



Bloodstream infections associated with hospital care 2019-20

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Latest edition

Staphylococcus aureus (*S. aureus*, or 'golden staph') bloodstream infections (SABSI) associated with hospital care can be serious, particularly when bacteria are resistant to common antimicrobials.

In 2019-20, all states and territories had public hospital SABSI rates below the national benchmark of 2.0 cases per 10,000 patient days.

Over the past 5 years, the SABSI rate has fluctuated at around 0.7, for instance, 0.74 in 2015-16 and 0.71 in 2019-20.

Cat. no: HSE 240

Findings from this report:

- Nationally, public hospital SABSI rates fluctuated between 0.74-0.71 cases per 10,000 patient days over the past 5 years
- In 2019-20 public hospitals had 1,428 SABSI cases during 20.1 million days of patient care under surveillance
- All states and territories had a SABSI rate lower than the national benchmark of 2.0 cases per 10,000 patient days
- 83% of public hospital SABSI cases were treatable with commonly used antibiotics

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Introduction

This report provides information and data on *Staphylococcus aureus* (*S. aureus*, or 'golden staph') bloodstream infections (SABSI) associated with hospital care in Australia. It presents national information on healthcare-associated SABSI for the period 1 July 2019 to 30 June 2020. Summary analyses are also provided for the previous 4 years.

SABSI data for public hospitals are provided to the Australian Institute of Health and Welfare (AIHW) by states and territories as part of the National *Staphylococcus aureus* Bacteraemia Data Collection (NSABDC). However in 2020, the Victorian government granted an exemption to all Victorian hospitals from reporting routine surveillance during the period 1 April to 31 December inclusive due to some hospitals having resource issues due to pandemic response requirements. This included an exemption from submitting data on SABSI and hand hygiene audits.

Private hospitals are also invited to supply SABSI data to the AIHW, although currently their participation in the NSABDC is voluntary. More information about the NSABDC is provided in the [Data quality statement](#).

Information relating to SABSI occurring in individual public hospitals and participating private hospitals is available from [MyHospitals](#). Note that due to various administrative arrangements, SABSI data for a small number of public hospitals is not reported on MyHospitals but included in counts within this report.

Impact of hand washing: COVID-19 and SABSI

While the data here include the start of the COVID-19 pandemic, there is no clear indication of a link between SABSI rates and the response to the pandemic. Hand hygiene, for example, is a common strategy in both the efforts to reduce SABSI in Australia's hospitals as well as the response to the COVID-19 pandemic but it is only one of a variety of risk factors that influence infection rates and the associations are complex. This makes drawing links difficult. The Australian rates of hand hygiene compliance can be explored from [MyHospitals](#).

'Bloodstream infections' vs 'bacteraemia'

Previous editions of this report have used the term 'bacteraemia' for these infections. Wherever possible, this report uses the term 'bloodstream infections' rather than bacteraemia.

'Antimicrobials' vs 'antibiotics'

Antimicrobials are medicines that kill or slow the growth of microorganisms that cause diseases. Antibiotics are the most commonly prescribed antimicrobial against bacteria.

Acknowledgements

Information about SABSI is collected by hospital staff for infection surveillance purposes. The AIHW thanks state and territory health authorities and participating private hospitals and hospital groups for providing SABSI data through the National *Staphylococcus aureus* Bacteraemia Data Collection (NSABDC).

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What are Staphylococcus aureus bloodstream infections (SABSI)?

Staphylococcus aureus are frequently found on the skin or in the nose of many individuals and are commonly spread from person to person in the community. These bacteria are usually harmless and most people are unaware they are carrying them. In hospitals, *Staphylococcus aureus* may be transmitted between people, often through direct or indirect physical contact. Bacteria from the patient's skin or from the hand of a healthcare worker can gain direct entry into a patient's bloodstream if they have open wounds (including incisions) or when invasive devices such as catheters are inserted. Other patients who have a greater risk of SABSI are those with:

- weakened immune systems (associated with cancer, or with transplant receipt, or with being very young or elderly)
- with chronic diseases such as diabetes or
- severe underlying illness.

Staphylococcus aureus (*S. aureus*, or 'golden staph') bloodstream infections (SABSI) may occur as a result of the delivery of health care and these infections are called healthcare-associated. Many healthcare-associated infections, including SABSI, are considered to be potentially preventable.

For more information on the definition of healthcare-associated SABSI see [Appendix A](#).

Is SABSI serious?

Patients who develop SABSI are more likely to suffer complications that result in longer hospital stays and increased costs of hospitalisation. SABSI can result in death.

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SABSI is an indicator of the safety and quality of hospital care

The rate of healthcare-associated *Staphylococcus aureus* bloodstream infections is an indicator under the [Australian Health Performance Framework](#) and under the [National Healthcare Agreement](#) (NHA).

The NHA sets out objectives for state and territory governments for health care services. A performance benchmark for healthcare-associated SABSI in public hospitals is included for the outcome area *Australians receive appropriate high quality and affordable hospitals and hospital-related care*.

It includes a performance benchmark for public healthcare-associated SABSI of no more than 2.0 cases per 10,000 days of patient care under surveillance ('patient days') for acute care public hospitals. This benchmark does not apply to private hospitals but may be noted in SABSI reporting for private hospitals.

Data from the NSABDC have shown that the rate of SABSI (both MSSA and MRSA) has been fewer than 2.0 cases per 10,000 patient days for public hospitals in each state and territory every year since rates were first published in 2010-11. Data have also been below the forthcoming new benchmark of 1.0 cases per 10,000 patient days in each state and territory every year since 2016-17.

[Appendix B](#) provides a more detailed description of the NHA performance indicator relating to SABSI.

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Antimicrobial resistance in *Staphylococcus aureus*

Antimicrobial resistance occurs when some of the bacteria that cause infections resist the effects of antimicrobials used to treat them. This may lead to ‘treatment failure’, or the inability to treat the cause of the infection (Department of Health, 2020). Methicillin is an antimicrobial used to treat SABSIs.

A bloodstream infection that is identified by a laboratory as being caused by a methicillin-resistant strain of *S. aureus* is referred to as MRSA. A bloodstream infection that is identified by a laboratory as being caused by a *S. aureus* strain that is methicillin-sensitive is referred to as MSSA.

A bloodstream infection caused by MRSA may cause more harm to patients and is associated with poorer patient outcomes as there are fewer antimicrobials available to treat the infection.

The analysis and monitoring of SABSIs resistance to antimicrobials can inform strategies regarding the appropriate prescribing of antimicrobials with the aim of reducing resistance and adverse effects on patients.

Antimicrobial Use and Resistance in Australia (AURA) Surveillance System

The Antimicrobial Use and Resistance in Australia (AURA) Surveillance System publishes data on antimicrobial prescribing in hospitals and rates of MRSA in Australia. Overall, more than 24% of antimicrobial prescriptions in Australian hospitals were assessed as inappropriate (National Centre for Antimicrobial Stewardship and ACSQHC 2021). Methicillin resistance in *S. aureus* has been stable from 2013-2019 (Coombs et al. 2021).

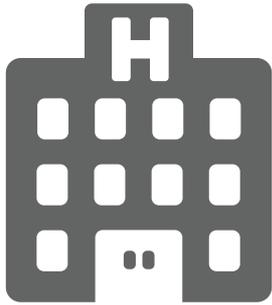
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- Australian Commission on Safety and Quality in Health Care (ACSQHC), 2018. Australian Passive Antimicrobial Resistance Surveillance  [First report: multi-resistant organisms](#). Sydney: ACSQHC. Viewed 12 Nov 2020.
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SABSI in public hospitals



Over 700 public hospitals reported a total of 1,428 cases of SABSI



SABSI rates over the past 5 years ranged from 0.74 cases per 10,000 patient days in 2015-16 to 0.71 in 2019-20



The proportion of cases treated with commonly used antibiotics have ranged from 81% to 83% over the past 5 years

In 2019-20:

- There were 1,428 SABSI cases occurring during 20.1 million days of patient care under surveillance. Patient days under SABSI surveillance covered 99% of days of patient care in public hospitals.
- Overall, there were 0.71 SABSI cases per 10,000 patient days.
- 83% of SABSI cases were methicillin-sensitive (MSSA), and therefore treatable with commonly used antimicrobials.

Data in this report relating to numbers of cases and rates of *S. aureus* bloodstream infections exclude public hospitals where there were no SABSI surveillance arrangements, as well as some public hospital services supplied by private hospitals. Data relating to individual public hospitals with SABSI surveillance arrangements where services are supplied by private providers are available from the [MyHospitals](#) website.

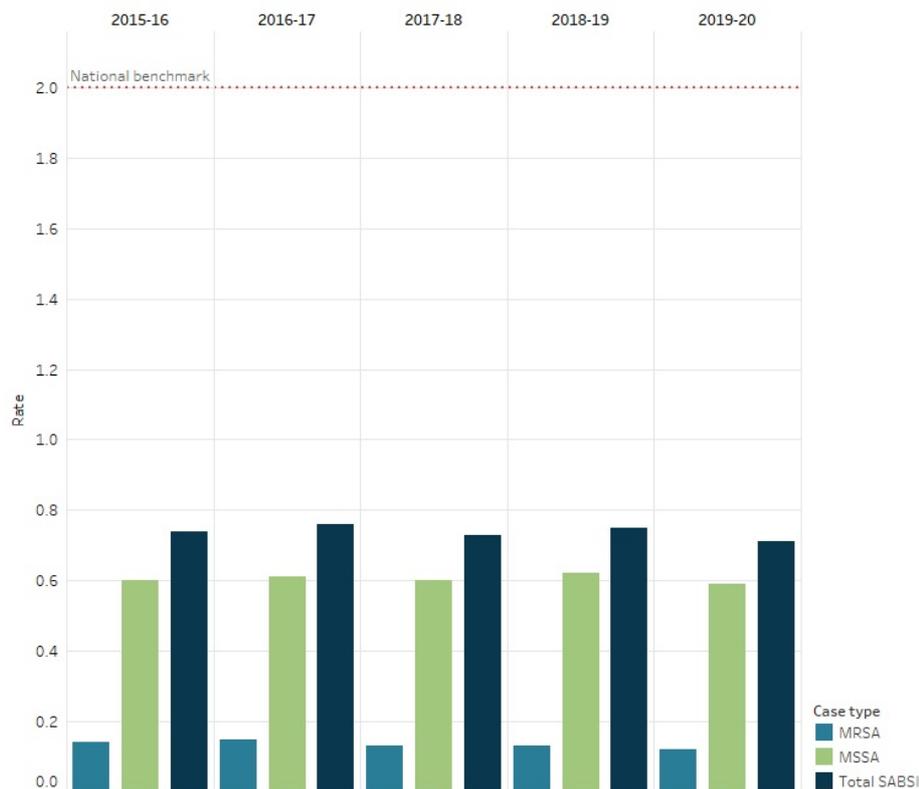
Changes in SABSI over time

Between 2015-16 and 2019-20:

- SABSI rates over the past 5 years have slightly decreased, from 0.74 cases per 10,000 patient days in 2015-16 to 0.71 in 2019-20.
- The proportion of MSSA cases slightly increased from 81% to 83%.
- The proportion of MRSA cases slightly decreased from 19% to 17%.

Figure 1: SABSI in public hospitals, by case type, 2015-16 to 2019-20

Figure 1: SAB in public hospitals, by case type, 2014-15 to 2018-19 (data visualisation)



Source: AIHW National *Staphylococcus aureus* Bacteraemia Data Collection
<http://www.aihw.gov.au/>

SABSI in states and territories

In 2019-20:

- For each state and territory, and at the national level, the SABSI rate was lower than the national benchmark of 2.0 cases per 10,000 patient days.
- SABSI rates in 2019-20 ranged from 0.34 in the Northern Territory to 0.81 in Tasmania and the Australian Capital Territory.
- Differences in SABSI rates between states and territories may reflect differences in surveillance and validation processes.

Table 1. SABSI infections in public hospitals, MSSA and MRSA, states and territories, 2019-20

	MSSA rate (a)	MRSA rate (a)	Total SABSI	Total SABSI rate (a)	Patient days under surveillance ('000)	Coverage %
NSW	0.59	0.17	506	0.76	6,651,835	99
Vic	0.59	0.11	359	0.70	5,161,314	100
Qld	0.60	0.07	271	0.67	4,057,359	100
WA	0.61	0.10	104	0.71	1,468,973	96
SA	0.60	0.11	107	0.72	1,490,040	100
Tas	0.74	0.07	36	0.81	443,862	100
ACT	0.65	0.15	32	0.81	397,001	100
NT	0.16	0.18	13	0.34	380,961	100
Total	0.59	0.12	1,428	0.71	20,051,345	99

(a) Cases per 10,000 patient days

Source: AIHW National *Staphylococcus aureus* Bacteraemia Data Collection.

SABSI rates by type of public hospital

Major, large and children's hospitals can be more likely to treat patients at risk of SABSI than other hospitals, and therefore tend to have higher proportions of SABSI and higher SABSI rates.

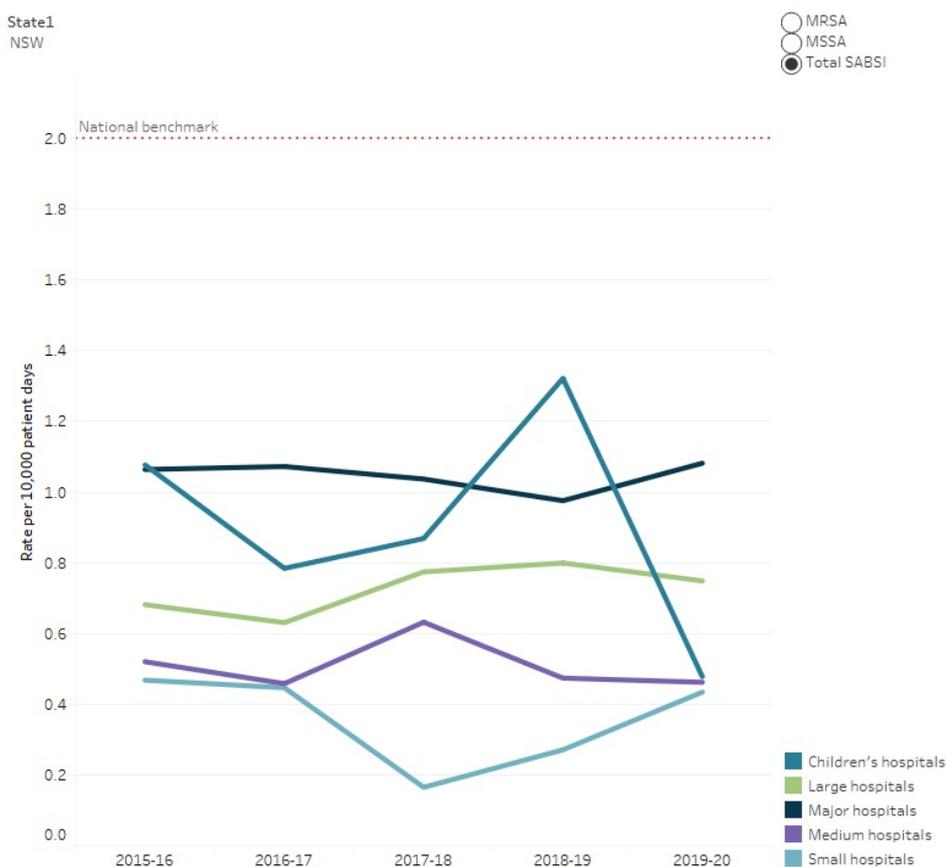
For more information on public hospital peer groups, see the technical notes on the [MyHospitals](#) website.

In 2019-20:

- The SABSI rate across all major hospitals was 0.96 cases per 10,000 patient days. In comparison, the rate across all large hospitals was 0.71 cases per 10,000 patient days and the rate across medium hospitals was 0.46 cases per 10,000 patient days. The SABSI rate across all children's hospitals was 0.91 cases per 10,000 patient days and the rate across small hospitals was 0.32.
- Over half of all SABSI cases occurred in major hospitals (55%).
- 33% of all SABSI cases occurred in large hospitals.
- 6% of all SABSI cases occurred in medium hospitals.
- 4% of all SABSI cases occurred in children's hospitals.
- 3% of all SABSI cases occurred in small hospitals.

Figure 2: SABSI rate over time, by peer group and case type, states and territories

Figure 2: SAB infection rate over time, by peer group and case type, states and territories (data visualisation)



1. For more information on data quality, including collection methodologies and data limitations, see METeOR on the AIHW website.
Source: AIHW National *Staphylococcus aureus* Bacteraemia Data Collection
<http://www.aihw.gov.au/>

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SABSI in private hospitals

Counts and rates for individual private hospitals participating in the NSABDC are provided on [MyHospitals](#).

In 2019-20:

- There were 202 SABSI cases occurring during 6.6 million days of patient care under surveillance. Patient days under SABSI surveillance covered 99.9% of days of patient care in private hospitals that provided SABSI data.
- Overall, there were 0.30 SABSI cases per 10,000 patient days.
- 83% of SABSI cases were methicillin-sensitive (MSSA), and therefore treatable with commonly used antimicrobials.
- Amongst the 63 private hospitals that reported 1 or more SABSI cases in 2019-20, SABSI rates ranged from 0.09 cases per 10,000 patient days to 1.80 cases per 10,000 patient days.
- All private hospitals reporting 1 or more SABSI cases provided separate counts of MSSA and MRSA cases. Among these hospitals, rates of MSSA ranged from 0 to 1.55 and rates of MRSA ranged from 0 to 1.80 cases per 10,000 patient days.



28% of private hospitals provided data for 2019-20



183 private hospitals reported a total of 202 SABSI cases

Private hospital participation

The rate of private hospital participation in the NSABDC for 2019-20 is calculated using counts of all private hospitals from the 2016-17 Private Health Establishments Collection of the Australian Bureau of Statistics (ABS 2018).

- 183 private hospitals (or 28%) participated in the NSABDC. This is the same as the overall participation rate for the 2018-19 NSABDC (183 private hospitals, or 28%, provided data by the time of the previous AIHW report, though not all hospitals reported in both years).
- 3 private hospitals also provided public hospital services.

Table 2. Participation in NSABDC reporting among private hospitals, states and territories, 2019-20

	Private hospitals participating in 2019-20 NSABDC ^(a) (no.)	Private hospitals listed as such in 2016-17 (no.)	Participation rate (%)
NSW	60	210	29
Vic	60	174	34
Qld	30	118	25
WA	19	64	30
SA	9	56	16
Tas, ACT & NT ^(b)	5	35	14
Total	183	657	28

a. Includes some public hospital services supplied by private providers.

b. Figures for Tasmania, the Australian Capital Territory and the Northern Territory were combined to protect the confidentiality of the small numbers of private hospitals in these states and territories.

Source: AIHW National *Staphylococcus aureus* Bacteraemia Data Collection and ABS Private Health Establishments Collection (ABS 2018).

Private hospital data quality

Currently, private hospitals participate in the NSABDC on a voluntary basis, and coverage of SABSI rates in the private sector is therefore incomplete. The casemix of patients treated in private hospitals may also be different to that in public hospitals. Data reported by participating private hospitals may therefore not be representative of the private sector as a whole.

References

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Programs to reduce SABSI

Hand hygiene: the washing and/or use of alcohol-based rubs by healthcare workers to clean their hands. It should be performed according to the World Health Organisation's (WHO) 'Save Lives - Clean Your Hands' campaign (WHO 2020).

There are many initiatives that take place at the national, state and territory and local/hospital level to reduce the occurrence of SABSI and other healthcare-associated infections (HAIs). These include the National Hand Hygiene Initiative (NHHI), which aims to educate and promote standardised hand hygiene practice in all Australian hospitals (ACSQHC 2019a).

The NHHI is managed by the Australia Commission on Safety and Quality in Health Care. State and territory health departments, along with a number of private health organisations, report hand hygiene compliance three times per year for the NHHI (ACSQHC 2020a).

In addition to coordinating the National Hand Hygiene Initiative, the Commission provides an [online compendium of resources](#) that have been developed by the various jurisdictions to support organisations in improving SABSI prevention and management. The Commission has also produced resources to support a [nationally standardised approach to a surveillance \(since 2010\) and data validation for SABSI \(since 2014\)](#). Furthermore, the Commission has also recently produced an online information sheet on the [analysis of SABSI data as part of a quality improvement approach](#).

The World Health Organization (WHO) has also been running a number of hand hygiene campaigns over the past ten years. Their most recent campaign is 'Save lives - Clean Your Hands, 2020 (WHO 2020).

References

Australian Commission on Safety and Quality in Health Care (ACSQHC) 2019a. [National Hand Hygiene Initiative](#). Sydney: ACSQHC. Viewed 12 Nov 2020.

Australian Commission on Safety and Quality in Health Care (ACSQHC) 2020a. [National hand hygiene audit data - Audit 3, 2020](#). Sydney: ACSQHC. Viewed 12 Nov 2020.

Australian Government Department of Health (DoH) 2020. [How to protect yourself and others from coronavirus \(COVID-19\)](#). Canberra: Department of Health. Viewed 10 Dec 2020.

World Health Organization (WHO) 2020. [Save lives - Clean Your Hands 2020](#), Geneva: WHO. Viewed 12 Nov 2020.

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Appendixes

A. Definition of healthcare-associated *Staphylococcus aureus* bloodstream infections (SABSI)

A case (or patient episode) of SABSI is defined as a positive blood culture for *Staphylococcus aureus*. For surveillance purposes, only the first isolate (a culture of microorganisms isolated for study) per patient is counted, unless at least 14 days have passed without a positive blood culture, after which an additional episode is recorded.

A SABSI case is considered to be healthcare-associated if: the first positive blood culture is collected more than 48 hours after hospital admission or fewer than 48 hours after discharge, or if the first positive blood culture is collected 48 hours or less after admission and the patient-episode of SABSI meets at least one of the following key clinical criteria:

- SABSI is a complication of the presence of an indwelling medical device (for example, intravascular line, haemodialysis vascular access, cerebrospinal fluid shunt, urinary catheter).
- SABSI occurs within 30 days of a surgical procedure, where the SABSI is related to the surgical site.
- SABSI was diagnosed within 48 hours of a related invasive instrumentation or incision.
- SABSI is associated with neutropenia contributed by cytotoxic therapy. Neutropenia is defined as at least two separate calendar days with values of absolute neutrophil count or total white blood cell count (WBC) < 500 cells/mm³ (0.5×10^9 /L) on or within a seven-day period which includes the date the positive blood specimen was collected (day 1), the 3 calendar days before and the 3 calendar days after.

The definition of SABSI was developed by the Australian Commission on Safety and Quality in Health Care (ACSQHC). The ACSQHC changed the definition in 2016, with clarification of the neutropenia criterion. The change (which was first applied in the 2015-16 reporting period) is not considered to have resulted in counts of SABSI for 2015-16 that are not comparable with counts for previous years. The definition used for SABSI occurring prior to 1 July 2015 is available at [National Healthcare Agreement: PI 22-Healthcare associated infections: Staphylococcus aureus bacteraemia, 2016](#).

B. NHA PI 22: Healthcare-associated infections

The National Healthcare Agreement performance indicator is calculated using:

- the number of SABSI patient episodes associated with public hospitals for both hospitals focussing on acute care and hospitals focussing on non-acute or sub-acute care such as psychiatric, rehabilitation and palliative care
- the number of days of patient care for the public hospitals included in the SABSI surveillance arrangements.

The performance indicator includes data on:

- counts of SABSI, with data presented separately for MRSA and MSSA SABSI
- the rate of SABSI per 10,000 days of patient care for public hospitals included in the SABSI surveillance arrangements.

Data are restricted to cases associated with care provided in public hospitals. Cases that are associated with care provided by private hospitals and with non-hospital care are excluded, even if the patients are subsequently treated for the SABSI in a public hospital.

In 2016, the specification of this performance indicator was amended to exclude unqualified days (for example, when acute care was not required) for newborns from the count of days of patient care included in the SABSI surveillance arrangements, which had previously been included.

More information is available from the current specification for this performance indicator, available at [National Healthcare Agreement: PI 22-Healthcare associated infections: Staphylococcus aureus bacteraemia, 2021](#).

C. Data quality statement

- The NSABDC is a data collection that includes counts of healthcare-associated SABSI for public hospitals covered by SABSI surveillance arrangements, and for private hospitals that choose to provide data. Data collected also includes counts of patient days under surveillance and total patient days.
- SABSI cases are reported by all states and territories and participating private hospitals using the national agreed case definitions (see Appendix A).
- There may be imprecise exclusion of some SABSI cases due to the inherent difficulties in determining the origins of SABSI, such as those originating in non-hospital settings.
- For some states and territories there is less than 100% coverage of public hospitals as surveillance arrangements may not be in place in all wards or all hospitals.
- The accuracy and comparability of SABSI rates among states and territories and over time are also limited because the count of days of patient care reflects the amount of admitted patient activity.
- The data for 2011-12 to 2019-20 are comparable. The count of days of patient care reflects the amount of admitted patient activity, but does not reflect the amount of non-admitted patient activity as this cannot be captured due to variations in admission practice.

- The data for 2010-11 are comparable with subsequent year data except for public hospital data for Queensland.
- The New South Wales (NSW) Ministry of Health provided the number of occupied bed days for NSW public hospitals rather than the number of patient days under surveillance. The comparability of NSW data and data from other states and territories is therefore limited, but only by the small extent that counts of occupied bed days would be expected to differ from counts of days of patient care.
- The 2019-20 patient day and coverage data may be preliminary for some hospitals or states and territories.
- Private hospitals supply data voluntarily to the NSABDC, and not all private hospitals report data. The casemix of patients treated in private hospitals may also be different to that in public hospitals. Coverage of the private sector is therefore incomplete and reported data may not be representative of the sector as a whole.
- Due to the changes in 2016 to the denominator of the performance indicator specification, data published in 2017 and subsequent years for the reporting years 2010-11 to 2014-15 are not comparable with data previously published in:
 - the Council of Australian Governments (COAG) Reform Council publications
 - the AIHW series '*Staphylococcus aureus* bacteraemia in Australian public hospitals: Australian hospital statistics'
 - the annual *Report on Government Services* produced by the Steering Committee for the Review of Government Service Provision.

For the full data quality statement see [Data quality statement for the 2019-20 NSABDC](#)

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