Australian Government
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Australian hospital statistics 2011–12

Staphylococcus aureus bacteraemia in Australian public hospitals

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Authoritative information and statistics to promote better health and wellbeing

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Australian hospital statistics 2011–12

Staphylococcus aureus bacteraemia in Australian public hospitals

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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.

Contents

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The report was prepared by David Braddock, Katrina Burgess, Jenny Hargreaves, Miriam Lum On and Jenny Webb, of the Australian Institute of Health and Welfare.

Abbreviations

ACT	Australian Capital Territory
ACSQHC	Australian Commission on Safety and Quality in Health Care
AIHW	Australian Institute of Health and Welfare
COAG	Council of Australian Governments
CRC	COAG Reform Council
HAI	healthcare-associated infection
MRSA	methicillin-resistant *Staphylococcus aureus*
MSSA	methicillin-sensitive *Staphylococcus aureus*
NHA	National Healthcare Agreement
NHMRC	National Health and Medical Research Council
NHPA	National Health Performance Authority
NSABDC	National *Staphylococcus aureus* Bacteraemia Data Collection
NSW	New South Wales
NT	Northern Territory
Qld	Queensland
SAB	*Staphylococcus aureus* bacteraemia
SA	South Australia
Tas	Tasmania
Vic	Victoria
WA	Western Australia

Summary

This report presents national information on cases of *Staphylococcus aureus* bacteraemia (SAB) associated with care provided by public hospitals for 1 July 2011 to 30 June 2012. This report builds on robust national and jurisdictional arrangements to monitor and reduce SAB.

What is SAB?

- SAB is a serious bloodstream infection that may be associated with hospital care. As such, it is known as a type of healthcare-associated infection.
- Patients who develop bloodstream infections such as SAB are more likely to suffer complications that result in a longer hospital stay and an increased cost of hospitalisation. Serious infections may also result in death.
- In December 2008, Australian Health Ministers endorsed the reporting of SAB by all hospitals in their relevant jurisdiction to form a national data collection.
- In addition, rates of SAB, including cases caused by methicillin-resistant *Staphylococcus aureus*, were announced in 2008 as one of the performance indicators to be reported by jurisdictions under the National Healthcare Agreement.

SAB rates in 2011–12

- In 2011–12, all states and territories had rates of SAB below the national benchmark of 2.0 cases per 10,000 patient days. The national rate was 0.9 cases per 10, 000 patient days.
- The rates ranged from 0.7 per 10,000 patient days in Western Australia to 1.3 in the Northern Territory.
- There were 1,734 cases of SAB reported for Australian public hospitals overall, of which 76% were methicillin sensitive, and therefore treatable with commonly used antibiotics. This was slightly lower than the 1,875 cases reported nationally in 2010–11.
- The reported SAB cases occurred during 18.5 million days of patient care under SAB surveillance during 2011–12.
- Between 2010–11 and 2011–12, rates of SAB decreased nationally, and in New South Wales, Queensland, Western Australia, Tasmania and Northern Territory. The rate increased in the Australian Capital Territory.

1 Introduction

This report presents the second year of nationally consistent information on cases of *Staphylococcus aureus* bacteraemia (SAB) associated with public hospitals in Australia. This report is one of a series of reports the Australian Institute of Health and Welfare (AIHW) publishes on hospitals each year. As for previous years, this series has included reports on emergency department care and elective surgery waiting times, released respectively in September and October, 2012. The series also includes a comprehensive report and a summary report on Australian hospitals, which for 2011-12 will be published in April 2013.

The SAB data in this report matches that provided by the AIHW for the Council of Australian Governments Reform Council report on the National Healthcare Agreement, and the Steering Committee for the Review of Government Service Provision *Report on Government Service Provision*, both due for publication in early 2013.

The data also align with data provided by the AIHW to the National Health Performance Authority for its reporting on the performance of individual public hospitals, through the *MyHospitals* website.

Background

Healthcare-associated infections

Healthcare-associated infections (HAIs) are acquired by patients during interactions with the healthcare system and are caused by micro-organisms such as bacteria and viruses (NHMRC 2010). They include infections acquired during hospitalisation and during care at other healthcare facilities. HAIs can be bloodstream infections (bacteraemia) or localised infections, such as those associated with surgical sites.

It is estimated that there are about 200,000 HAIs each year in Australia (Cruickshank & Ferguson 2008), making it the most common complication affecting patients in hospital. HAIs cause patients pain and suffering, prolonging hospital stays and increasing costs to the healthcare system (NHMRC 2010). Some patients die as a result of HAIs, and many of these deaths are preventable.

Staphylococcus aureus and SAB

Staphylococcus aureus is an important cause of healthcare-associated bacteraemia, causing significant illness and death. When associated with healthcare procedures, these infections are considered to be potentially preventable.

When *Staphylococcus aureus* causes bacteraemia, this is referred to as *Staphylococcus aureus* bacteraemia, or SAB.

The bacteria causing SAB are commonly found on the skin or in the nose of many individuals and are commonly spread from person to person in the community. In hospitals, the transmission is most commonly via the hands of healthcare workers. The bacteria from the patient's skin or from the hand of a healthcare worker have a direct entry into the patient's bloodstream when intravascular devices such a central, or peripheral venous catheters are inserted.

Patients with open wounds, invasive devices such as catheters or with weakened immune systems (cancer or transplant recipients, very young or older patients), or who have chronic disease such as diabetes or severe underlying illness, and prolonged or recurrent exposure to antibiotics, are at greater risk of infection than the general public.

Some *Staphylococcus aureus* bacteria are resistant to methicillin and other antibiotics used to treat bloodstream infections. In that case, the infections are referred to as being caused by MRSA. If the *Staphylococcus aureus* bacteria are able to be treated with common antibiotics, then these infections are referred to as being caused by methicillin-sensitive *Staphylococcus aureus* (MSSA). Resistance can be defined as bacteria's ability to survive and even replicate during a course of treatment with a specific antibiotic. In Australia, *Staphylococcus aureus* strains in hospital can be methicillin resistant, and resistant to several other antimicrobial drugs (Nimmo et al. 2003). These emerging resistant strains are of particular concern as they are particularly virulent (Cosgrove et al. 2003).

National initiatives to monitor and reduce SAB

Consistent with the public health importance of HAIs, a range of national and local initiatives have been established throughout Australia in recent years to reduce the occurrence of SAB, with leadership provided by the Australian Commission on Safety and Quality in Health Care (ACSQHC) (see Box 1). 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, which have, in turn, meant that nationally consistent data on public hospital-associated SAB cases are now available.

Box 1: Australian Commission on Safety and Quality in Health Care HAI initiatives

Reducing HAI is a major program area for the ACSQHC (ACSQHC 2011).The ACSQHC's HAI program includes a number of national initiatives such as:

- The National Antimicrobial Stewardship Initiative that assesses current antibiotic surveillance processes in Australia, including their appropriateness and effectiveness in helping to reduce HAIs and limit the increase in the prevalence of multi-resistant organisms.
- The National Hand Hygiene Initiative that monitors and promotes improvements in hand hygiene compliance rates, to reduce HAI and to measure hospital performance in hand hygiene. This initiative is managed by Hand Hygiene Australia.
- The development, with the National Health and Medical Research Council (NHMRC), of National Infection Control Guidelines.
- The Building Clinician Capacity Initiative that aims to address knowledge-based gaps by providing educational packages and toolkits for clinical staff working in infection control and prevention roles.

Source: ACSQHC 2012.

The SAB performance indicator

In 2008, Australian Health Ministers endorsed the reporting of data on public hospital-associated SAB cases by states and territories as part of performance reporting under the National Healthcare Agreement (NHA). These data are reported each year by the Council of Australian Governments (COAG) Reform Council (CRC).

The NHA, which sets out objectives of the Australian, state and territory governments for health care services, includes an outcome area that Australians receive appropriate high quality and affordable hospital and hospital-related care. The NHA includes public hospital-associated SAB as a performance benchmark for safety and quality:

> The rate of *Staphylococcus aureus* (including MRSA) bacteraemia 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.

A review of the NHA was commissioned in 2011 to evaluate performance reporting issues, including revision of the National Health Performance Framework and reducing the number of performance indicators. The review recommended that the SAB performance indicator be retained (COAG 2012).

Specification

The current specification for the performance indicator is outlined in Box 2 and shown in detail in Appendix A. The SAB performance indicator includes data on:

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

Data are restricted to cases associated with care provided in public hospitals. All types of public hospitals are included, both those focusing on acute care, and those focusing on non-acute or sub-acute care, for example, rehabilitation or palliative care. Cases associated with private hospitals and with non-hospital care are excluded.

Changes

Since publication of the 2010–11 SAB rates, a number of modifications to the performance indicator specification were agreed for reporting for 2011–12. These changes include:

- the inclusion of unqualified newborns in the patient day denominator. All newborns are monitored by surveillance programs, thus their patient days are included in the denominator.
- hospital boarders and posthumous organ procurement episodes are explicitly excluded from the indicator, as they are not covered under current surveillance programs.

The name of the performance indicator has also been changed from *NHA PI 39–Healthcare-associated Staphylococcus aureus (including MRSA) bacteraemia in acute care hospitals, 2012* to *PI 22–Healthcare-associated infections, 2013.*

Data source

State and territory government health authorities source data on public hospital-associated SAB cases from HAI surveillance arrangements in their public hospitals. States and territories also provide data on patient days for the rate calculations. The patient day data are sourced from data on admitted patient care in public hospitals.

Data were provided to the AIHW for national collation into its National *Staphylococcus aureus* Bacteraemia Data Collection and calculation of rates. A data quality statement for the 2011–12 collection is in Appendix B.

Box 2: *Staphylococcus aureus* bacteraemia performance indicator specification

The **numerator** is the number of SAB cases (as defined below) associated with public hospitals.

Cases associated with care provided by private hospitals and non-hospital health care are excluded.

A patient episode (case) of SAB is defined as a positive blood test for *Staphylococcus aureus*.

For surveillance purposes, only the first isolate 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 is considered to be healthcare-associated if the first positive blood test is more than 48 hours after hospital admission or less than 48 hours after discharge, or, if the first positive blood test is 48 hours or less after admission and one or more of the following criteria was met:

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 ($<1 \times 10^9$) contributed to by cytotoxic therapy.

The **denominator** is the number of patient days for public hospitals included in the SAB surveillance arrangements. This includes patient days for unqualified newborns and excludes patient days associated with episodes for posthumous organ procurement and hospital boarders.

The SAB rate is calculated as 10,000 × (numerator/denominator).

The data are presented as the number of cases and the number of cases per 10,000 patient days.

State and territory

The following states and territories make data relating to healthcare-associated SAB available on their websites:

- New South Wales: Healthcare-associated infections reporting <http://www.cec.health.nsw.gov.au/programs/hai>.
- Victoria: Victorian Infection Control Nosocomial Infection Surveillance System (VICNISS) hospital-acquired infection surveillance annual report 2009–10 <http://www.vicniss.org.au/Resources/VICNISSAnnualReport2009-10.pdf>.
- Queensland: Hospital performance (includes healthcare infections) <http://www.health.qld.gov.au/hospitalperformance/>.
- Western Australia: Healthcare-associated infection unit <http://www.public.health.wa.gov.au/3/455/3/%20reports__healthcare_associated_infection_unit.pm>.

- Tasmania: Healthcare-associated infection surveillance reports <http://www.dhhs.tas.gov.au/peh/tasmanian_infection_prevention_and_control_unit/publications_and_guidelines>.
- South Australia: Healthcare-associated infection program

  <http://www.sahealth.sa.gov.au/wps/wcm/connect/public+content/sa+health+internet/clinical+resources/safety+and+quality>

  <http://www.health.sa.gov.au/INFECTIONCONTROL/Default.aspx?tabid=147>.
- Australian Capital Territory: ACT Public Health Services Quarterly Performance Reports (includes healthcare-associated infection rates)

  <http://health.act.gov.au/publications/reports/act-public-health-services-quarterly-performance-report/act-public-health-services-quarterly-performance-report>.

2 *Staphylococcus aureus* bacteraemia cases

SAB cases in 2011–12

Information on the number of cases of SAB reported as associated with public hospital care between 1 July 2011 and 30 June 2012 is in Table 2.1.

At the national level and for each state and territory, the rate of SAB (including MRSA) was lower than the national benchmark of 2.0 per 10,000 patient days. The rates of SAB per 10,000 patient days under SAB surveillance ranged from 0.7 in Western Australia to 1.3 in the Northern Territory. The national rate was 0.9 cases per 10,000 patient days.

There were 1,734 cases of SAB reported for Australian public hospitals. MSSA cases (76%) were more common in all states and territories than MRSA cases. The MSSA cases would have been treatable with commonly used antibiotics.

The reported SAB cases occurred during 18.5 million days of patient care under SAB surveillance during 2011–12. They represented 95% of all public hospital patient days.

How have SAB rates changed over time?

Due to the changes in the performance indicator specification, the data for 2011–12 are only comparable with the data presented in this publication from 2010–11. They cannot be directly compared with the rates published in *Australian hospital statistics 2010–11: Staphylococcus aureus bacteraemia in Australian public hospitals* (AIHW 2011) or the data currently published on the *MyHospitals* website. There were also a number of minor changes between the cases previously reported in 2010–11 as a result of some states and territories undertaking audits of SAB data. Revised data for 2010–11 are in Table 2.2.

In 2010-11 the national rate was 1.1 cases per 10,000 patient days and the state and territory rates ranged from 0.9 in Victoria and the Australian Capital Territory (ACT) to 1.5 in the Northern Territory. There were 1,875 cases of SAB reported for Australian public hospitals, of which 73% were MSSA cases.

Between 2010–11 and 2011–12, the number of SAB cases decreased by 7.5% nationally. The rates of SAB per 10,000 patient days under SAB surveillance decreased in New South Wales, Queensland, Western Australia, Tasmania and Northern Territory, but the rate increased in the Australian Capital Territory.

The coverage based on patient days under SAB surveillance increased by 5 percentage points, from 90 to 95%.

Table 2.1: Cases of *Staphylococcus aureus* (including MRSA) bacteraemia (SAB) in public hospitals, MRSA and MSSA, by state/ territory, 2011–12[a]

	NSW	Vic	Qld	WA	SA	Tas	ACT	NT	Australia
					Rate per 10,000 patient days				
Methicillin-resistant *Staphylococcus aureus*	0.3	0.2	0.2	0.2	0.3	0.2	0.2	0.5	0.2
Methicillin-sensitive *Staphylococcus aureus*	0.7	0.8	0.7	0.6	0.6	0.7	1.0	0.8	0.7
Total[b]	**1.0**	**0.9**	**0.9**	**0.7**	**0.9**	**0.8**	**1.1**	**1.3**	**0.9**
					Number of cases				
Methicillin-resistant *Staphylococcus aureus*	201	80	51	23	42	5	6	15	423
Methicillin-sensitive *Staphylococcus aureus*	473	375	220	81	85	22	31	24	1,311
Total	**674**	**455**	**271**	**104**	**127**	**27**	**37**	**39**	**1,734**
Patient days under SAB surveillance ('000)[c]	6,735	4,837	3,178	1,436	1,396	318	325	304	18,529
Coverage (per cent)	97	99	98	84	82	90	98	100	95

(a) The SAB cases were associated with both admitted patient care and with non-admitted patient care (including emergency departments and outpatient clinics). The comparability of the SAB rates among jurisdictions is limited because of coverage differences and because the count of patient days reflects the amount of admitted patient activity, but does not necessarily reflect the amount of non-admitted patient activity.

(b) Total may not equal sum of components due to rounding.

(c) Coverage and patient day estimates may be preliminary. Coverage is the number of patient days for hospitals included in the SAB surveillance arrangements as a proportion of total patient days for all public hospitals.

Table 2.2: Cases of *Staphylococcus aureus* (including MRSA) bacteraemia (SAB) in public hospitals, MRSA and MSSA, by state/ territory, 2010–11[(a)(b)]

	NSW	Vic	Qld[(c)]	WA	SA	Tas	ACT	NT	Australia
					Rate per 10,000 patient days				
Methicillin-resistant *Staphylococcus aureus*	0.4	0.2	0.3	0.2	0.2	0.2	0.2	0.5	0.3
Methicillin-sensitive *Staphylococcus aureus*	0.9	0.7	0.9	0.8	0.7	1.1	0.7	0.9	0.8
Total[(d)]	**1.3**	**0.9**	**1.2**	**1.0**	**0.9**	**1.2**	**0.9**	**1.5**	**1.1**
					Number of cases				
Methicillin-resistant *Staphylococcus aureus*	223	118	72	23	31	6	6	16	505
Methicillin-sensitive *Staphylococcus aureus*	536	322	218	117	91	36	23	27	1,370
Total	**769**	**440**	**290**	**140**	**122**	**42**	**29**	**43**	**1,875**
Patient days under SAB surveillance ('000)	5,961	4,791	2,453	1,377	1,331	342	310	296	16,862
Coverage (per cent)	94	99	77	84	81	91	98	100	90

(a) The SAB cases were associated with both admitted patient care and with non-admitted patient care (including emergency departments and outpatient clinics). The comparability of the SAB rates among jurisdictions is limited because of coverage differences and because the count of patient days reflects the amount of admitted patient activity, but does not necessarily reflect the amount of non-admitted patient activity.

(b) Note that these data have been updated since the publication of *Australian hospital statistics 2010–2011:* Staphylococcus aureus *bacteraemia in Australian public hospitals* (AIHW 2011).

(c) Only includes patients aged 14 and over.

(d) Total may not equal sum of components due to rounding.

Limitations of the data

While the data are based on the nationally agreed definition of a SAB case, there are limitations that affect the comparability of the information.

Variation in definitions

The indicator uses a definition of a case of SAB agreed on and used by all states and territories. However, there may be imprecise exclusion of private hospital and non-hospital cases due to the inherent difficulties in determining the origins of SAB cases.

States and territories through their HAI surveillance arrangements collected the data on SAB cases. The arrangements for the collection of data by hospitals and the reporting to state and territory health authorities may vary among the jurisdictions.

Although the previous indicator name stipulated 'acute care' public hospitals, all public hospitals are included. The provision of 'acute' services varies among jurisdictions, so it is not possible to exclude 'non-acute' hospitals from the indicator in a way that would be uniform among all states and territories. Therefore, all hospitals have been included in the scope of the indicator so that the same approach is taken for each state and territory.

Variation in coverage

The coverage is the number of patient days for hospitals in the SAB surveillance arrangements as a proportion of total patient days for all public hospitals.

For some states and territories, there is less than 100 per cent coverage of public hospitals (Tables 2.1 and 2.2) and this may affect the reported rates. It is possible that there will be a lower risk of SAB in hospitals not included in the SAB surveillance arrangements, especially where they undertake fewer invasive procedures than hospitals which are included. Rates should be interpreted in conjunction with information about SAB surveillance coverage.

To enable better comparison, only patient days for those hospitals/patients that were covered by the SAB surveillance arrangements are included (in the denominator). For example, if a hospital was not included in the SAB surveillance arrangements for part of the year, then the patient days for that part of the year were not included. If part of the hospital was not included in the SAB surveillance arrangements (for example, children's wards, psychiatric wards), then patient days for that part of the hospital were not included. Patient days for 'non-acute' hospitals (such as rehabilitation and psychiatric hospitals) are included if the hospital was included in the SAB surveillance arrangements, but not otherwise.

Data for Queensland for 2010-11 include only patients aged 14 and older.

Limitations of the denominator

The SAB cases were associated with both admitted patient care and non-admitted patient care (including emergency departments and outpatient clinics). No denominator is available to describe the total admitted and non-admitted patient activity of public hospitals. However, the number of patient days for admitted patient activity is used as the denominator to take into account the large differences between the sizes of the public hospital sectors among the jurisdictions. The comparability of the SAB rates among jurisdictions and over time may be limited because the count of patient days reflects the

amount of admitted patient activity, but does not necessarily reflect the amount of non-admitted patient activity.

The amount of hospital activity that patient days reflect varies among jurisdictions and over time because of variation in admission practices and casemix differences.

Patient days are used as the denominator, rather than occupied bed days, because occupied bed day data were not available for all states and territories. Patient days are the total number of days of stay for all patients who are separated from hospital during a specified period—that, is there may have been days of stay that occurred in a previous period(s) but are counted in the period in which the patient separated from hospital. Occupied bed days are the number of days of stay for all patients that occurred during a specified period. There may be some difference between patient days and occupied bed days. However, at the state and territory level, for annual figures, there is unlikely to be a marked difference between counts of patient days and occupied bed days.

The patient day data used for the denominators may be preliminary for some hospitals or jurisdictions for 2011-12.

Casemix differences

The data presented have not been adjusted for any differences in casemix among the states and territories. Casemix is a term that refers to the range and types of patients (the mix of cases) treated by a hospital or other health service. For SAB, relevant aspects of casemix could include patient comorbidities and procedures.

Comparability of rates

The comparability of the SAB rates among jurisdictions may be limited because of coverage differences and because the count of patient days reflects the amount of admitted patient activity, but does not necessarily reflect the amount of non-admitted patient activity.

Appendix A

National Healthcare Agreement: PI 22–Healthcare-associated infections, 2013

Identifying and definitional attributes

Metadata item type:	Indicator
Indicator type:	Progress measure
Short name:	PI 22-Healthcare-associated infections, 2013
METeOR identifier:	443699
Registration status:	Health, Standard 31/10/2011
Description:	*Staphylococcus aureus* bacteraemia (SAB) associated with acute care public hospitals (excluding cases associated with private hospitals and non-hospital care).
Indicator set:	National Healthcare Agreement (2013) Health, Standard 31/10/2011
Outcome area:	Hospital and Related Care, Health, Standard 07/07/2010

Collection and usage attributes

Computation description:

Acute care public hospitals are defined as all public hospitals, including those defined as public psychiatric hospitals in the Public Hospital Establishments National Minimum Data Set. All types of public hospitals are included, both those focusing on acute care, and those focusing on non-acute or sub-acute care, including psychiatric, rehabilitation and palliative care.

Unqualified newborns are included in the indicator. Hospital boarders and posthumous organ procurement are excluded from the indicator.

A patient episode of SAB is defined as a positive blood culture for *Staphylococcus aureus*. For surveillance purposes, only the first isolate per patient is counted, unless at least 14 days has passed without a positive blood culture, after which an additional episode is recorded.

A *Staphylococcus aureus* bacteraemia 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, CSF 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 (<1 x 10^9) contributed to by cytotoxic therapy.

Exclusions:

Cases where a known previous positive test has been obtained within the last 14 days are excluded. For example, if a patient has SAB in which 4 sets of blood cultures are positive over the initial 3 days of the patient's admission, only 1 episode of SAB is recorded. If the same patient had a further set of positive blood cultures on day 6 of the same admission, these would not be counted again, but would be considered part of the initial patient episode.

Note: If the same patient had a further positive blood culture 21 days after admission (that is, greater than 14 days after their last positive on day 6), then this would be considered a second patient episode of SAB.

Denominator: include unqualified newborns, exclude posthumous organ procurement and hospital boarders.

Analysis by state and territory is based on location of the hospital.

Presented as:

- a number
- per 10,000 patient days.

Coverage: Denominator ÷ Number of patient days for all public hospitals in the state or territory.

Any variation from the specifications by jurisdictions will be footnoted and described in the data quality statement.

Computation:

Numerator

10,000 x (Numerator ÷ Denominator).

Numerator:

Number of SAB patient episodes (as defined above) associated with acute care public hospitals.

Denominator:

Number of patient days for public acute care hospitals under surveillance (that is, only for hospitals included in the surveillance arrangements).

Include unqualified newborns, exclude posthumous organ procurement and hospital boarders.

Disaggregation:

2010–11 (back cast for inclusion of unqualified newborns) and 2011–12—state and territory, by:

- Methicillin-resistant *Staphylococcus aureus* (MRSA)/methicillin-sensitive *Staphylococcus aureus* (MSSA).

Some disaggregation may result in numbers too small for publication.

Comments:

Most recent data available for 2013 CRC report: 2011–12.

The number of SAB patient episodes associated with acute public hospitals under surveillance includes SAB patient episodes associated with *all* public hospitals, and the number of patient days for public acute care hospitals under surveillance includes the number of patient days for *all* public hospitals under surveillance.

For some states and territories there is less than 100 per cent coverage of hospitals. This may impact on the reported rate. For those jurisdictions with incomplete coverage of acute care public hospitals (in the numerator), only patient days for those hospitals that contribute data are included (in the denominator). Specifically, if a hospital was not included in the SAB surveillance arrangements for part of the year, then the patient days for that part of the year are excluded from the number of patient days for public acute care hospitals under surveillance. If part of the hospital was not included in the SAB surveillance arrangements (for example, children's wards, psychiatric wards), then patient days for that part of the hospital are excluded from the number of patient days for public acute care hospitals under surveillance. Patient days for 'non-acute' hospitals (such as rehabilitation and psychiatric hospitals) are included if the hospital was included in the SAB surveillance arrangements, but not otherwise. However, all these patient days are included in the coverage rate denominator measure of total number of patient days for all public hospitals in the state or territory.

Some states operate a 'signal surveillance' arrangement for smaller hospitals whereby the hospital notifies the appropriate authority if a SAB case is identified, but the hospital is not considered to have formal SAB surveillance as per larger hospitals. Where this arrangement is in place, these hospitals should be included as part of the indicator. That is, SAB patient episodes and patient days should be included as 'under surveillance'.

Only episodes associated with acute public hospital care in each jurisdiction should be counted. If a case is associated with care provided in another jurisdiction (cross border flows) then it is reported (where known) by the jurisdiction where the care associated with the SAB occurred.

There may be patient episodes of SAB identified by a hospital which did not originate in the identifying hospital (as determined by the definition of a patient episode of SAB), but in another public hospital. If the originating hospital is under SAB surveillance, then the patient episode of SAB should be attributed to the originating hospital and should be included as

part of the indicator. If the originating hospital is not under SAB surveillance, then the patient episode is unable to be included in the indicator.

Patient episodes associated with care provided by private hospitals and non-hospital health care are excluded.

Patient days for unqualified newborns are included. Patient days for hospital boarders and posthumous organ procurement are excluded.

Almost all patient episodes of SAB will be diagnosed when the patient is an admitted patient. However, the intention is that cases are reported whether they were associated with admitted patient care or non-admitted patient care in public acute care hospitals.

Where there is significant variation in the data collection arrangements, for example, non-coverage of cases diagnosed less than 48 hours after admission, it will affect the calculation of values across states and territories.

Variation in admission practices across jurisdictions will influence the denominator for this indicator, impacting on comparability of rates.

Jurisdictional manuals should be referred to for full details of definitions used in infection control surveillance.

Note that patient episodes of SAB are just one type of healthcare-associated infection. Hence, this performance indicator is not a complete measure of healthcare-associated infections for the outcome area of hospital and related care.

Representational attributes

Representation class:	Rate
Data type:	Real
Unit of measure:	Episode
Format:	NN[N]

Data source attributes

Data sources:

Data Source
State/territory infection surveillance data
Frequency
Annual
Data custodian
State/territory health authorities

Data Source
State/territory admitted patient data
Frequency
Annual
Data custodian

State/territory health authorities

Accountability attributes

Reporting requirements:	National Healthcare Agreement
Organisation responsible for providing data:	Australian Institute of Health and Welfare
Benchmark:	National Healthcare Agreement: PB g-The rate of *Staphylococcus aureus* (including MRSA) bacteraemia 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, 2013.
Further data development / collection required:	Specification: Substantial work required
Release date:	

Appendix B

Data quality statement for the National *Staphylococcus aureus* Bacteraemia Data Collection

This data quality statement provides information relevant to interpretation of statistics derived from the National *Staphylococcus aureus* Bacteraemia Data Collection (NSABDC).

Summary of key issues

- The NSABDC is a data set that includes counts of cases of SAB for each public hospital covered by SAB surveillance arrangements, and for private hospitals that choose to provide data.
- 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 from private hospitals and non-hospital settings.
- For some states and territories there is less than 100 per cent coverage of public hospitals.
- The data for 2011–12 are comparable with the revised data for 2010–11 as published in *Australian hospital statistics 2011–2012:* Staphylococcus aureus *bacteraemia in Australian public hospitals* (AIHW 2013). Due to changes in the performance indicator specification, they are not comparable with the data published in the *Australian hospital statistics 2010–11: Staphylococcus aureus bacteraemia (SAB) in Australian public hospitals* (AIHW 2011).
- The patient day and coverage data may be preliminary for some hospitals or jurisdictions.

Description

The NSABDC includes counts of cases of SAB for each public hospital covered by SAB surveillance arrangements, and for private hospitals that choose to provide data. The data for public hospitals are collected in the hospital infection control arrangements by state and territory health authorities. Data on MRSA and MSSA cases for public hospitals are reported separately at a state or territory level.

The data include the counts of patient days under surveillance.

A **case (patient episode) of SAB** is defined as a positive blood culture for *Staphylococcus aureus*. For surveillance purposes, only the first isolate 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 ($<1 \times 10^9$) contributed to by cytotoxic therapy.

This definition of a case of SAB was used by all states and territories for reporting for the 2011–12 year (see Attachment A for current NHA indicator specification).

Institutional environment

The AIHW is a major national agency set up by the Australian Government under the *Australian Institute of Health and Welfare Act 1987* to provide reliable, regular and relevant information and statistics on Australia's health and welfare. It is an independent statutory authority established in 1987, governed by a management board, and accountable to the Australian Parliament through the Health and Ageing portfolio.

The AIHW aims to improve the health and wellbeing of Australians through better health and welfare information and statistics. It collects and reports information on a wide range of topics and issues, ranging from health and welfare expenditure, hospitals, disease and injury, and mental health, to ageing, homelessness, disability and child protection.

The Institute also plays a role in developing and maintaining national metadata standards. This work contributes to improving the quality and consistency of national health and welfare statistics. The Institute works closely with governments and non-government organisations to achieve greater adherence to these standards in administrative data collections to promote national consistency and comparability of data and reporting.

One of the AIHW's main functions is to work with the states and territories to improve the quality of administrative data and, where possible, to compile national data sets based on data from each jurisdiction, analyse these data sets, and disseminate information and statistics.

The *Australian Institute of Health and Welfare Act 1987*, in conjunction with compliance to the *Privacy Act 1988*, (Commonwealth), ensures that the data collections managed by the AIHW are kept securely and under the strictest conditions with respect to privacy and confidentiality.

For further information, see the AIHW website <http://www.aihw.gov.au/>.

Data for the NSABDC were supplied to the AIHW by state and territory health authorities for the purpose of reporting against the NHA performance benchmark and performance indicator 'Healthcare-associated infections' and for reporting by the National Health Performance Authority (NHPA).

Timeliness

The reference period for this data set is 2011–12. Data are provided annually by state and territory health authorities. The original timetable was for states and territories to provide the data by 24 August 2012. States and territories provided the data to the AIHW by November 2012. The data were published in January 2013.

Accessibility

The AIHW publishes data from the NSABDC annually in the *Australian hospital statistics:* Staphylococcus aureus *bacteraemia in Australian public hospitals* series. These reports may be accessed on the AIHW website: <http://www.aihw.gov.au/hospitals/>.

Interpretability

Information on the definitions used for the NSABDC, including patient days, admitted patient, non-admitted patient and care type, are available on the AIHW's online metadata repository (METeOR). METeOR can be accessed on the AIHW website:

<http://meteor.aihw.gov.au/content/index.phtml/itemId/181162>.

At time of publication, the NHA performance indicator specification had yet to be released on METeOR but has been included in Appendix A of this report.

Relevance

Data from the NSABDC are used for the NHA performance benchmark and performance indicator about safety and quality in hospital and related care.

If a case is associated with care provided in another jurisdiction, then it may be reported (where known) by the jurisdiction where the care associated with the SAB occurred.

Almost all cases of SAB will be diagnosed when the patient is an admitted patient. However, the intention is that cases are reported whether they were determined to be associated with admitted patient care or non-admitted patient care in public hospitals.

The count of patient days reflects the amount of admitted patient activity, but does not reflect the amount of non-admitted patient activity. The amount of hospital activity that patient days reflect varies among jurisdictions and over time because of variation in admission practices.

Accuracy

States and territories are primarily responsible for the quality of the data they provide. However, the AIHW undertakes validations on receipt of data. Data are checked for valid values, logical consistency and historical consistency. Potential errors are queried with jurisdictions, and corrections and resubmissions may be made in response to these edit queries. The AIHW does not adjust data to account for possible data errors or missing or incorrect values, except as stated.

The arrangements for the collection of data by hospitals and the reporting to state and territory health authorities may vary among the jurisdictions. Jurisdictional manuals should be referred to for full details of definitions used in their infection surveillance arrangements.

For some states and territories there is less than 100 per cent coverage of public hospitals.

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 from private hospitals and non-hospital settings. However, it is likely that the number of cases incorrectly included or excluded would be small.

The patient day data may be preliminary for some hospitals or jurisdictions.

Coherence

The NSABDC data were first reported for 2008–09 in the 2010 COAG Reform Council *National Agreement performance information 2008-09* (SCRGSP 2009). The 2008–09 data were provided by five jurisdictions only and before the development of an agreed national definition of a case of SAB. These data were limited to principal referral and large hospitals only. For these reasons, 2008–09 data are not comparable with those reported subsequently, with the exception of data for Tasmania.

NSABDC data for 2009–10 were presented in the 2011 COAG Reform Council *National Healthcare Agreement: performance report for 2009–10* (CRC 2011). New South Wales used a definition of SAB that differed from the national definition.

NSABDC data for 2010–11 were presented in *Australian hospital statistics 2010–2011:* Staphylococcus aureus *bacteraemia in Australian public hospitals* (AIHW 2011), the 2012 COAG Reform Council *National Healthcare Agreement: performance report for 2010–11* (CRC 2012) and the *MyHospitals* website.

Due to the changes in the performance indicator specification, the data for 2011–12 are only comparable with the revised data from 2010–11. However, data for Queensland for 2010–11 includes only patients aged 14 and over, however, for 2011–12 all age groups are included.

These revised data for 2010-11 cannot be directly compared with the 2010-11 rates published in previous COAG Reform Council publications or *Australian hospital statistics 2010–11: Staphylococcus aureus bacteraemia in Australian public hospitals* (AIHW 2011), or with the data currently published on the *MyHospitals* website.

Glossary

Admitted patient: A patient who undergoes a hospital's formal admission process to receive treatment and/or care. This treatment and/or care is provided over a period of time and can occur in hospital and/or in the person's home (for hospital-in-the-home patients).

Antimicrobial resistance: Antimicrobial resistance occurs where a micro-organism develops ways to survive exposure to an antimicrobial medicine that could previously kill or weaken them.

Bacteraemia: A bacterial infection of the blood or the lymph system.

Bloodstream infection: The presence of live micro-organisms in the blood.

Casemix: The range and types of patients (the mix of cases) treated by a hospital or other health service. Casemix classifications (such as Australian Refined—Diagnosis Related Groups) provide a way of describing and comparing hospitals and other services for management purposes.

Healthcare-associated infection: Infections acquired as a direct or indirect result of healthcare.

Infection: The invasion and reproduction of micro-organisms inside the body. This can cause tissue injury and disease.

Methicillin-resistant *Staphylococcus aureus* (MRSA): Strains of *Staphylococcus aureus* that are resistant to many of the antibiotics commonly used to treat infections (NHMRC 2010).

Methicillin-sensitive *Staphylococcus aureus* (MSSA): Strains of *Staphylococcus aureus* that are sensitive to treatment with the antibiotics commonly used to treat infections.

Non-admitted patient: A patient who receives care from a recognised non-admitted patient service or clinic of a hospital.

Patient days: The total number of days for patients who were admitted for an episode of care and who separated during a specified reference period. A patient who is admitted and separated on the same day is allocated one patient day.

Private hospital: A privately owned or operated institution, catering for patients who are treated by a doctor of their own choice. Patients are charged fees for accommodation and other services provided by the hospital and relevant medical and paramedical practitioners. Acute care and psychiatric hospitals are included, as are private free-standing day hospital facilities.

Public hospital: A hospital controlled by a state or territory health authority. Public hospitals offer free diagnostic services, treatment, care and accommodation to all eligible patients.

Qualified days: The number of qualified days within newborn episodes of care for babies aged 9 days old or less admitted to hospital. Days within newborn episodes of care are either qualified or unqualified. A newborn day is qualified (acute) when a newborn meets at least one of the following criteria:

- is the second or subsequent live born infant of a multiple birth, whose mother is currently an admitted patient
- is admitted to an intensive care facility in a hospital, being a facility approved by the Australian Government Health Minister for the purpose of the provision of special care
- remains in hospital without its mother
- is admitted to the hospital without its mother.

Unqualified newborn days are those days that do not meet these criteria.

Separation: An episode of care for an admitted patient, which can be a total hospital stay (from admission to discharge, transfer or death) or a portion of a hospital stay beginning or ending in a change of type of care (for example, from acute to rehabilitation). Separation also means the process by which an admitted patient completes an episode of care either by being discharged, dying, transferring to another hospital or changing type of care.

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In 2011–12, all states and territories had rates of hospital-associated *Staphylococcus aureus* bacteraemia (SAB) below the national benchmark, with rates ranging from 0.7 to 1.3 cases per 10,000 patient days.

There were 1,734 cases of hospital-associated SAB reported for Australia, which occurred during approximately 18.5 million days of patient care.