> <ul style="list-style-type: none"> A recognised pathogen includes any organism that is not considered a potential contaminant. Examples of recognised pathogens include: <i>Staphylococcus aureus</i>, <i>Escherichia coli</i>, <i>Klebsiella pneumoniae</i>, <i>Pseudomonas aeruginosa</i>, <i>Proteus</i> spp, <i>Candida</i> spp.
Criterion 2: potential contaminant organisms
<ul style="list-style-type: none"> The same (matching) potential contaminant organism is cultured from two or more blood cultures drawn on separate occasions. (Refer to Appendix 5 “Determining ‘same’ potential contaminants”) <p>AND</p> <ul style="list-style-type: none"> The patient has at least one of the following signs and symptoms: fever (>38°C); chills; or hypotension (within 24 hours of the date of the BSI event – see comments) <p>Comments for Criterion 2</p> <ul style="list-style-type: none"> Organisms that can be considered as potential contaminants of blood cultures include those species that are part of the normal skin flora, such as diphtheroids [<i>Corynebacterium</i> spp.], <i>Propionibacterium</i> spp., coagulase-negative staphylococci [including <i>S. epidermidis</i>], viridans group streptococci, <i>Aerococcus</i> spp., <i>Micrococcus</i> spp. Potential contaminants may also include other bacteria that can be found transiently on the skin such as <i>Bacillus</i> [not <i>B. anthracis</i>] spp., <i>Pseudomonas</i> spp. [other than <i>P.aeruginosa</i>], <i>Xanthomonas</i> spp., <i>Ralstonia</i> spp. CDC/NHSN uses the term :”common commensals” and the NHSN list of common commensals is to be used. This can be accessed at: http://www.cdc.gov/nhsn/PS-Analysis-resources/ . Any organism that is considered a potential contaminant and is not on this list should be reviewed in liaison with a microbiologist/infectious diseases physician. An element refers to a specific component of infection and includes: positive blood culture(s); fever (>38°C), chills and hypotension. Criterion elements must occur within a timeframe that does not exceed a gap of 24 hours between any two elements e.g. positive blood cultures and fever. The same (matching) potential contaminant blood cultures represent a single element. The collection date of the first potential contaminant should be used to determine the date of the BSI event.

Note: Other specific signs and symptoms for patients aged one year or less are not listed as paediatric patients are not included in HISWA surveillance. Refer to CDC/NHSN module³

Appendix 8 Definition of a Laboratory-confirmed BSI (cont'd)

Determining “same” potential contaminant organisms

- If potential contaminant organisms are identified to the species level from one culture and a companion culture is identified with only a descriptive name (e.g. to the genus level), then it is assumed that the organisms are the “same” (matching).
- Only genus and species identification are required to determine the sameness of organisms. If additional comparative methods are available at your facility (e.g. susceptibility profiles), they should be used in consultation with a clinical microbiologist or infectious diseases physician.
- The table below shows examples of “same” (matching) potential contaminant organisms and these should be reported to the species level.

Culture (species level)	Companion culture	Report “same” organisms as
<i>Staphylococcus epidermidis</i>	Coagulase-negative staphylococci	<i>Staphylococcus epidermidis</i>
<i>Bacillus cereus</i>	<i>Bacillus</i> spp	<i>Bacillus cereus</i>
<i>Micrococcus luteus</i>	<i>Micrococcus</i> spp	<i>Micrococcus luteus</i>
<i>Streptococcus salivarius</i>	Viridans group streptococci	<i>Streptococcus salivarius</i>

- The phrase “two or more blood culture sets drawn on separate occasions” means that:
 - blood from at least two blood draws must be collected on the same day or consecutive calendar days (e.g. blood draws on Monday and Tuesday would be acceptable but blood draws on Monday and Wednesday would be too far apart in time to meet this criterion).
 - preparation and decontamination of two separate sites for drawing blood is recommended, e.g. different venipuncture sites, a combination of venipuncture and lumen withdrawal.
 - at least one bottle from each blood draw is reported by the laboratory as having grown the same (matching) potential contaminant (i.e. is a positive blood culture).

Note: For paediatric patients: a blood culture may consist of a single bottle due to volume constraints. Therefore to meet criterion 2, each bottle from two single bottle blood draws would have to be culture positive for the same potential contaminant.

Appendix 8 Definition of a Laboratory-confirmed BSI cont'd

Reporting instructions

- Catheter tip cultures are not a substitute for blood cultures in the determination of a BSI. The presence or absence of a positive tip culture does not affect the surveillance definition. Catheters can become colonised by an organism that originates from a different body site. Catheters may have luminal colonisation which may not be detected by usual laboratory culture procedures. In addition, catheters may be contaminated at the time of removal.
- Purulent phlebitis confirmed with a positive semi-quantitative culture of a catheter tip, but with either negative blood culture or no blood culture taken is not a BSI .
- 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 are collected must be reported.

Appendix 9 Definition of a Mucosal Barrier Injury related BSI

<p>MBI-related BSI[^]</p> <p>Criterion 1</p>	<p>Patient meets criterion 1 for laboratory-confirmed BSI,[^] with at least one blood culture growing any of the following intestinal organisms with no other organisms isolated: <i>Bacteriodes</i> spp., <i>Candida</i> spp., <i>Clostridium</i> spp., <i>Enterococcus</i> spp., <i>Fusobacterium</i> spp., <i>Peptostreptococcus</i> spp., <i>Prevotella</i> spp., <i>Veillonella</i> spp., or <i>Enterobacteriaceae</i>. Refer to complete list of MBI organisms at http://www.cdc.gov/nhsn/PS-Analysis-resources/.</p> <p>and</p> <p>patient meets at least one of the following:</p> <ol style="list-style-type: none"> 1. Is an allogeneic hematopoietic stem cell transplant recipient within the past year with one of the following documented during same hospitalisation as positive blood culture: <ol style="list-style-type: none"> a. Grade III or IV gastrointestinal graft versus host disease (GI GVHD). b. ≥ 1 litre diarrhoea in a 24-hour period (or ≥ 20 mL/kg in a 24-hour period for patients <18 years or age) with onset on or within 7 calendar days before the date the positive blood culture was collected. 2. Is neutropenic (see Definition Appendix 10).
<p>MBI-related BSI[^]</p> <p>Criterion 2</p>	<p>Patient meets criterion 2 for laboratory-confirmed BSI when the blood cultures are growing only viridans group streptococci with no other organisms isolated</p> <p>and</p> <p>patient meets as least one of the following:</p> <ol style="list-style-type: none"> 1. Is an allogeneic hematopoietic stem cell transplant recipient within the past year with one of the following documented during same hospitalisation as positive blood culture: <ol style="list-style-type: none"> a. Grade III or IV gastrointestinal graft versus host disease (GI GVHD). b. ≥ 1 litre diarrhoea in a 24-hour period (or ≥ 20 mL/kg in a 24-hour period for patients <18 years or age) with onset on or within 7 calendar days before the date the positive blood culture was collected. 2. Is neutropenic (see Definition Appendix 10).
<p>Comments</p>	<ol style="list-style-type: none"> 1. MBI-related BSI Criterion 1 and 2 apply to patients of any age including those ≤1 year of age 2. In MBI-related BSI Criterion 1 and 2, “No other organism isolated” means there is no isolation in a blood culture of another recognised pathogen (e.g., <i>S. aureus</i>) or common commensal (e.g., coagulase negative staphylococci) other than listed in MBI-related BSI criterion 1 and 2 that would otherwise meet the CLABSI criteria. If this occurs, the infection should not be classified as MBI-related BSI. 3. Grade III/IV GI GVHD is defined as follows: <ul style="list-style-type: none"> • In adults: ≥ 1 L diarrhoea/day or ileus with abdominal pain • In paediatric patients: ≥20 ml/kg/day of diarrhoea.

[^] HISWA use the term “MBI-related BSI” instead of “MBI LCBI” used by CDC/NHSN

Appendix 10 Examples illustrating the MBI-related BSI definition of neutropenia

		Day -7	Day -6	Day -5	Day -4	Day -3	Day -2	Day -1	Day 1*	Day 2	Day 3	Day 4
Pt. A	WBC	100	800	400	300	ND	ND	320	400 +BC* w/ Candida spp. x1	ND	550	600
Pt. B	ANC	ND	410	130	ND	ND	120	110	ND + BC* w/ viridians strep x2 and fever >38°C	110	300	320
Pt. C	WBC	100	800	400	300	ND	ND	ND	600 +BC* w/ Candida spp. x1	230	ND	400

ND = not done *Day the blood specimen that was positive was collected

Definition of Neutropenia

At least 2 separate days with values of absolute neutrophil count (ANC) or total white blood cell count (WBC) $<500 \text{ cells/mm}^3$ ($0.5 \times 10^9/\text{L}$) on or within a seven-day time period which includes the date the positive blood culture was collected (Day 1), the 3 calendar days before and the 3 calendar days after.

Examples

Patient A meets MBI-related BSI criterion 1, sub-criterion 2: Positive blood culture with intestinal organism (Candida spp) and neutropenia (2 separate days of $\text{WBC} < 0.5 \times 10^9/\text{L}$ occurring on the date the positive blood culture was collected [Day 1] or during the 3 days before or the 3 days after that date). In this case, the Day 1 value = 400, and Day-1 value = 320.

Patient B meets MBI-related BSI criterion 2, sub-criterion 2: At least 2 positive blood cultures with viridians group streptococci (in this case, 2 positive), and fever $> 38^\circ\text{C}$ and neutropenia (2 separate days of $\text{ANC} < 0.5 \times 10^9/\text{L}$ occurring on the date the positive blood culture was collected [Day 1] or during the 3 days before or the 3 days after that date). In this case, the Day-1 value = 110 and Day -2 value = 120. Note: any two of Days -2, -1, 2, 3 and 4 could be used to meet this requirement since WBC or ANC $< 500 \text{ cells/mm}^3$ ($0.5 \times 10^9/\text{L}$) were present on those days.

Patient C meets MBI-related BSI criterion 1, sub-criterion 2: Positive blood culture with intestinal organism (Candida spp) and neutropenia (2 separate days of $\text{WBC} < 0.5 \times 10^9/\text{L}$ occurring on the date the positive blood culture was collected [Day 1] or during the 3 days before or the 3 days after that date).

Appendix 11 CLABSI Sampling of ICU Central Line Days- Worked Example

Central line sampling tool		
Year: 2014 Month: August	No. of patients with 1 or more	
Day of Month		
	CI central lines	PI central lines
1	20	5
2		
3	22	5
4		
5	15	4
6		
7		
8	24	3
9		
10	25	3
11		
12	24	4
13		
14		
15	20	4
16		
17	22	4
18		
19	18	4
20		
21		
22	25	3
23		
24	22	3
25		
26	25	3
27		
28	22	3
29	24	3
30		
31	20	3
Total line day counts	328	54

Instructions for Line Day Data Collection

■ Patients with 1 or more central lines in situ on a day are counted only once as per these rules:

► if there are 2 or more CI central lines in situ count 1 CI central line

► if there are 2 or more PI central lines in situ count 1 PI central line

► if there is a PI and a CI central line in situ, count 1 CI central line only.

■ Counts of central line days will cease on patient discharge from ICU even if the lines remain in situ.

■ Count lines at approximately the same time each day.

■ Counts of central lines can be performed daily or by sampling, preferably on 3 or more non-consecutive days per week.

Calculations

Total number of central lines days(a)	328	54
Number of days when counts performed(b)	15	15
Average number of central lines per day (c) = a/b	21.9	3.6
Number of days in the month (d)	31	31
Total central line days for month (e) = c x d	678	112

Module 8

Haemodialysis Access-Associated Bloodstream Infection

Haemodialysis Access-associated Bloodstream Infection

Haemodialysis places patients at high risk for healthcare associated infection due to the immunocompromised state intrinsic to end stage renal disease, the high prevalence of diabetes, and numerous human, environmental and procedural factors. The invasiveness of the haemodialysis procedure, which requires vascular access, is an established risk factor for bloodstream infection (BSI). This is a serious complication that can result in significant morbidity and mortality.¹

1. Methodology

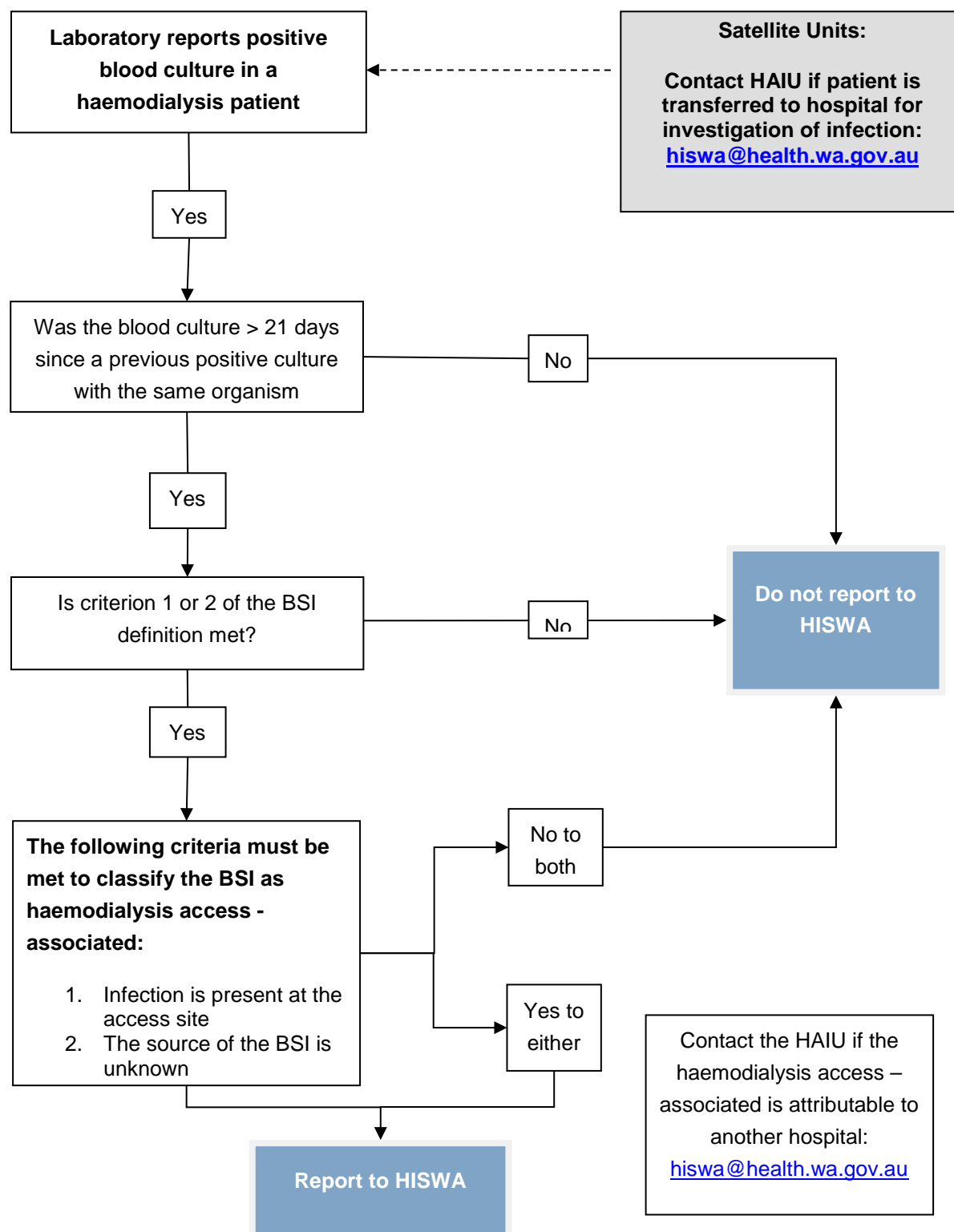
For haemodialysis (HD) units to make a valid comparison of access-associated BSI rates the methodology must be similar and definitions consistently applied. It is essential that communication occurs between hospital and satellite HD service providers to ensure that access-associated BSI are identified and attributed to the correct unit.

- Hospital surveillance personnel are required to:
 - implement processes to ensure all positive blood culture reports from HD patients are received and investigated to determine if the BSI is access-associated and the attributable HD unit.
- Satellite HD personnel are required to:
 - contact the HAIU if a patient is transferred to a hospital directly from dialysis for investigation of infection and report if blood cultures or access site specimens were obtained prior to transfer.
- Methodology to assist with classification of HD access-associated BSI is described in Figure 8. Refer to Module 1 for an introduction to HAI surveillance.

Note: Surveillance personnel should take opportunities to promote best practice for blood culture collection to optimise BSI detection and classification as potential contaminants i.e. blood specimens drawn for culture should be obtained from 2 - 4 blood draws from separate venipuncture sites (within a few hours of each other) and not through an intravascular catheter.

Collection must be conducted using aseptic technique i.e. by using sterile gloves, ensuring the skin and the top of the culture bottle are disinfected prior to access with an alcohol-based disinfectant and allowed to dry.

Figure 8 Flowchart for surveillance of haemodialysis access-associated BSI



Note: Ensure haemodialysis access-associated BSIs are entered into other relevant modules
Eg. If the BSI is a MRSA, ensure its entered into the specific organism module

2. Definitions

2.1 HD vascular access

- Refers to any intravascular access utilised for the purpose for haemodialysis e.g. cuffed or non-cuffed central venous catheters, arterio-venous grafts or fistulae (refer to section 3).

2.1 HD access site infection

- A HD access site infection is defined as the presence of one or more of the following symptoms at the access site: purulent discharge, increased swelling or redness.²

2.2 Haemodialysis access-associated BSI

- First, the criteria for classification as a BSI must be met (refer Appendix 12).
- A HD access-associated BSI is defined as, a BSI in a HD patient where the source of the BSI is an access site infection, or is unknown .²
 - if a HD access site infection is present the BSI is classified as access-associated
 - where there is no access site infection, active investigation must be taken to determine the presence or absence of a focus of infection at another site. This includes a review of medical records, laboratory, diagnostic and imaging reports
 - if a focus of infection at another site other than the access device is considered the likely source of the BSI the infection must fulfil the infection criteria for that site outlined in *Surveillance Definitions for Specific Types of Infection*.³

Note: HD patients often have chronic vascular wounds e.g. leg ulcers, which are colonised with micro-organisms and are not clinically infected. If the same organism is identified in a BSI, it is unlikely that the colonised wound is the source of the BSI. Rather, it is probable that these organisms have been transmitted to the access site resulting in a BSI or access site infection. Therefore, if there are no other sources of infection, these cases are classified as a HD-BSI.

2.3 New access-associated BSI events

- There must be 21 days or more between positive blood cultures with the same organism for a HD access-associated BSI to be counted as a new event ² i.e. BSIs with the same organism that occur less than 21 days apart are considered ongoing infection and are not counted as a new event.

2.4 Attribution of BSI to a HD Unit

- An access-associated BSI will be attributed to the HD unit where the access device was last accessed prior to developing signs and symptoms of infection, unless there is compelling evidence to the contrary.

3. Stratification of Haemodialysis Access Types

- Haemodialysis access types are stratified for reporting and analysis and are listed in order of increasing risk of infection:
 - arteriovenous fistula (AVF) – the connection of an artery and a vein using the patient's own blood vessels
 - arteriovenous graft (AVG) – the connection of an artery and a vein using synthetic or native grafts (graft types are combined for reporting)
 - cuffed catheters - permanent or semi-permanent, tunnelled central lines
 - non-cuffed catheters - temporary, non-tunnelled central lines.

4. HISWA Dataset

4.1 Numerator data fields

The numerator data fields for HD access-associated BSI required to be entered into the HISWA database are described in Table 12.

Table 12 Haemodialysis access-associated BSI numerator data fields and descriptors for HISWA database

Data field	Descriptor
Patient ID	Unique patient identifier
Date of birth	Patient date of birth
Laboratory specimen number	Laboratory number assigned to the specimen
Specimen date	Date the specimen was obtained
Type of access	Type of access <ul style="list-style-type: none"> ▪ AVF ▪ AVG (native & synthetic) ▪ Non-cuffed catheter ▪ Cuffed catheter
Organism 1	The pathogenic organism isolated from a blood culture
Organism 2	The 2nd pathogenic organism isolated from a blood culture
Organism 3	The 3 rd pathogenic organism isolated from a blood culture

4.2 Denominator data fields

- The denominator used is the number of patient-months, stratified by the type of vascular access type.
- The data fields required to be entered into the HISWA database each month are described in Table 13.

Table 13 Haemodialysis access-associated BSI denominator data fields for HISWA database

Access type	Number of patient-months
AVF	
AVG (synthetic and native combined)	
Cuffed catheter	
Non-cuffed catheter	

4.2.1 Denominator data collection

- The number of patients who received HD on the first two working days of each month, stratified by access type, are counted.
- A sample tool for denominator data collection in Satellite units only, is shown in Appendix 13. A blank collection tool is available from the HAIU website.⁴
- Each HD patient is only counted once each month on the specified collection date.
- If the patient has multiple vascular access types, count only the access type with the highest risk of infection, e.g. catheters have a higher risk than AVF or AVG. Refer to Section 3.
- Non-cuffed catheters are not included in counts from Satellite HD units, as utilisation in this setting is rare.

4.2.2 Inclusions

The following patients are included in the surveillance:

- Chronic adult HD patients
- Patients receiving HD as 'visitors' to another HD unit within Western Australia.

4.2.3 Exclusions

The following patients are excluded in the surveillance:

- Patients with acute renal failure requiring HD.
- HD patients who are short term visitors from outside WA, i.e. less than 1 week.

5. Calculation of Rates

- The haemodialysis access-associated BSI rate is expressed per 100 patient-months, stratified by access type, and can be interpreted as the proportion of patients with each access type who develop a BSI each month.
- $$\text{BSI rate} = \frac{\text{Number of access-associated BSI} \times 100}{\text{Number of patient-months}}$$

6. References

1. Association for Professionals in Infection Control and Epidemiology (APIC). Guide to the elimination of infections in haemodialysis. Washington: APIC; 2010.
2. Centers for Disease Control and Prevention (CDC), National Healthcare Safety Network (NHSN), Dialysis Event (DE), January 2014.
www.cdc.gov/nhsn/PDFs/pscManual/8pscDialysisEventcurrent.pdf
3. CDC/NHSN Surveillance Definitions for Specific Types of Infection, January 2014. http://www.cdc.gov/nhsn/pdfs/pscmanual/17pscnosinfdef_current.pdf
4. Department of Health, Western Australia. Healthcare Associated Infection Unit (HAIU) Denominator Data Collection Tool .

Appendix 12: Definition of a Laboratory-confirmed BSI

A laboratory-confirmed BSI must meet either Criterion 1 or 2:

Criterion 1: recognised pathogen
<ul style="list-style-type: none"> ■ The patient has a recognised pathogen isolated from one or more positive blood cultures <p>Comments for Criterion 1</p> <ul style="list-style-type: none"> ■ a 'recognised pathogen' includes any organism that is not considered a potential contaminant. ■ examples of recognised pathogens include: <i>Staphylococcus aureus</i>, <i>Escherichia coli</i>, <i>Klebsiella pneumoniae</i>, <i>Pseudomonas aeruginosa</i>, <i>Proteus</i> spp, <i>Candida</i> spp.
Criterion 2: potential contaminant organisms
<ul style="list-style-type: none"> ■ The same (matching) potential contaminant organism is cultured from two or more blood cultures drawn on separate occasions. (Refer to Appendix 12 "Interpreting 'same' potential contaminants") <p>AND</p> <ul style="list-style-type: none"> ■ the patient has at least one of the following signs and symptoms: fever (>38°C); chills; or hypotension (within 24 hours of the date of the BSI event – see comments) <p>Note: Other specific signs and symptoms for patients aged one year or less are not listed as paediatric patients are not included in HISWA surveillance. Refer to CDC/NHSN module³</p> <p>Comments for Criterion 2</p> <ul style="list-style-type: none"> ■ Organisms that can be considered as potential contaminants of blood cultures include those species that are part of the normal skin flora, such as diphtheroids [<i>Corynebacterium</i> spp.], <i>Propionibacterium</i> spp., coagulase-negative staphylococci [including <i>S. epidermidis</i>], viridans group streptococci, <i>Aerococcus</i> spp., <i>Micrococcus</i> spp. Potential contaminants may also include other bacteria that can be found transiently on the skin such as <i>Bacillus</i> [not <i>B. anthracis</i>] spp., <i>Pseudomonas</i> spp. [other than <i>P. aeruginosa</i>], <i>Xanthomonas</i> spp., <i>Ralstonia</i> spp. ■ CDC/NHSN uses the term: "common commensals" and the NHSN list of common commensals is to be used. This can be accessed at: http://www.cdc.gov/nhsn/PS-Analysis-resources/. Any organism that is considered a potential contaminant and is not on this list should be reviewed in liaison with a microbiologist/infectious diseases physician. ■ An element refers to a specific component of infection and includes: positive blood culture(s); fever (>38°C), chills and hypotension. Criterion elements must occur within a timeframe that does not exceed a gap of 24 hours between any two elements e.g. positive blood cultures and fever. The same (matching) potential contaminant blood cultures represent a single element. The collection date of the first potential contaminant should be used to determine the date of the BSI event.

Appendix 12: Definition of a Laboratory-confirmed BSI (cont'd)

Determining “same” potential contaminant organisms

- If potential contaminant organisms are identified to the species level from one culture and a companion culture is identified with only a descriptive name (e.g. to the genus level), then it is assumed that the organisms are the “same” (matching).
- Only genus and species identification are required to determine the sameness of organisms. If additional comparative methods are available at your facility (e.g. susceptibility profiles), they should be used in consultation with a clinical microbiologist or infectious diseases physician.
- The table below shows examples of “same” potential contaminant organisms and these should be reported to the species level.

Culture (species level)	Companion culture	Report “same” organisms as
<i>Staphylococcus epidermidis</i>	Coagulase-negative staphylococci	<i>Staphylococcus epidermidis</i>
<i>Bacillus cereus</i>	<i>Bacillus</i> spp	<i>Bacillus cereus</i>
<i>Micrococcus luteus</i>	<i>Micrococcus</i> spp	<i>Micrococcus luteus</i>
<i>Streptococcus salivarius</i>	Viridans group streptococci	<i>Streptococcus salivarius</i>

- The phrase “two or more blood cultures drawn on separate occasions” means that:
 - blood from at least two blood draws must be collected on the same day or consecutive calendar days (e.g. blood draws on Monday and Tuesday would be acceptable but blood draws on Monday and Wednesday would be too far apart in time to meet this criterion).
 - preparation and decontamination of two separate sites for drawing blood is recommended, e.g. different venipuncture sites, a combination of venipuncture and lumen withdrawal.
 - at least one bottle from each blood draw is reported by the laboratory as having grown the same (matching) potential contaminant (i.e. is a positive blood culture).

Appendix 12: Definition of a Laboratory-confirmed BSI (cont'd)

Reporting instructions

- Catheter tip cultures are not a substitute for blood cultures in the determination of a BSI. The presence or absence of a positive tip culture does not affect the surveillance definition. Catheters can become colonised by an organism that originates from a different body site. Catheters may have luminal colonisation which may not be detected by usual laboratory culture procedures. In addition, catheters may be contaminated at the time of removal.
- Purulent phlebitis confirmed with a positive semi-quantitative culture of a catheter tip, but with either negative blood culture or no blood culture taken is not a BSI .
- 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 are collected must be reported.

Appendix 13 HISWA Sample Denominator Data Collection Tool for Satellite Haemodialysis Units

HISWA Haemodialysis Access-associated Bloodstream Infection Surveillance Denominator Data (pt-months) Collection Tool for Satellite Dialysis Units												
Month	No. of patients with a cuffed (tunneled) catheter, e.g. Hickman			No. of patients with an AV Fistula			No. of patients with an AV Graft (native & synthetic)			No. of patients with a non-cuffed (non-tunneled) catheter e.g. Vascath		
Day/Date	Shift 1	Shift 2	Shift 3	Shift 1	Shift 2	Shift 3	Shift 1	Shift 2	Shift 3	Shift 1	Shift 2	Shift 3
Monday Date										Do not count		
Tuesday Date										Do not count		
Totals for each shift / Add Mon & Tues for each shift	a	b	c	a	b	c	a	b	c	Not applicable		
Access device total for month (Add all shift totals)	Total no of cuffed catheter pt-months = (a+b+c)			Total no of AVF pt-months = (a+b+c)			Total no of AVG pt-months = (a+b+c)			Not applicable		

DATA COLLECTION DATES

Refer to “Key Dates” on the HAIU website.

DATA COLLECTION INSTRUCTIONS

- Count one access type for each patient on the specified collection dates.
- If a patient has more than one access type, count the access type that is associated with the higher risk of infection, e.g. catheters are higher risk than AVF or AVG.
- Non-cuffed catheters are not counted. If a non-cuffed catheter is in situ, count the access type that is usually in situ for that patient.
- Count only chronic HD patients attending the unit.
- Count HD patients present on collection dates that are visitors from other WA HD units.
- Do not count short term visitors from outside WA i.e. less than 1 week.
- Enter data on HISWA database at the end of each month and finalise.

Module 9

Occupational Exposure

Occupational Exposure

An occupational exposure occurs when a healthcare worker (HCW) is at risk of acquiring a blood borne viral (BBV) disease, such as hepatitis B, hepatitis C or human immunodeficiency virus, through exposure to an infected patient's blood or body fluids. Occupational exposures are increasingly regarded as preventable. In addition to education and adherence to standard precautions, the use of safety engineered medical devices (SEMDs) is an effective measure in eliminating the risk of some exposures.¹

1. Methodology

- All HCFs should have incident monitoring systems in place for the reporting and management of occupational exposures.
- All occupational exposures where a risk assessment has been performed and follow-up is deemed necessary are to be reported to HISWA.
- The minimal data on each occupational exposure is reported to HISWA. Hospitals should collect additional information to ensure a risk management approach is undertaken to prevent occupational exposures.

2. Definitions

2.1 Occupational exposure

- An occupational exposure is an incident that occurs during the course of a person's paid or unpaid work where there is a risk of acquiring a BBV following exposure to another person's blood, tissue, or body fluids that are potentially infected with a BBV. Occupational exposures are further classified as:

2.1.1 Parenteral exposure

- Parenteral (or percutaneous) exposures include:
 - any incident where there is penetration of the skin or mucous membranes with a sharp object that may be contaminated with blood, tissue or other potentially infectious body fluids, Sharp objects include needles, scalpels, broken glass, broken capillary tubes, surgical instruments, wires, spicules of bone and teeth
 - penetration of a dirty / contaminated glove with a clean sharp object
 - human bites if the skin is broken.

2.1.2 Non-parenteral exposure

- Non-parenteral (or non-percutaneous) exposures include:
 - any incident where a person's mucous membranes (eyes, nose, mouth) or where non-intact skin (e.g. skin abrasions, open wounds or skin that is damaged with dermatitis) is exposed to blood, tissue or other potentially infectious body fluids.

2.2 Blood and body fluids

- The following body fluids are considered a potential risk for BBV transmission:
 - blood, serum, plasma and all tissue or body fluids visibly contaminated with blood
 - pleural, amniotic, pericardial, peritoneal, synovial and cerebrospinal fluids, uterine / vaginal secretions or semen
 - laboratory specimens containing concentrated BBV ^{2,3}
- Faeces, nasal secretions, saliva, sputum, sweat, tears, urine, and vomitus carry a minimal risk of BBV infection unless they are visibly contaminated with blood or where there is no obvious blood but there is potential for blood contamination ^{2,3}
- There is no evidence that a BBV is transmitted by blood contamination of intact skin, by inhalation or by faecal-oral contamination.

3. Healthcare Worker Classification

3.1 Inclusions

All HCWs, students, contractors and volunteers are included in the surveillance and classified according to Table 14.

Table 14 Classification of HCW occupations and descriptors

HISWA Classification	Descriptor
Doctor	All medical officers, specialist clinicians, dentists, visiting and student doctors.
Nurse	All nurses - registered, enrolled; student; midwife; nursing assistant.
Allied Health	Clinical healthcare professions distinct from medicine, dentistry and nursing e.g. social work, dietetics, podiatry, pharmacy, audiology occupational therapy, physiotherapy, radiography, psychology, speech pathology and prosthetics and student allied health.
Patient Support Services	Other HCWs providing services that support clinical patient care e.g. patient care assistants, ward orderlies, phlebotomists, all technicians (laboratory, theatre, respiratory, orthopaedic, pathology and anaesthetic) and CSSD/TSSU staff.
Environmental Services	HCWs mainly involved in maintaining equipment and the environment e.g. housekeeping, catering, cleaning, laundry workers, waste management, plumbers, engineers, carpenters, maintenance, visiting contractors.
Other	Other employees / workers who do not fit into the above classifications e.g. administrative, clerical, information technology, chaplains, volunteers, transport, security.

3.2 Exclusions

The following occupational exposures are excluded from surveillance:

- Occupational exposures that are not officially reported and documented e.g. anecdotal reports.
- Visitors who are not employees or contractors e.g. patient visitors.

4. HISWA Dataset

4.1 Numerator data fields

The numerator data fields required to be entered into the HISWA database are described in Table 15.

Table 15 Occupational exposure data fields and descriptors for HISWA database

Data field	Descriptor
Identifier	HCW identifier - initials or DOB
Exposure date	The date of the occupational exposure incident
Occupation	The classification of the HCW reporting the occupational exposure as per Table 12
Type of exposure	<ul style="list-style-type: none"> ▪ parenteral ▪ non-parenteral

4.1.1 Inclusions

- Report all occupational exposures where a risk assessment has been performed and follow-up is required.
- Report occupational exposures from staff working in all inpatient and outpatient departments of a hospital, including:
 - emergency and outpatient departments, day wards and units e.g. dialysis
 - psychiatric hospitals, and psychiatric units within hospitals
 - HITH
 - rehabilitation wards within hospitals

4.2 Denominator data fields

The denominator used is the total number of bed-days for the HCF (multi-day and same-day bed-days). Emergency department and outpatient clinic presentations are not included in bed-day data.

5. Calculation of Rates

- The occupational exposure rate is expressed per 10, 000 bed-days.
- Occupational exposure rate = $\frac{\text{Number of exposure} \times 10,000}{\text{Total number of multi and same-day bed-days}}$

6. References

1. Jagger, J. Caring for healthcare workers: a global perspective. *Infect Control Hosp Epidemiol*. 2007; 28:1-4.
2. Centres for Disease Control and Prevention. Updated U.S. public health service guidelines for the management of occupational exposures to HIV and recommendations for post exposure prophylaxis. 2005. MMWR / vol 54 / No.RR-9,
3. Centres for Disease Control and Prevention. Recommendations for Postexposure Interventions to Prevent Infection with Hepatitis B virus, Hepatitis C Virus or Human Immunodeficiency Virus and Tetanus in Persons Wounded iDuring Mass-Casualty Events 2008. MMWR / vol 57 / No. RR-6

Module 10

Bed-Day and Separation Data

Bed-Day and Separation Data

In WA, public HCFs and private HCFs contracted to provide care for public patients, are required to submit data to HISWA for a suite of mandatory HAI surveillance indicators, some of which are also required for reporting to the National Health Performance Authority. Collection of HCF bed-day and separation data is essential to calculate infection rates for these indicators and generate timely reports.

1. Requirements

- Administrators responsible for management of patient information data are required to provide monthly bed-day and separation data to surveillance personnel.
- Surveillance personnel are required to obtain and check bed-day and separation data and submit to HISWA within 30 days from the end of the reporting month.
- The mandatory indicators and reporting requirements are outlined in Module 1.

2. Definitions

2.1 Bed-Days

- Bed-days are defined and calculated as multi-day and same-day.
- HITH patients are included in all bed-day data.

2.1.1 Multi-day bed-days

A count of beds that are occupied by overnight patients admitted to the hospital for a minimum of one night.

2.1.2 Same-day bed-days

A count of beds / chairs that are occupied by patients that are admitted as same-day patients. i.e. is admitted to and separated from the HCF on the same date.

2.2 Separations

- Separations are defined as formal and statistical.
- Separations submitted to HISWA include both formal and statistical separations.
- HITH patients are included in all separation data.

2.2.1 Formal separations

This is the administrative process by which a HCF records the cessation of inpatient treatment and / or care and / or accommodation of a patient.

2.2.2 Statistical separations

This is the administrative process by which a HCF records the cessation of an episode of care for a patient within the one hospital stay i.e. there is a change of care type category (not change of ward, treatment or client status)

2.3 Newborns

Unqualified newborns i.e. newborn who are 9 days of age or less and do not require admission to a neonatal ICU and whose mother is an admitted patient.

A qualified newborn is a newborn aged 9 days or less who requires intensive care or becomes an admitted patient without its mother.

2.4 Boarders

A boarder is a person who is receiving food and/or accommodation but for whom the hospital does not accept responsibility for treatment and/or care , including newborns of 10 days of age or greater who do not require an admitted patient level of care.

3. HISWA Data Fields

Data fields required to be entered into HISWA database are described in Table 16

Table 16 Monthly bed-day data required for HISWA

Month	ICU	Non-ICU	Psychiatric	Unqualified newborns	Patients <2 years of age*
Multi-day bed-days					
Same-day bed-days					
Multi-day separations (formal and statistical)					
Same-day separations (formal and statistical)					

***Patients < 2 years of age on the date of admission.**

Note: Columns in Table 16, for ICU, Non-ICU and Psychiatric are not to include data for unqualified newborns. (Refer to Table 17)

4. HISWA Data Field Descriptors

HISWA data fields, inclusions and exclusions are described in Table 17.

Table 17 HISWA bed-day data fields

Multi-day bed-days	
ICU	Admitted patients with an overnight stay in ICU
Non-ICU	Admitted patients with overnight stay in the HCF, excluding ICU and psychiatric units.
Psychiatric	Admitted patients with overnight stay in a psychiatric unit.
Inclusions	HITH patients, qualified newborns.
Exclusions	Same-day admissions, unqualified newborns, boarders WACHS Small Hospitals and residents of Residential Aged Care Reporting Establishments.
Multi-day separations (includes formal and statistical separations)	
ICU	Patients discharged or separated from ICU following an episode of care that includes an overnight stay.
Non-ICU	Patients discharged from all wards, excluding ICU and psychiatric units, following an episode of care that includes an overnight stay.
Psychiatric	Patients discharged from psychiatric units following an episode of care that includes an overnight stay.
Inclusions	HITH, qualified neonates.
Exclusions	Same-day admissions, unqualified newborns, boarders, WACHS Small Hospitals and residents of Residential Aged Care Reporting Establishments.
Same-day bed-days and separations (includes formal and statistical separations)	
ICU	Patients discharged from the HCF directly from ICU on the same-day of admission. This does not include transfers from the ICU to wards.
Non-ICU	Patients discharged from the HCF, excluding ICU and psychiatric units, on the same day of admission.
Psychiatric	Patients discharged from psychiatric units on the same day of admission.
Inclusions	HITH, same-day patients e.g. dialysis units, day-surgery, qualified newborns
Exclusions	Overnight stay patients, unqualified newborns, boarders, (WACHS Small Hospitals and residents of Residential Aged Care Reporting Establishments.
<p><i>Note: contracted patients i.e. activity funded by other hospitals will be counted in the denominator data of the contracted hospital only. Patients undergoing organ procurement will not to be included in any denominator data.</i></p>	

5. National Surveillance Data

- Patient-days are the standard denominator used for national reporting of HAI surveillance data. Patient-day denominator data for public HCFs in WA will be obtained from the state information management systems for national reporting as required.
- Patient-days are 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 reporting period are not counted until that period.¹

5.1 Variations between HISWA and National Data

- HISWA uses bed-days to calculate rates .The yearly variance between calculations of patient-days and occupied bed-days is reported to be less than one percent, however the monthly variation can be quite significant for smaller hospitals.¹

6. References

1. The Australian Commission on Safety and Quality in Health Care (ACSQHC). Data Set Specification. Surveillance of Healthcare Associated Infections: *Staphylococcus aureus* Bacteraemia and *Clostridium difficile* Infection. Version 3, July/August 2010.
www.health.gov.au/internet/safety/publishing.nsf/Content/PriorityProgram-03

Abbreviations and Acronyms

ACCESS	Australian Collaborating Centre for Enterococcus and Staphylococcus Species
ACHS	Australian Council for Healthcare Standards
ACSQHC	Australian Commission on Safety and Quality in Healthcare
AICA	Australian Infection Control Association (now Australian College for Infection Prevention and Control [ACIPC])
ASA	American Society of Anaesthesiology
AV	arteriovenous
AVF	arteriovenous fistula
AVG	arteriovenous graft
BSI	bloodstream infection
CDC	Centres for Disease Control and Prevention
CDCD	Communicable Disease Control Directorate
CI	confidence interval
CI central line	centrally-inserted central line
CI-CLABSI	centrally-inserted central line-associated bloodstream infection
CLABSI	central line-associated bloodstream infection
CLUR	central line utilisation ratio
CVC	central venous catheter
HA-SABSI	healthcare associated <i>Staphylococcus aureus</i> bloodstream infection
HAI	healthcare associated infection
HAIU	Healthcare Associated Infection Unit
HISWA	Healthcare Infection Surveillance Western Australia
HITH	hospital-in-the-home
ICD-10-AM	International Classification of Diseases 10 th Revision Australian Modification
ICU	intensive care unit
IV	intravascular
IVD	intravascular device
MBI	mucosal barrier injury
MRSA	methicillin-resistant <i>Staphylococcus aureus</i>
MSSA	methicillin-sensitive <i>Staphylococcus aureus</i>
NHSN	National Healthcare Safety Network
PDS	post discharge surveillance
PI central line	peripherally-inserted central line
PI-CLABSI	peripherally inserted central line-associated bloodstream infection
<i>S.aureus</i>	<i>Staphylococcus aureus</i>
SABSI	<i>Staphylococcus aureus</i> bloodstream infection
SEMD	safety engineered medical device
SSI	surgical site infection
TMS	theatre management system
VICNISS	Victorian Department of Health Nosocomial Infection Surveillance System
WA	Western Australia
WACHS	Western Australia Country Health Service

Notes

Notes



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