

## About

Staphylococcus aureus bloodstream infections (SAB also called S. aureus, or 'golden staph') associated with healthcare can be serious, particularly when they are resistant to common antimicrobials.

In 2017-18, all states and territories had public hospital SAB rates below the national benchmark of 2.0 cases per 10,000 patient days.

Between 2013-14 and 2015-16, the SAB rate decreased from 0.89 to 0.74 cases per 10,000 patient days. It has remained around this level since (0.76 in 2016-17 and 0.73 in 2017-18).

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Findings from this report:

- The national SAB rate in public hospitals for 2017-18 was 0.73 cases per 10,000 patient days
- All jurisdictions had public hospital SAB rates below the national benchmark
- 1,493 cases of SAB were reported in public hospitals in 2017-18, compared to 1,501 cases in 2016-17
- 82% of SAB cases in 2017-18 were treatable with commonly used antimicrobials

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# Bloodstream infections associated with hospital care 2017-18: Australian hospital statistics

Web report | Last updated: 20 Feb 2019 | Topic: Health care quality & performance

# Introduction

This report provides information and data visualisations for *Staphylococcus aureus* bloodstream infections (SAB also called *S. aureus*, or 'golden staph') associated with hospital care in Australia. It presents national information on healthcare-associated SAB for the period 1 July 2017 to 30 June 2018, focusing on cases associated with public hospitals. Summary analyses are also provided for the previous 4 years.

SAB 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). Private hospitals are also invited to supply SAB data to the AIHW, although currently their participation in the NSABDC is voluntary. More information about the NSABDC is provided in the <u>Data quality</u> summary.

Information relating to SAB occurring in individual public hospitals and participating private hospitals is available from <u>MyHospitals</u>. Note that due to various administrative arrangements, SAB data for a small number of public hospitals included in counts within this report are not available through <u>MyHospitals</u>.

'Bloodstream infections' vs 'bacteraemia'
Previous editions of this report have used the term bacteraemia for these infections. Wherever possible, this report uses the more accessible term <b>bloodstream infections</b> rather than bacteraemia.
'Antimicrobials' vs 'antibiotics'
Antimicrobials are medicines that kill or slow the growth of germs (bacteria, viruses, fungi) that cause diseases. Antibiotics are the most
commonly prescribed antimicrobial.



# What are Staphylococcus aureus bloodstream infections (SAB)?

*Staphylococcus aureus* bloodstream infections (SAB) are often associated with healthcare and occur when *Staphylococcus aureus* bacteria (also called *S. aureus*, or 'golden staph') cause an infection of the bloodstream, or bacteraemia. When associated with healthcare procedures, these infections are considered to be potentially preventable.

*Staphylococcus aureus* bacteria are frequently found on the skin or in the nose of many individuals and are commonly spread from person to person in the community. In this form they are usually harmless and most people are unaware they are carrying them.

In hospitals, *Staphylococcus aureus* bacteria are most commonly transmitted via the hands of healthcare workers. 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 SAB infections are those with:

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

#### Are SAB infections serious?

Patients who develop bloodstream infections such as SAB are more likely to suffer complications that result in longer hospital stays and increased costs of hospitalisation. The most serious SAB infections can result in death.

Appendix A provides a definition of healthcare-associated SAB cases.

#### SAB resistance to antimicrobials

Antimicrobial resistance occurs when some of the germs (bacteria, viruses, or fungi) that cause infections resist the effects of the medicines used to treat them. This may lead to 'treatment failure', or the inability to treat the cause of the infection (Department of Health & Department of Agriculture and Water Resources, 2017).

A SAB case that is identified by a laboratory as being caused by a methicillin-resistant strain of S. *aureus* is referred to as MRSA. SAB caused by MRSA may cause more harm to patients and is associated with poorer outcomes as there are fewer antimicrobials available to treat the infection.

A SAB case that is identified by a laboratory as being caused by a S. *aureus* strain that is sensitive to commonly used antimicrobials (methicillin-sensitive) is referred to as MSSA.

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

Variations in prescribing of antimicrobials in hospitals and rates of MRSA are analysed in reports on Antimicrobial Use and Resistance in Australia (AURA) Surveillance System data published by the Australian Commission on Safety and Quality in Health Care (ACSQHC). Overall, more than 24% of antimicrobial prescriptions in Australian hospitals were assessed as inappropriate (National Centre for Antimicrobial Stewardship and ACSQHC 2017); methicillin resistance in *S. aureus* has been stable at around 20% for the last decade, but there is evidence it increased slowly over the three years to 2017, and the rate of community-associated MRSA blood infections is increasing (ACSQHC 2018; Coombs et al. 2018).

#### References

- Australian Commission on Safety and Quality in Health Care (ACSQHC), 2018. Australian Passive Antimicrobial Resistance Surveillance. <u>First report: multi-resistant organisms</u>. Sydney: ACSQHC. Viewed 24 January 2019.
- Coombs G, Bell JM, Daley D, Collignon P, Cooley L, Gottlieb T, Iredell J, Kotsanas D, Nimmo G and Robson J on behalf of the Australian Group on Antimicrobial Resistance, 2018, Turnidge JD. Australian Group on Antimicrobial Resistance. <u>Sepsis Outcome Programs 2016</u> <u>Report</u>. Sydney: ACSQHC. Viewed 24 January 2019.
- Department of Health & Department of Agriculture and Water Resources, 2017. <u>Antimicrobial Resistance, About AMR</u>. Viewed 24 January 2019.
- National Centre for Antimicrobial Stewardship and ACSQHC, 2017. <u>Antimicrobial prescribing practice in Australian hospitals: results of</u> <u>the 2017 Hospital National Antimicrobial Prescribing Survey</u>. Sydney: ACSQHC. Viewed 24 January 2019.



## SAB is an indicator of the safety and quality of hospital care

In 2008, Australian health ministers endorsed the reporting of data on SAB cases occurring in public hospitals by states and territories as part of performance reporting under the National Healthcare Agreement (NHA).

The NHA sets out objectives for state and territory governments for health care services. A performance benchmark for healthcareassociated SAB 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 SAB of no more than 2.0 cases per 10,000 days of patient care under surveillance ('patient days') for acute care public hospitals by 2011-12 in each state and territory. While the NHA performance benchmark is not mandatory for private hospitals, it has also been applied to private hospital SAB data referred to within this report.

Data from the NSABDC have shown that the rate of SAB (both MSSA and MRSA) bloodstream infections 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.

Appendix B provides a more detailed description of the NHA performance indicator relating to SAB.

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# SAB in public hospitals



Over 600 public hospitals reported a total of



**82%** of cases were treatable with commonly-used antibiotics





There were **0.73 SAB cases per 10,000 patient days** in 2017–18

## Scope of public hospital SAB data in this report

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

In 2017-18:

- There were 1,493 cases of SAB occurring during 20.5 million days of patient care under surveillance. Patient days under SAB surveillance covered 98% of days of patient care in public hospitals.
- Overall, there were 0.73 SAB cases per 10,000 patient days.
- 82% of SAB cases were methicillin-sensitive (MSSA), and therefore treatable with commonly used antimicrobials.

7.9%

## Changes in SAB rates over time



This is a decrease from **0.89** cases per 10,000 patient days in 2013–14 to **0.73** in 2017–18

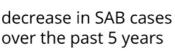






Figure PB1 and Table PB1 show changes in SAB rates between 2013-14 and 2017-18.

## Figure PB1. SAB in public hospitals, MRSA, MSSA and total SAB rates, 2013-14 to 2017-18

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#### Table PB1. SAB cases and rates in public hospitals, MSSA and MRSA, 2013-14 to 2017-18

	2013-14	2014-15	2015-16	2016-17	2017-18		
Cases							
MSSA	1,233	1,160	1,172	1,211	1,226		
MRSA	388	331	278	290	267		
Total	1,621	1,491	1,450	1,501	1,493		
Cases per 10,000 patient days							
MSSA	0.67	0.62	0.60	0.61	0.60		
MRSA	0.21	0.18	0.14	0.15	0.13		
Total	0.89	0.79	0.74	0.76	0.73		
Patient days under surveillance ('000)	18,298.4	18,825.0	19,608.1	19,833.8	20,453.2		
Coverage rate (%)	98	98	98	98	98		

Source: AIHW National Staphylococcus aureus Bacteraemia Data Collection.

#### SAB cases and rates in states and territories

Figure PB2. SAB cases and rates in public hospitals, states and territories, 2013-14 to 2017-18

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	MSSA	MRSA	Total SA	AB cases	Patient days under surveillance	Coverage
	rate (a)	rate (a)	cases	rate (a)	<b>'</b> 000	%
NSW	0.56	0.17	530	0.72	7,336.3	97
Vic	0.64	0.13	402	0.77	5,240.5	99
Qld	0.57	0.06	239	0.62	3,832.8	100
WA	0.71	0.12	121	0.83	1,466.5	97
SA	0.67	0.16	119	0.83	1,430.3	94
Tas	0.73	0.12	36	0.85	422.1	100

ACT	0.74	0.08	30	0.82	365.3	98
NT	0.19	0.25	16	0.45	359.4	100
Total	0.60	0.13	1,493	0.73	20,453.2	98

(a) Cases per 10,000 patient days.

Source: AIHW National Staphylococcus aureus Bacteraemia Data Collection.

- For each state and territory, and at the national level, the 2017-18 SAB rate was lower than the national benchmark of 2.0 cases per 10,000 patient days.
- SAB rates in 2017-18 ranged from 0.45 in the Northern Territory to 0.85 in Tasmania.
- Between 2013-14 and 2017-18 SAB rates decreased in New South Wales, Victoria and Queensland, and fluctuated in other states and territories.
- Differences in SAB rates between jurisdictions may reflect differences in surveillance and validation processes.

#### SAB rates by type of public hospital

Principal referral hospitals and Public acute group A hospitals can be more likely to treat patients at risk of SAB than other hospitals, and therefore tend to have higher proportions of SAB cases and higher SAB rates.

#### Hospital peer groups

*Principal referral hospitals* ('Major hospitals' on <u>MyHospitals</u>) provide a very broad range of services, have a range of highly specialised service units, and have very large patient volumes. The term 'referral' recognises that these hospitals have specialist facilities not typically found in smaller hospitals.

Public acute group A hospitals ('Large hospitals' on <u>MyHospitals</u>) generally provide a wide range of services, but narrower than *Principal referral hospitals*. While complex patients may be treated, they are usually less complex than those seen in *Principal referral hospitals*.

Public acute group B hospitals ('Medium hospitals' on <u>MyHospitals</u>) provide a narrower range of services, and are less likely to treat complex patients than either Principal referral or Public acute group A hospitals.

*Children's hospitals* specialise in the treatment and care of children. For the purposes of this report and its associated data, children's hospitals include *Combined women and children's hospitals* (that is, those specialising in the treatment of both women and children.

For more information on public hospital peer groups, see <u>Australian hospital peer groups</u> (AIHW 2015).

Four out of every five public hospital SAB cases recorded in 2017-18 occurred in *Principal referral* or *Public acute group A* hospitals.

- Half of all SAB cases occurred in Principal referral hospitals, while 30% occurred in Public acute group A hospitals.
- A further 6% occurred in *Public acute group B hospitals*.

The SAB rate across all *Principal referral hospitals* was 1.01 cases per 10,000 patient days. In comparison, the rate across all *Public acute group A hospitals* was 0.73 cases per 10,000 patient days and the rate across all *Public acute group B hospitals* was 0.51 cases per 10,000 patient days. The SAB rate across all Children's hospitals was 1.44 cases per 10,000 patient days.

A data visualisation allowing exploration of SAB rates in individual public hospitals by peer group is available on the <u>MyHospitals</u> website.

#### Figure PB3. SAB rates in public hospitals, MSSA and MRSA rates, peer groups, states and territories, 2017-18

#### Visualisation not available for printing

#### SAB in private hospitals

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

The rate of private hospital participation in the NSABDC for 2017-18 is calculated using counts of all private hospitals from the 201617-Private Health Establishments Collection of the Australian Bureau of Statistics (ABS 2018).



24%

of private hospitals provided data for 2017–18



160 private hospitals reported a total of 204 SAB cases

In 2017-18:

- As shown in Table PV1, about one in four private hospitals (160, or 24%)<sup>1</sup> participated in the NSABDC. This is similar to overall participation figures for the 2016-17 NSABDC (89 private hospitals having provided data by the time of the previous AIHW report, with around 60 more submitting data in the following months for inclusion on the <u>MyHospitals</u> website).
- Private hospitals participating in the 2017-18 NSABDC included 3 that also provided public hospital services. These are shown as public hospitals on <u>MyHospitals</u>.
- A total of 204 cases of SAB were reported by private hospitals.
- All private hospitals reporting SAB data had rates below the national benchmark<sup>1</sup>.
- The total SAB rate for all private hospitals participating in the 2017-18 NSABDC was 0.33 cases per 10,000 patient days. Note the SAB rates in private hospitals choosing to participate in the collection might not be representative of private hospitals as a whole and therefore are not readily comparable to public hospitals.
- Amongst the 65 private hospitals that reported 1 or more SAB cases in 2017-18, SAB rates ranged from 0.11 cases per 10,000 patient days to 1.84 cases per 10,000 patient days<sup>1</sup>.
- 30 of the private hospitals reporting 1 more SAB cases provided separate counts of MSSA and MRSA cases. Among these hospitals, rates of MSSA ranged from 0 to 1.84 and rates of MRSA ranged from 0 to 0.41<sup>1</sup>.

Counts and rates for individual private hospitals participating in the NSABDC are provided on <u>MyHospitals.</u>

Notes

1. Includes 4 private hospitals that provided SAB rates but did not provide counts of SAB cases or patient days.

	Private hospitals participating in 2017-18 NSABDC <sup>(a)</sup> no.	Private hospitals listed as such in 2016-17 no.	Participation rate %
NSW	48	210	23
Vic	52	174	29
Qld	29	118	25
WA	15	64	23
SA	12	56	21
Tas, ACT & NT <sup>(b)</sup>	4	35	11
Total	160	657	24

Table PV1. Participation in SAB reporting among private hospitals, states and territories, 2017-18

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 jurisdictions.

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

- Australian Bureau of Statistics (ABS) 2018. Private Hospitals, Australia, 2016-17, ABS cat. no. 4390.0. Canberra: ABS. Viewed 6 November 2018.
- Australian Commission on Safety and Quality in Health Care (ACSQHC) and National Health Performance Authority (NHPA) 2015. <u>Australian Atlas of Healthcare Variation</u>. Sydney: ACSQHC. Viewed 15 November 2018.
- Australian Commission on Safety and Quality in Health Care (ACSQHC) and Australian Institute of Health and Welfare (AIHW), 2018. <u>Australian Atlas of Healthcare Variation</u>. Sydney: ACSQHC. Viewed 13 December 2018.
- Australian Institute of Health and Welfare (AIHW) 2015. Australian hospital peer groups. <u>Health services series no. 66</u>. Cat no. HSE 171. Canberra: AIHW. Viewed 12 November 2018.



# What is Australia doing to reduce SAB?

There are many initiatives that take place at the national, jurisdiction and local/hospital level to reduce the occurrence of SAB and other HAIs. These include the National Hand Hygiene Initiative (NHHI), which aims to educate and promote standardise hand hygiene practice in all Australian hospitals (ACSQHC 2011, 2018; ACSQHC & NHPA 2015; ACSQHC & AIHW 2018).

## Hand hygiene

Hand hygiene is a key intervention to prevent or reduce HAIs, including SAB.

Hand hygiene in hospitals generally refers to the washing and/or use of alcohol-based rubs by healthcare workers to clean their hands, and should be performed according to the World Health Organisation's (WHO) 'Five Moments for Hand Hygiene (WHO 2018).

The NHHI is managed by Hand Hygiene Australia (HHA) and includes auditing and reporting processes for hospitals to measure how they are performing. Following establishment of the NHHI, an interim benchmark (compliance rate) of 70% applied. This benchmark was increased to 75% in 2016, and increased again to 80% in 2017.

In the audit period covering April to June 2018 (audit period 2 2018), HHA found an overall hand hygiene compliance rate of 85%.

Between 2013 (audit period 1) and 2018 (audit period 2), compliance rates at public hospitals increased from 77% to 84% (see Figure HH1).

Figure HH1. Hand hygiene compliance rates for public hospitals, 2013 to 2018

#### Visualisation not available for printing

Between 2013 (audit period 1) and 2018 (audit period 2), compliance rates at private hospitals increased from 76% to 86% (see Figure HH2).

#### Figure HH2. Hand hygiene compliance rates for private hospitals, 2013 to 2018

#### Visualisation not available for printing

#### References

- Australian Commission on Safety and Quality in Health Care (ACSQHC) 2011. <u>Australian safety and quality goals for health care:</u> consultation paper. Sydney: ACSQHC. Viewed 25 October 2018.
- ACSQHC 2018. Healthcare associated infection. Sydney: ACSQHC. Viewed 25 October 2018.
- ACSQHC and Australian Institute of Health and Welfare (AIHW), 2018. <u>Australian Atlas of Healthcare Variation</u>. Sydney: ACSQHC. Viewed 13 December 2018,
- Hand Hygiene Australia (HHA) 2018. National Data National Hand Hygiene Initiative. Viewed 25 October 2018.
- World Health Organization (WHO) 2018. My 5 Moments for Hand Hygiene, Copenhagen: WHO. Viewed 25 October 2018.



# Appendix A. Definition of healthcare-associated Staphylococcus aureus bloodstream infections (SAB)

A case (or patient episode) of SAB 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 SAB 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 SAB meets at least one of the following key clinical criteria:

- SAB is a complication of the presence of an indwelling medical device (for example, intravascular line, haemodialysis vascular access, cerebrospinal fluid shunt, urinary catheter).
- SAB occurs within 30 days of a surgical procedure, where the SAB is related to the surgical site.
- SAB was diagnosed within 48 hours of a related invasive instrumentation or incision.
- SAB 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/mm<sup>3</sup> ( $0.5 \times 10^9/L$ ) 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 SAB 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 SAB cases for 2015-16 that are not comparable with counts for previous years. The definition used for SAB cases occurring prior to 1 July 2015 is available at <u>National Healthcare Agreement: PI 22-Healthcare associated infections:</u> Staphylococcus aureus bacteraemia, 2016.



# Appendix B. National Healthcare Agreement performance indicator: Healthcare-associated infections

The National Healthcare Agreement performance indicator is calculated using:

- the number of SAB 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 SAB surveillance arrangements.

The performance indicator includes data on:

- counts of SAB cases, with data presented separately for MRSA and MSSA SAB cases
- the rate of cases of SAB per 10,000 days of patient care for public hospitals included in the SAB 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 SAB 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 SAB surveillance arrangements, which had previously been included.

More information is available from the current specification for this performance indicator, available at <u>National Healthcare Agreement: Pl</u> <u>22-Healthcare associated infections: Staphylococcus aureus bacteraemia, 2018</u>.

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## Notes

## Acknowledgements

Information about SAB cases 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 SAB data through the National *Staphylococcus aureus* Bacteraemia Data Collection (NSABDC).

### Citation

## Data quality summary: National Staphylococcus aureus Bacteraemia Data Collection (NSABDC)

- The NSABDC is a data collection that includes counts of healthcare-associated SAB cases for public hospitals covered by SAB 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.
- SAB cases are reported by all states and territories and participating private hospitals using the national agreed case definitions (visit <u>Appendix A</u>).
- There may be imprecise exclusion of some SAB cases due to the inherent difficulties in determining the origins of SAB episodes, 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 the rates of SAB among jurisdictions 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 2017-18 are comparable.
- The data for 2010-11 are comparable with subsequent year data except for public hospital data for Queensland.
- The New South Wales (NSW) Department 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 jurisdictions 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 2017-18 patient day and coverage data may be preliminary for some hospitals or jurisdictions.
- 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:
  - $\circ\;$  the Council of Australian Governments (COAG) Reform Council publications
  - $\circ$  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.
- Private hospitals supply data voluntarily to the NSABDC, and not all private hospitals report data. Coverage of the private sector is therefore incomplete and reported data may not be representative of the sector as a whole.

#### Data quality statement

Comprehensive data quality statement for the 2017-18 NSABDC

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# Data



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