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Staphylococcus aureus bacteraemia in Australian public hospitals 2015–16

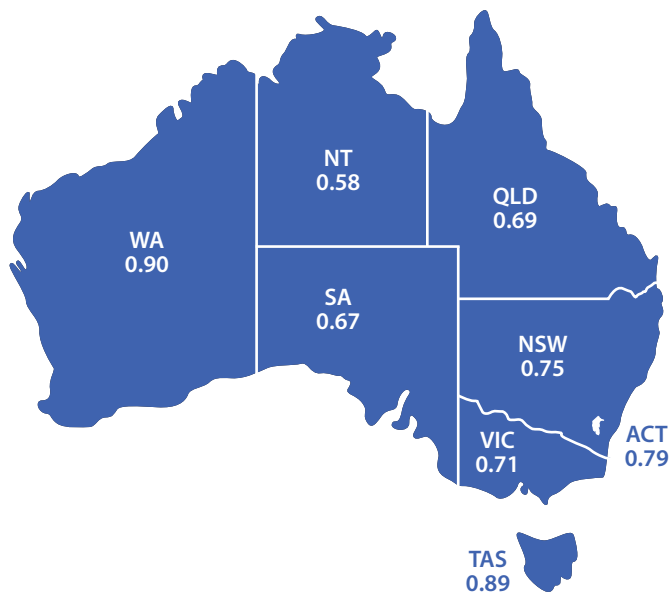


Australian hospital statistics

Staphylococcus aureus bacteraemia (SAB) in Australian public hospitals 2015–16

SAB is a serious bloodstream infection that may be associated with hospital care. Hospitals aim to have as few cases as possible.

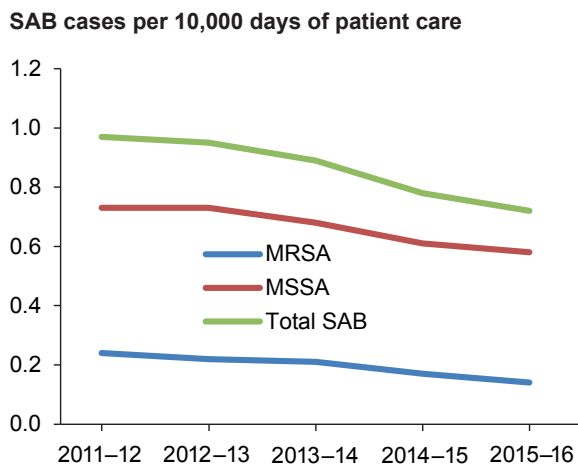
The nationally agreed benchmark is no more than 2.0 SAB cases per 10,000 days of patient care for public hospitals in each state and territory.



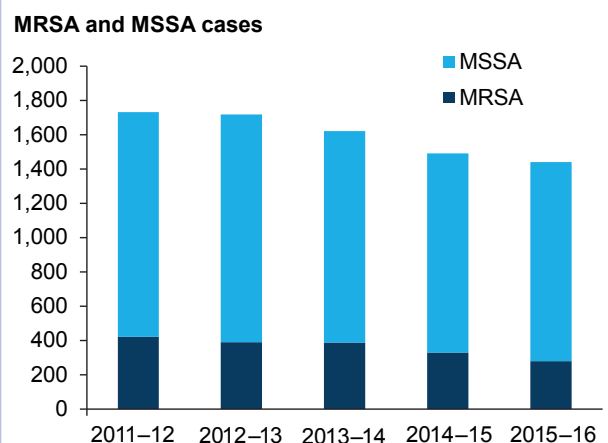
In 2015–16:

- all jurisdictions had rates below the national benchmark
- the national rate of SAB in public hospitals was 0.73 cases per 10,000 days of patient care
- 1,440 cases of SAB were reported
- 81% of cases were treatable with commonly used antibiotics—methicillin-sensitive *Staphylococcus aureus* (MSSA) cases
- 19% of cases were antibiotic resistant—methicillin-resistant *Staphylococcus aureus* (MRSA) cases.

Between 2011–12 and 2015–16, rates of SAB decreased from 0.96 cases to 0.73 cases per 10,000 days of patient care.



Overall, the number of SAB cases decreased from 1,732 in 2011–12 to 1,440 cases in 2015–16. The number of MRSA cases decreased from 422 to 280 cases.



Introduction

This report presents nationally consistent information on cases of *Staphylococcus aureus* bacteraemia (SAB) associated with Australian public hospitals. It contributes to ongoing robust national and jurisdictional arrangements to monitor and reduce SAB.

The report presents national information on cases of SAB associated with care provided by public hospitals for the period 1 July 2015 to 30 June 2016. It also includes summary data for the previous 4 years. The data were provided by states and territories to the Australian Institute of Health and Welfare (AIHW).

SAB performance information for individual public hospitals and for some private hospitals is available on the AIHW's MyHospitals website: <<http://www.myhospitals.gov.au/>>.

What is *Staphylococcus aureus* bacteraemia?

SAB is a type of infection often associated with healthcare. It occurs when *Staphylococcus aureus* bacteria ('Golden staph') cause an infection of the bloodstream (bacteraemia). When associated with healthcare procedures, these infections are considered to be potentially preventable. The national definition of a SAB case is outlined in Box 1.

Patients who develop bloodstream infections such as SAB are more likely to suffer complications that result in longer stays in hospital, and the most serious infections can result in death. They also result in potentially unnecessary increases in the cost of hospitalisation.

The bacteria causing SAB 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 that they are carrying them.

In hospitals, transmission is most commonly 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 the patient's bloodstream if they have open wounds or when intravascular devices, such as central or peripheral venous catheters, are inserted.

Who is at risk?

Patients who have a greater risk of infection than the general public are those with:

- open wounds
- invasive devices such as catheters
- 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
- prolonged or recurrent exposure to antibiotics.

SAB resistance to antibiotics

Antibiotic resistance can be defined as the ability of bacteria to survive and even replicate during a course of treatment with a specific antibiotic.

A SAB case that is identified by a laboratory as being caused by methicillin-resistant *Staphylococcus 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 antibiotics available to treat the infection.

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

Box 1: Definition of *Staphylococcus aureus* bacteraemia (SAB) cases

A case (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 has passed without a positive blood culture, after which an additional episode is recorded.

A case of SAB will be considered to be healthcare-associated if the first positive blood culture is collected more than 48 hours after hospital admission or less than 48 hours after discharge, or if the first positive blood culture is collected 48 hours or less after admission and one or more of the following key clinical criteria was met for the patient episode of SAB:

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

The definition of SAB was developed by the Australian Commission on Safety and Quality in Health Care (the Commission). The Commission changed the definition in 2016, with clarification of the neutropenia criterion. The change 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 <http://meteor.aihw.gov.au/content/index.phtml/itemId/598734>.

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) (see Box 2).

The NHA sets out objectives for the Australian, state and territory governments for health-care services and includes the outcome area *Australians receive appropriate high quality and affordable hospital and hospital-related care*. A performance benchmark for public hospital-associated SAB is included for that outcome area:

The rate of SAB (including MRSA) is no more than 2.0 per 10,000 occupied bed days for acute care public hospitals by 2011–12 in each state and territory.

Box 2: 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 (both hospitals focussing on acute care and hospitals focussing on care such as rehabilitation)
- 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 cases of SAB, 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).

(continued)

Box 2 (continued): National Healthcare Agreement performance indicator: Healthcare associated infections

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 included in the current specification for the performance indicator, available on the AIHW website at <<http://meteor.aihw.gov.au/content/index.phtml/itemId/630047>>.

There were 1,440 SAB cases in public hospitals in 2015–16

In 2015–16:

- the 1,440 SAB cases occurred during 19.7 million days of patient care under surveillance, or 98% of days of patient care in public hospitals (Table 1)
- about 81% of cases were methicillin-sensitive (MSSA), and therefore treatable with commonly used antibiotics.

SAB rates were lower than the national benchmark in 2015–16

- The national rate was 0.73 cases per 10,000 days of patient care (Table 1).
- Nationally, and for each state and territory, the rate of SAB was lower than the national benchmark of 2.0 per 10,000 days of patient care.
- The rates of SAB ranged from 0.58 per 10,000 days of patient care in the Northern Territory to 0.90 in Western Australia.

Table 1: Cases of *Staphylococcus aureus* bacteraemia (SAB) in public hospitals, MRSA and MSSA, states and territories, 2015–16^(a)

	NSW	Vic	Qld	WA ^(b)	SA	Tas	ACT	NT	Total
SAB cases									
Methicillin-resistant <i>Staphylococcus aureus</i>	131	52	35	30	16	6	4	6	280
Methicillin-sensitive <i>Staphylococcus aureus</i>	367	296	245	102	83	29	25	13	1,160
Total	498	348	280	132	99	35	29	19	1,440
SAB cases per 10,000 days of patient care									
Methicillin-resistant <i>Staphylococcus aureus</i>	0.20	0.11	0.09	0.20	0.11	0.15	0.11	0.18	0.14
Methicillin-sensitive <i>Staphylococcus aureus</i>	0.55	0.60	0.61	0.69	0.56	0.73	0.68	0.40	0.59
Total	0.75	0.71	0.69	0.90	0.67	0.89	0.79	0.58	0.73
Days of patient care under surveillance ('000)	6,665	4,933	4,043	1,470	1,469	395	365	328	19,669
Coverage (%)	99	99	100	95	95	100	100	100	98

(a) See 'Data quality summary' in this report and the Data Quality Statement accompanying this report online.

(b) Western Australia reported one case where both MRSA and MSSA were identified. This case is reported in the MRSA counts above for Western Australia, and in the total.

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

SAB rates varied by type of hospital

In 2015–16, about 51% of all SAB cases occurred in *Principal referral hospitals*, which accounted for 36% of days of patient care under surveillance. About 29% of cases occurred in *Public acute group A hospitals*, which accounted for about 30% of days of patient care under surveillance.

In 2015–16, SAB rates were highest for *Principal referral hospitals*, followed by *Public acute group A hospitals* (Table 2).

Principal referral hospitals 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 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*.

Hence, these 2 hospital groups could be more likely to treat patients at risk of SAB than other hospital peer groups.

Public acute group B hospitals provide a narrower range of services and are less likely to treat complex patients than either *Principal referral* or *Public acute group A hospitals*. For more information on public hospital peer groups, see *Australian hospital peer groups* (AIHW 2015a).

Table 2: Rates (SAB cases per 10,000 days of patient care) of *Staphylococcus aureus* bacteraemia (SAB) in public hospitals, by peer group, states and territories, 2015–16

	NSW	Vic	Qld	WA	SA	Tas	ACT	NT	Total
Principal referral hospitals	1.09	0.89	0.97	1.36	0.99	0.86	0.90	0.80	1.02
Public acute group A hospitals	0.67	0.81	0.72	0.42	0.69	1.14	0.54	0.28	0.72
Public acute group B hospitals	0.53	0.49	0.44	0.71	0.19	1.35	0.51
Other hospitals	0.35	0.50	0.26	0.57	0.36	0.00	0.00	0.30	0.40
All public hospitals	0.75	0.71	0.69	0.90	0.67	0.89	0.79	0.58	0.73

.. not applicable.

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

SAB cases and rates have decreased over time

Between 2011–12 and 2015–16:

- the number of SAB cases reported for Australian public hospitals decreased by 17%, from 1,732 to 1,440 cases (Table 3)
- the national rates of SAB decreased from 0.96 cases to 0.73 cases per 10,000 days of patient care under surveillance
- rates decreased in New South Wales, Victoria, Queensland and the Australian Capital Territory and fluctuated or remained about the same in the other states and territories (Figure 1)
- the number of MRSA cases decreased from 422 to 280 cases, and the proportion of all SAB cases that were MRSA decreased from 24% to 19% of the total
- SAB rates decreased for *Principal referral hospitals* and *Public acute group A hospitals* and were relatively stable for hospitals in other peer groups (Figure 2)
- coverage of the data collection (days of patient care under surveillance compared with all days of patient care) increased from 96% to 98%.

More recently, between 2014–15 and 2015–16:

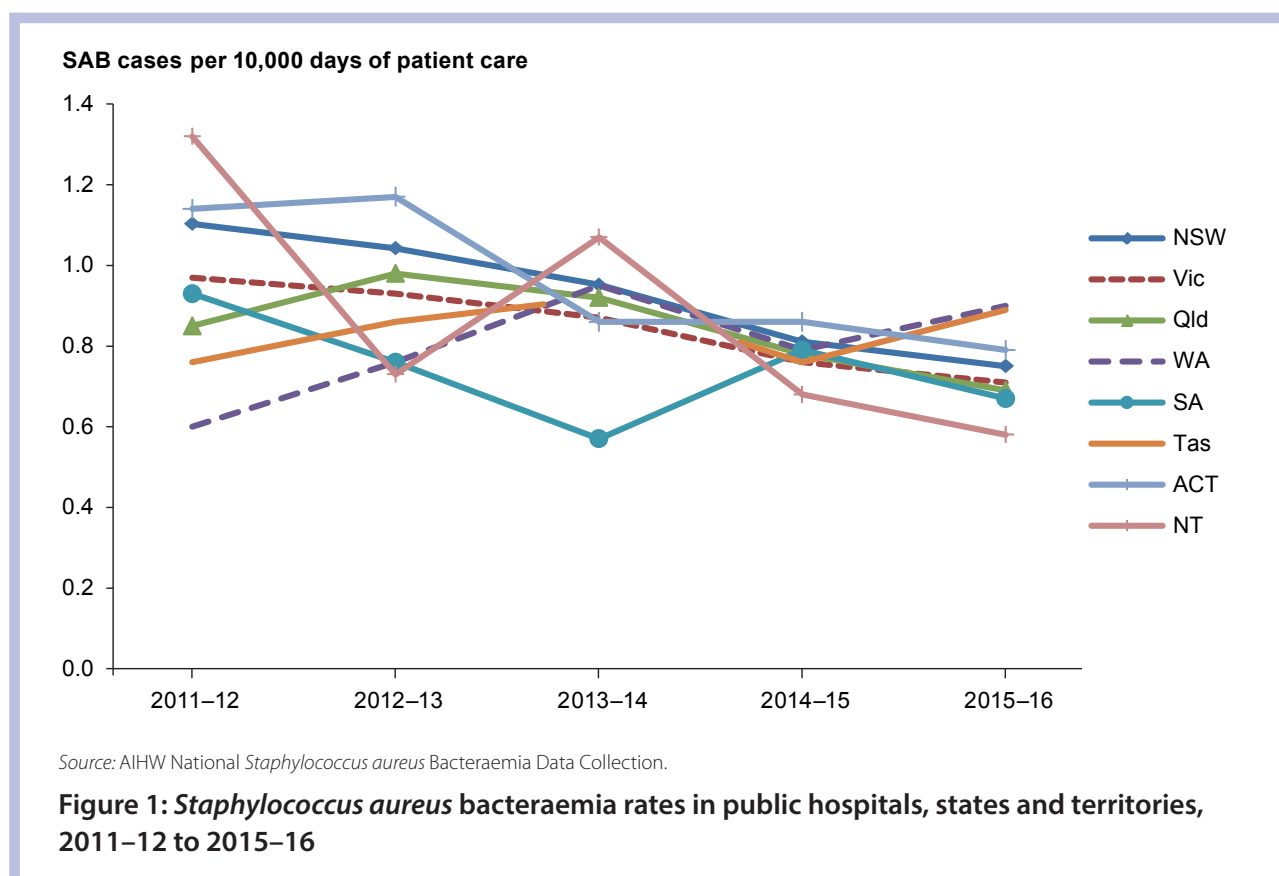
- the number of SAB cases reported nationally decreased by 3%
- the national rate of SAB decreased from 0.79 to 0.73 cases per 10,000 days of patient care under surveillance
- the SAB rate decreased for most states and territories, but not in Western Australia and Tasmania (Figure 1).

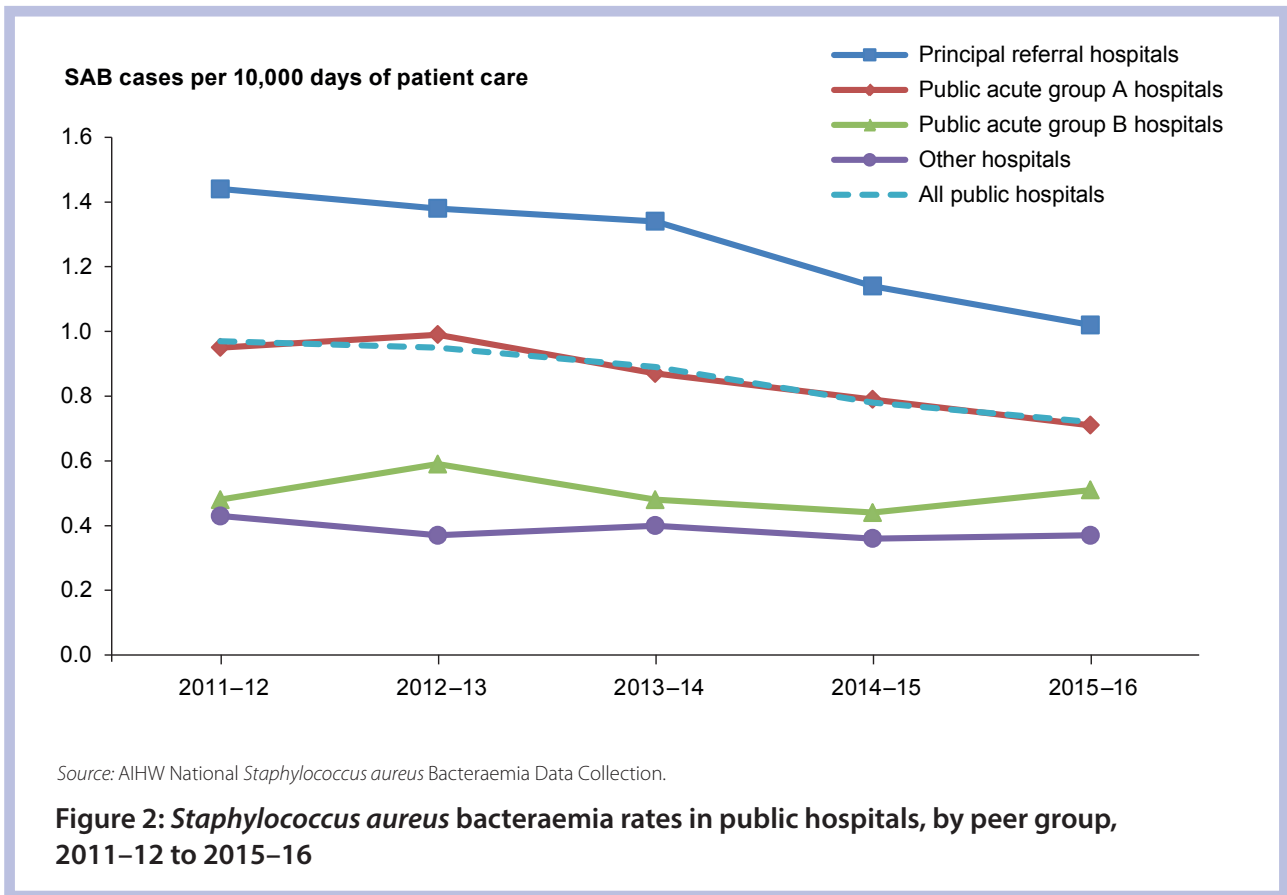
Table 3: Cases of *Staphylococcus aureus* bacteraemia (SAB) in public hospitals, MRSA and MSSA, 2011–12 to 2015–16^(a)

	2011–12	2012–13	2013–14	2014–15	2015–16
SAB cases					
Methicillin-resistant <i>Staphylococcus aureus</i>	422	391	388	331	280
Methicillin-sensitive <i>Staphylococcus aureus</i>	1,310	1,327	1,233	1,160	1,160
Total cases	1,732	1,718	1,621	1,491	1,440
SAB cases per 10,000 days of patient care					
Methicillin-resistant <i>Staphylococcus aureus</i>	0.23	0.22	0.21	0.17	0.14
Methicillin-sensitive <i>Staphylococcus aureus</i>	0.73	0.73	0.68	0.61	0.59
Total SAB cases per 10,000 days	0.96	0.94	0.89	0.79	0.73
Days of patient care under surveillance ('000)	17,973	18,186	18,172	18,945	19,669
Coverage of days of patient care under surveillance (%)	96	98	98	98	98

(a) See 'Data quality summary' in this report and the Data Quality Statement accompanying this report online for information on data revisions and comparability over time.

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





What is Australia doing to reduce SAB?

Healthcare-associated infections (HAIs) have been nominated as a priority area by the Australian Commission for Safety and Quality in Health Care (ACSQHC), under the goal *Safety of care*, in their report *Overview of the Australian safety and quality goals for health care* (ACSQHC 2012).

Consistent with the public health importance of HAIs, a range of national and local initiatives have been established throughout Australia to reduce the occurrence of SAB, with leadership provided by the ACSQHC (see Box 3).

These initiatives have been accompanied by the establishment of surveillance arrangements in public hospitals to monitor HAIs, and the development of an agreed national definition for cases of SAB (see Box 1).

These developments mean that nationally consistent data on public hospital-associated SAB cases can be reported.

Hand hygiene

Improvements in the hand hygiene of healthcare workers is the highest priority area to reduce the risk of HAIs (HHA 2016).

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 Organization's 'Five Moments for Hand Hygiene' (WHO 2016).

Hand Hygiene Australia reported that, in June 2016, hand hygiene compliance in all hospitals (both public and private) was about 84% (HHA 2016).

Between July 2011 and June 2016, hand hygiene compliance in public hospitals increased from about 71.8% to 83.6% (Figure 3).

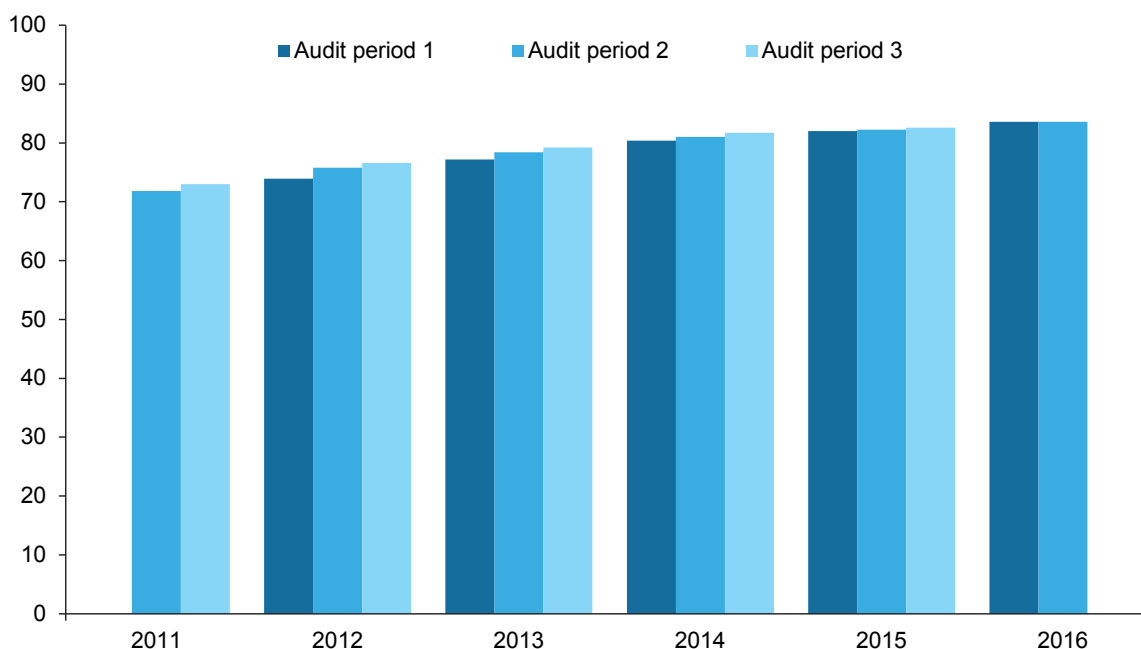
Box 3: Australian Commission on Safety and Quality in Health Care initiatives relating to SAB

The ACSQHC plays a major role in national improvements in safety and quality in health care, which includes reducing HAIs (ACSQHC 2016).

The ACSQHC HAI prevention program key initiatives include (ACSQHC 2016):

- national infection control guidance: the ACSQHC has developed tools and resources to implement the National Health and Medical Research Council's evidence-based guidelines to provide hospitals with guidance on how to prevent and control infections, including SAB. The guidelines include information on managing medical devices, such as cannulas and catheters
- an antimicrobial stewardship initiative, which supports activities that optimise antimicrobial use, improve patient outcomes and reduce the incidence of antimicrobial resistance in Australian hospitals
- building clinical capacity to address skill or knowledge gaps in infection control professions across healthcare settings
- a national surveillance initiative to monitor HAIs and provide timely feedback to jurisdictions and clinicians
- National Safety and Quality Health Service (NSQHS) Standard 3: *Preventing and Controlling Healthcare-Associated Infections*, which aims to prevent patients acquiring preventable HAIs, including SAB infections
- the National Hand Hygiene Initiative, which aims to educate and promote standardised hand hygiene practice in all Australian hospitals. This initiative includes auditing and reporting processes for hospitals to measure how they are performing.

Average hand hygiene compliance (per cent)



Source: HHA 2016.

Figure 3: Hand hygiene compliance rates for public hospitals, July 2011 to June 2016

Data collection

The data on cases of SAB associated with public hospitals were collected by hospital staff for hospital infection surveillance. Without their work, the information in this report would not have been available.

The preparation of this report would also not have been possible without the cooperation of the state and territory health authorities which provided these data to the AIHW for national collation as the National *Staphylococcus aureus* Bacteraemia Data Collection (NSABDC). States and territories also provided data on days of patient care (sourced from data on admitted patient care), for the rate calculations.

Data quality summary

This section presents a summary of information relevant to interpreting the data sourced from the NSABDC:

- The NSABDC is a data set that includes counts of cases of SAB for each public hospital covered by SAB surveillance arrangements—for some states and territories, there is less than 100% coverage of public hospitals, data have not been adjusted for under coverage.
- The NSABDC data set also includes counts for private hospitals that choose to provide data, although this report only presents information for public hospitals.
- Cases of SAB have been reported by all states and territories using the nationally agreed case definition.
- 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 healthcare settings.
- The days of patient care and coverage data may be preliminary for some hospitals or jurisdictions.
- 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 (the denominator) reflects the amount of admitted patient activity, but does not reflect the amount of non-admitted patient activity.
- In 2016, the performance indicator specification changed to exclude unqualified days for newborns from the denominator of the performance indicator, and previously reported data on days of patient care for 2010–11 to 2014–15 were revised by jurisdictions. Therefore, the data presented in this report for 2011–12 to 2014–15 may differ from the data published in earlier AIHW reports on this subject (AIHW 2011, 2013a, 2013b, 2014 and 2015b).
- In 2016, the definition of an episode of SAB was changed, with clarification of the clinical criterion related to neutropenia. However, the change is not considered to have resulted in counts of SAB cases for 2015–16 that are not comparable with counts for previous years.
- New South Wales provided the number of occupied bed days, rather than days of patient care under surveillance. The comparability of New South Wales 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 as used in this report).
- For 2015–16, Western Australia reported one case where both MRSA and MSSA were identified. For the indicator, this case has been reported in the MRSA count, not reported in the MSSA count, and reported as one case in the total for Western Australia.
- The data presented have not been adjusted for differences in casemix among the states and territories or among hospital peer groups. ('Casemix' is a term that refers to the range and types of patients treated by a hospital or other health service.) For SAB, relevant aspects of casemix that could affect the risk of SAB for patients include patient comorbidities and procedures performed.

A comprehensive data quality statement for the 2015–16 NSABDC collection is available at <http://meteor.aihw.gov.au>.

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The Australian Institute of Health and Welfare is a major national agency that provides reliable, regular and relevant information and statistics on Australia's health and welfare.

The Institute's purpose is to provide authoritative information and statistics to promote better health and wellbeing among Australians.

In 2015–16, 1,440 cases of hospital-associated *Staphylococcus aureus* bacteraemia (SAB) were reported in Australian public hospitals. The national rate of SAB in public hospitals was 0.73 cases per 10,000 days of patient care, and all states and territories had rates below the national benchmark of 2.0 cases per 10,000 days of patient care.

Between 2011–12 and 2015–16, rates of SAB decreased from 0.96 cases to 0.73 cases per 10,000 days of patient care.

Please note that there is the potential for minor revisions of data in this report. Please check the online version at <www.aihw.gov.au> for any amendments.