
F State-level data on hospital-acquired infections

Government monitoring of hospital-acquired infections is largely undertaken by state governments, reflecting their role as providers of public hospitals and regulators of private hospitals. Such monitoring is not done on a nationally-consistent basis, but public and private hospitals are included in most cases.

New South Wales is the only state with a dedicated infection surveillance program under which the data reported to government are limited to public hospitals.¹ The Northern Territory Government also confines its infection monitoring to public hospitals.² The ACT Government collects data from just one private hospital and two public hospitals, and so it would not be possible to maintain confidentiality in a public-private comparison.³ Nevertheless, it is likely that hospitals that are not required to report data to governments would still monitor their infection rates and participate in voluntary cross-hospital reporting programs, such as the Clinical Indicator Program (CIP) managed by the Australian Council on Healthcare Standards.

The Commission did not request infections data from individual hospitals (or groups of hospitals managed by the same entity) because it would be difficult to maintain confidentiality, and the collection methods and definitions may not be

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- 1 The NSW Government's infection surveillance program is mandatory for public hospitals (NSW Department of Health 2005). Reported data include surgical-site infections following selected procedures, central-line associated bloodstream infections, *Staphylococcus aureus* bacteraemia, and methicillin-resistant *Staphylococcus aureus* cases in intensive-care units (NSW Department of Health 2008). Private hospitals are encouraged to use the same indicator framework and should report data to their infection control and/or quality committee, and medical advisory committee.
 - 2 NT public hospitals submit infections data to the Clinical Indicator Program, which is managed by the Australian Council on Healthcare Standards.
 - 3 The ACT Government routinely collects data on bloodstream infections, and surgical-site infections associated with selected procedures (joint arthroplasty, cardiac surgery and caesarean sections) (Bull et al. 2008).

comparable with other hospitals (or groups). Data was not requested from the CIP, given the limitations with that information source (discussed in chapter 6).

F.1 Victoria

There are two potential sources of infections data in Victoria:

- Victorian Nosocomial Infection Surveillance System (VICNISS)
- Victorian Admitted Episodes Dataset (VAED).

Victorian Nosocomial Infection Surveillance System

VICNISS was established in 2002 and is funded by the Victorian Government to monitor infections in public hospitals. The VICNISS Coordinating Centre collects and analyses data from individual hospitals, and reports quarterly to participating hospitals and the Victorian Department of Health.

All public hospitals report to VICNISS. Private hospitals recently expressed an interest in also participating, and this has so far led to seven private hospitals reporting data. The Commission understands that all of these are larger private hospitals (more than 100 beds). It is expected that this development will ‘eventually enable a comprehensive data collection of surgical procedures in Victoria and allow comparisons between all hospitals, both public and private’ (Victorian Department of Human Services 2008b, p. iv).

VICNISS surveillance methods differ according to hospital size. Hospitals with 100 or more beds (type-1 hospitals) are subject to three components based on the US NNIS system. These components are the surveillance of surgical-site infections (SSIs), intensive-care units (ICUs) and neonatal ICUs. VICNISS uses the NHSN/NNIS risk index (described in box 6.1) to risk adjust SSI rates, although the methodology is modified for operations where the use of a laparoscope influences the risk of developing an SSI (for example, appendectomy and cholecystectomy) (Victorian Department of Human Services 2008b). The most recent published data for SSIs are shown in table F.1.

Surveillance for hospitals with fewer than 100 beds (type-2 hospitals) involves monitoring processes that have been demonstrated to affect outcomes and, for hospitals with high surgical throughput, reporting selected infection rates. While the prevalence of MRSA is not reported for type-1 hospitals, it is one of the infection rates that type-2 hospitals can report. The VICNISS Coordinating Centre stratifies the type-2 hospital data into small hospitals (1–14 acute beds), medium hospitals

(15–49 acute beds) and large hospitals (50–99 acute beds) and reports infections per occupied bed day. Data for type-2 hospitals on rates of methicillin-resistant *Staphylococcus aureus* (MRSA) and bloodstream infections (BSIs) are shown in table F.2.

Table F.1 SSI rates for Victorian public hospitals by procedure and risk category, 2007^a

	<i>Risk category^b</i>			
	<i>0</i>	<i>1</i>	<i>2</i>	<i>3</i>
Coronary artery bypass grafts, deep and organ space	–	1.0 (0.5–1.7)	1.6 (0.7–3.2)	–
Colon surgery	–	4.9 (2.5–8.7)	9.5 (6.3–13.6)	11.2 (6.3–18.1)
Caesarean section	1.5 (1.1–1.9)	1.3 (0.6–2.5)	–	–
Hip arthroplasty deep and organ space	0.9 (0.4–1.7)	1.9 (1.3–2.7)	–	–
Knee arthroplasty deep and organ space	1.3 (0.6–2.4)	0.8 (0.3–1.6)	–	–

^a Hospitals with 100 or more acute beds (VICNISS type-1 hospitals). SSI rates are expressed in terms of infections per 100 procedures. ^b Risk categories are based on the NHSN/NNIS risk index for SSIs (detailed in box 6.1). Numbers in parentheses are 95 per cent confidence intervals. – Nil or rounded to zero.

Source: Victorian Department of Health (unpublished VICNISS data).

Table F.2 MRSA and BSI rates for Victorian public hospitals by hospital size, 2004–2007^a

<i>Hospital size</i>	<i>MRSA^b</i>	<i>BSIs^b</i>
1–14 acute beds	0.5 (0.2–0.8)	0.1 (0.0–0.3)
15–49 acute beds	0.4 (0.3–0.7)	0.3 (0.1–0.4)
50–99 acute beds	1.0 (0.8–1.4)	0.7 (0.5–0.9)
Total	0.7 (0.5–0.8)	0.4 (0.3–0.5)

^a Hospitals with fewer than 100 acute beds (VICNISS type-2 hospitals). ^b Infection rates are expressed as infections per 10 000 occupied bed days. Numbers in parentheses are 95 per cent confidence intervals.

Source: Victorian Department of Human Services (2008b).

Victorian Admitted Episodes Dataset

The VAED contains data on all episodes of care for admitted patients in public and private hospitals in Victoria. Hospitals are required to provide these data to the Victorian Department of Health.

The Victorian Government provides data from the VAED to a national database — the National Hospital Morbidity Database (NHMD) managed by the Australian

Institute of Health and Welfare (AIHW) — as part of its healthcare agreement with the Australian Government. Other jurisdictions have similar arrangements with the Australian Government, and national coding standards have been established to ensure data are reported consistently. However, Victoria has supplementary coding standards to gather extra information for its own purposes beyond what is required at the national level. This includes a prefix on diagnosis codes that can, among other things, be used to identify conditions that arose during an episode of care. This prefix has been used for many years in Victoria, and will be utilised by the Victorian Department of Health to derive the condition-onset flag recently mandated for the NHMD.

The Commission obtained data from the Victorian Department of Health that uses the VAED condition-onset prefix, in combination with codes for specific infection organisms, to identify hospital-acquired cases of MRSA and vancomycin-resistant *enterococci* (VRE).⁴ These data may slightly understate the number of infections for technical reasons associated with the coding of diagnoses.⁵ To test this, the Commission compared public-hospital MRSA data from the VAED with that reported by VICNISS for type-2 hospitals. As expected, the MRSA infection rate was slightly lower using VAED data (table F.3).

The VAED data show that private hospitals had lower rates of hospital-acquired MRSA and VRE than public hospitals between 2005-06 and 2007-08 (figures F.1 and F.2). This pattern was also evident when the data were stratified by region and whether the patient spent time in an ICU (tables F.4 and F.5). Between 2005-06 and 2007-08, the infection rates for both MRSA and VRE in both public and private hospitals were greater in metropolitan hospitals than in rural hospitals. This may reflect the fact that metropolitan hospitals are more likely to treat complex cases with a greater risk of infection.

⁴ Cadwallader et al. (2001) also used data from hospital medical records to identify infections. They found that this approach was comparable to an infection-surveillance program in identifying SSIs following orthopaedic surgery in a WA teaching hospital in the late 1990s. More recently, Jackson, Michel, Roberts, Jorm and Wakefield (2009) have developed and validated a method for using data from hospital medical records that include a condition-onset flag to identify and classify hospital-acquired diagnoses (including hospital-acquired infections).

⁵ Data were derived from the VAED by identifying cases that had a C-prefix diagnosis for *Staphylococcus aureus* (ICD-10-AM code B95.6) or *Streptococcus* group D (B95.2), combined with a code for methicillin-resistant agent (Z06.32) or vancomycin-resistant agent (Z06.41). This might exclude some *Staphylococcus aureus* and *Streptococcus* group D infections that are identified by a combined 'infection site and organism code' specifying both (a) that there is an infection and (b) the organism is *Staphylococcus aureus* or *Streptococcus* group D.

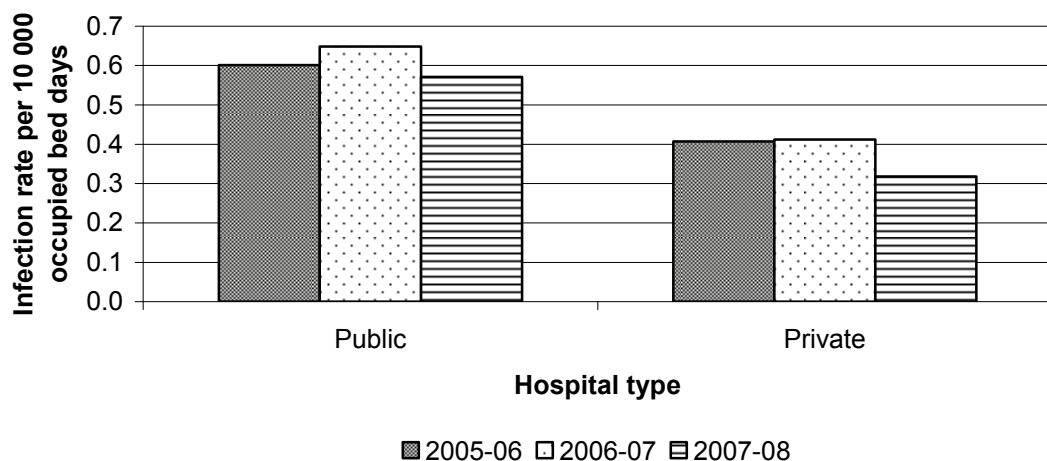
Table F.3 Comparison of VAED and VICNISS data for public-hospital MRSA infections

	VAED ^a	VICNISS ^b
	2005–2008 ^c	2004–2007 ^d
No. of MRSA infections	101	82
Acute occupied bed days	1 736 866	1 226 952
Infection rate (per 10 000 acute occupied bed days)	0.58	0.67

^a All public hospitals. MRSA infections were derived from the VAED by counting separations with diagnosis codes indicating a 'C-prefix' infection for B95.6 (*Staphylococcus aureus* as the cause of diseases classified to other chapters) and Z06.32 (methicillin-resistant agent) indicating the *Staphylococcus aureus* infection is methicillin resistant. ^b Public hospitals with fewer than 100 beds (VICNISS type-2 hospitals). ^c 1 July 2005 to 30 June 2008. ^d 1 May 2004 to 31 December 2007.

Source: Victorian Department of Health (unpublished VAED data); Victorian Department of Human Services (2008b).

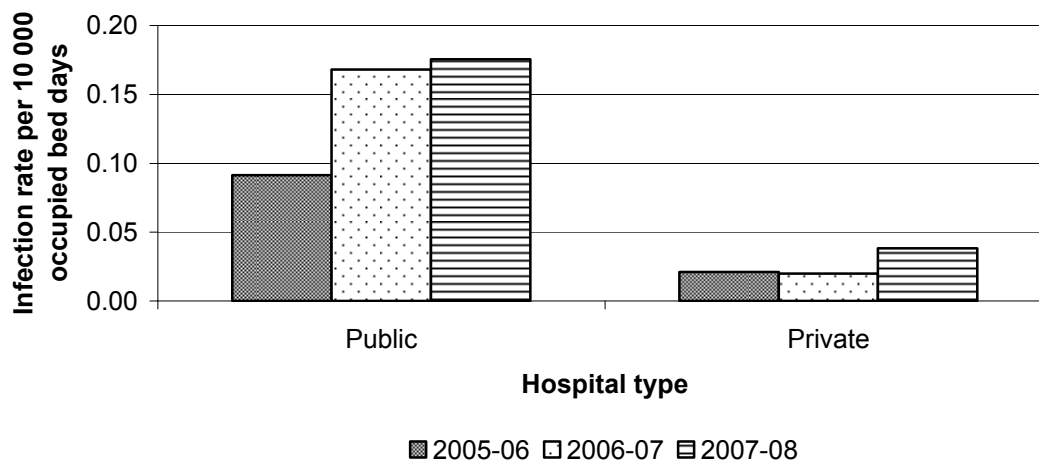
Figure F.1 Hospital-acquired MRSA infections in Victoria by sector, 2005–2008^a



^a Excluding same-day separations. MRSA infections derived from the VAED only include separations that had a diagnosis code indicating a 'C-prefix' infection for B95.6 (*Staphylococcus aureus* as the cause of diseases classified to other chapters) and Z06.32 (methicillin-resistant agent) indicating the *Staphylococcus aureus* infection is methicillin resistant. This excludes *Staphylococcus aureus* infections identified by a combined 'infection site and organism code' specifying both (a) that there is an infection, and (b) the organism is *Staphylococcus aureus*. As a result, the number of MRSA infections may be underestimated.

Source: Victorian Department of Health (unpublished VAED data).

Figure F.2 Hospital-acquired VRE infections in Victoria by sector, 2005–2008^a



^a Excluding same-day separations. VRE infections derived from the VAED only include separations that had a diagnosis code indicating a 'C-prefix' infection for B95.2 (*Streptococcus* group D, as the cause of diseases classified to other chapters) and Z06.41 (vancomycin-resistant agent) indicating the *Enterococci* or Group D *Streptococci* infection is vancomycin resistant. This excludes Group D *Streptococcus* infections identified by a combined 'infection site and organism code' specifying both (a) that there is an infection, and (b) the organism is Group D *Streptococcus*. As a result, the number of VRE infections may be underestimated. There were no VRE infections in any rural private hospitals between 2005-06 and 2007-08.

Source: Victorian Department of Health (unpublished VAED data).

Table F.4 Hospital-acquired MRSA infections in Victoria by region and ICU status, 2005-06 to 2007-08

	Public		Private	
	Metropolitan	Rural	Metropolitan	Rural
No. of MRSA infections ^a	523	159	154	16
No. of ICU MRSA infections ^b	184	38	53	4
Acute occupied bed days ^c	7 979 017	3 262 177	3 907 202	592 865
Infection rate (per 10 000 acute occupied bed days)	0.66	0.49	0.39	0.27
ICU infection rate (per 10 000 acute occupied bed days) ^d	0.23	0.12	0.14	0.07

^a Excluding same-day separations. MRSA infections derived from the VAED only include separations that had a diagnosis code indicating a 'C-prefix' infection for B95.6 (*Staphylococcus aureus* as the cause of diseases classified to other chapters) and Z06.32 (Methicillin-resistant agent) indicating the *Staphylococcus aureus* infection is methicillin resistant. This excludes *Staphylococcus aureus* infections identified by a combined 'infection site and organism code' specifying both (a) that there is an infection, and (b) the organism is *Staphylococcus aureus*. As a result, the number of MRSA infections may be underestimated. ^b This includes all patients who had hospital acquired MRSA infections and spent time in an ICU. ^c Excludes same-day separations. ^d Separations where the patient spent at least part of the episode in an ICU.

Source: Victorian Department of Health (unpublished VAED data).

Table F.5 Hospital-acquired VRE infections in Victoria by region and ICU status, 2005-06 to 2007-08

	<i>Public</i>		<i>Private</i>	
	<i>Metropolitan</i>	<i>Rural</i>	<i>Metropolitan</i>	<i>Rural</i>
No. of VRE infections ^a	155	8	12	–
No. of ICU VRE infections ^b	65	2	6	–
Acute occupied bed days ^c	7 979 017	3 262 177	3 907 202	592 865
Infection rate (per 10 000 acute occupied bed days)	0.19	0.02	0.03	–
ICU infection rate (per 10 000 acute occupied bed days) ^d	0.08	0.01	0.02	–

^a Excluding same-day separations. VRE infections derived from the VAED only include separations that had a diagnosis code indicating a 'C-prefix' infection for B95.2 (*Streptococcus* group D, as the cause of diseases classified to other chapters) and Z06.41 (Vancomycin-resistant agent) indicating the *Enterococci* or Group D *Streptococci* infection is Vancomycin resistant. This excludes Group D *Streptococcus* infections identified by a combined 'infection site and organism code' specifying both (a) that there is an infection, and (b) the organism is Group D *Streptococcus*. As a result, the number of VRE infections may be underestimated. ^b This includes all patients who had hospital acquired VRE infections and spent time in an ICU. ^c Excludes same-day separations. ^d Separations where the patient spent at least part of the episode in an ICU unit. – Nil or rounded to zero.

Source: Victorian Department of Health (unpublished VAED data).

F.2 Queensland

There are two key sources of infections data in Queensland:

- Health Quality and Complaints Commission (HQCC)
- Centre for Healthcare Related Infection Surveillance and Prevention (CHRISP).

Health Quality and Complaints Commission

The HQCC was established in July 2006 as an independent body to monitor and improve the quality of health services in Queensland, and to manage health complaints. It introduced standards for healthcare providers in July 2007, with a staged approach to implementation (HQCC 2009). Acute hospitals and day surgeries were the first group required to report their compliance with the standards, and first reports were submitted to the HQCC in October 2007. The reporting of infections data began in March 2008.

Hospitals have the option to advise the HQCC that they are unable to provide data, although the HQCC advised the Productivity Commission that this has become less of a problem over time. The HQCC provided this study with unpublished data it had collected on SSIs and SAB BSIs for the six-month period from July to

December 2008. This period has the most complete set of infections data collected by the HQCC to date. The data show that average infection rates were lower in private hospitals (table F.6), but this result needs to be highly qualified. The HQCC cautioned that the data have a number of limitations because:

- the data are not risk adjusted
- the reporting arrangements are designed to enable healthcare providers to measure their own quality improvements over time, rather than compare themselves with other providers
- responsibility for data accuracy rests with reporting healthcare providers, as the HQCC does not have a systematic process to verify all submitted data
- different healthcare providers employ different sampling methods and sizes. These may not have been randomised or be representative of the provider's casemix. The HQCC has published guidance on appropriate sample sizes but these have not always been followed. In addition, the Productivity Commission understands that not all providers advise the HQCC about the methodology they use
- providers have employed a mix of medical chart, observational and administrative data audits to obtain the data
- differences in the casemix of individual providers may result in different infection rates. Casemix differences are particularly relevant when comparing the public and private sectors.

Table F.6 Selected hospital-acquired infections in Queensland, July–December 2008^a

Sector	<i>Staphylococcus aureus</i> bacteraemia			Surgical-site infections		
	Reporting hospitals	Infection rate		Reporting hospitals	Infection rate	
		Average ^b	Inter-quartile range ^c		Average ^b	Inter-quartile range ^c
no.	per 100 000 occupied bed days	per 100 000 occupied bed days	no.	per 100 surgical patients	per 100 surgical patients	
Public	103	8.27	0–0.89	37	2.30	0–1.95
Private	53	6.03	0–5.55	36	0.26	0–0.86
Total	156	7.41	0–3.50	73	0.76	0–2.33

^a Excludes same-day facilities. ^b Aggregated average calculated by dividing the total number of infections across all reporting hospitals by the total number of occupied bed days/surgical patients across all reporting hospitals. ^c The range between the first and third quartiles.

Source: HQCC (unpublished data).

Centre for Healthcare Related Infection Surveillance and Prevention

Twenty-four public hospitals in Queensland voluntarily submit surveillance data to CHRISP, which is part of the Queensland Department of Health. Private hospitals do not submit data to CHRISP.

The data aggregated and analysed by CHRISP include inpatient SSIs for 16 indicator procedures, healthcare-associated BSIs including SAB, and significant organisms including MRSA and *Clostridium difficile* (CHRISP 2009; Queensland Health, sub. 27). SAB data are collected for inpatients and non-inpatients, and can be stratified into three hospital types based on the services that they provide. This is a new classification system based on work undertaken by CHRISP that showed a correlation between BSIs and particular services (Tong et al. 2009).

Definitions used by CHRISP are based on the Health Care Associated Infection Surveillance Definitions from the Australian Infection Control Association (AICA) and the ACSQHC. The risk-adjustment method used for SSIs is based on that developed in the United States by the US National Healthcare Safety Network (NHSN) (formerly the US National Nosocomial Infections Surveillance — NNIS). Recent CHRISP data for SSIs are shown in table F.7.

CHRISP provides feedback to individual hospitals in six-monthly reports that compare the hospital's infection rates with statewide control limits. The control limits are based on statewide averages for the relevant hospital type, and the methodology is based on funnel plots (Spiegelhalter 2004).

Table F.7 SSI rates for Queensland public hospitals by surgical procedure, 2004–2008^a

<i>Surgical procedure</i>	<i>Risk category^b</i>					
	<i>0</i>		<i>1</i>		<i>2</i>	
Total hip replacement	0.71	(0.45–1.07)	0.97	(0.58–1.51)	2.80	(1.35–5.09)
Revision total hip replacement	3.10	(1.49–5.62)	3.36	(1.62–6.08)	8.33	(2.29–19.98)
Total knee replacement	0.68	(0.46–0.97)	0.91	(0.6–1.33)	0.61	(0.12–1.77)
Revision total knee replacement	1.52	(0.31–4.38)	2.07	(0.56–5.22)	5.26	(0.6–17.74)
Femoro-popliteal bypass	7.14	(2.91–14.16)	5.88	(3.88–8.50)	8.43	(4.68–13.75)
Elective lower segment caesarean section	0.45	(0.34–0.58)	0.99	(0.71–1.35)	3.61	(0.73–10.2)
Emergency lower segment caesarean section	0.95	(0.80–1.12)	1.38	(1.09–1.73)	1.18	(0.13–4.21)
Mastectomy (simple)	0.69	(0.19–1.76)	1.59	(0.52–3.68)	–	..
Mastectomy (radical)	0.31	(0.00–1.70)	0.60	(0.01–3.29)	–	..
Total abdominal hysterectomy	0.96	(0.61–1.42)	3.04	(2.08–4.29)	4.88	(1.33–12.02)
Cardiac valve replacement	1.05	(0.12–3.75)	3.03	(0.34–10.52)	–	..
CABG with graft site (sternal wound) ^c	1.27	(0.66–2.21)	1.46	(1.15–1.83)	2.82	(2.04–3.79)
CABG with graft site (graft wound) ^c	1.65	(1.36–2.00)	3.40	(2.69–4.24)	–	..
CABG with no separate graft site ^c	0.86	(0.17–2.51)	1.54	(0.17–5.44)	–	..

^a SSI rates are expressed in terms of infections per 100 procedures. ^b Risk categories are based on the NHSN/NNIS risk index for SSIs (detailed in box 6.1). Numbers in parentheses are 95 per cent confidence intervals. ^c CABG refers to coronary artery bypass graft. – Nil or rounded to zero. .. Not applicable.

Source: Queensland Department of Health (unpublished data).

F.3 South Australia

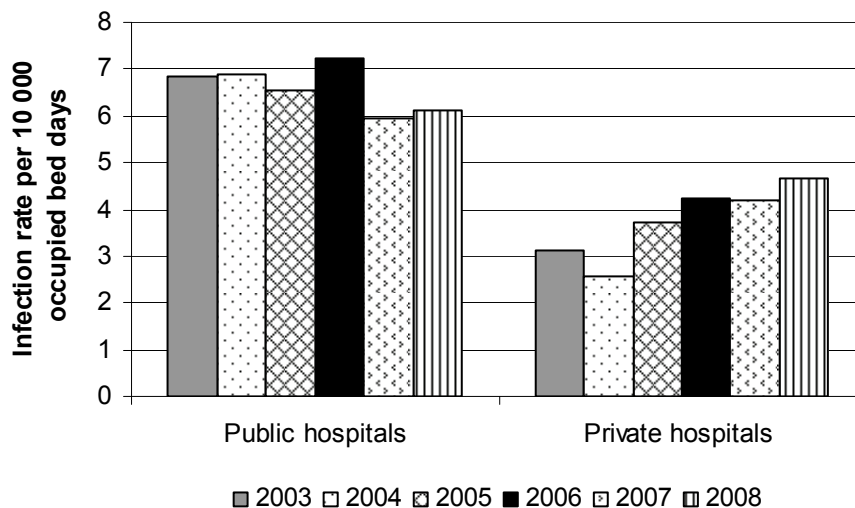
The Infection Control Service (ICS) within the SA Department of Health collects data on BSIs, multi-resistant organisms (MROs) and *Clostridium difficile*. A wide range of MROs are reported, including MRSA and extended spectrum

beta-lactamase producing gram negatives.⁶ South Australia is the only Australian state that conducts statewide surveillance of multiresistant gram-negative bacteria infections (Christiansen et al. 2008). In many cases, the SA infections data can be stratified into different risk groups, such as ICU/non-ICU, specialty and inpatient/non-inpatient (SA Department of Health 2005a, 2005b, 2009a).

Reporting is voluntary and there are currently 17 participating hospitals (eight public and nine private). The Commission understands that there is a high participation rate among metropolitan hospitals, and that they account for the majority of reporting establishments. Participating hospitals receive regular reports from the ICS with statewide aggregates and the participant's data. The ICS also releases public reports, but these do not disaggregate data between public and private hospitals.

The Commission obtained ICS data for eight public hospitals and eight private hospitals, disaggregated by sector. These data show that from 2003 to 2008, rates of hospital-acquired BSI were lower in private hospitals than in public hospitals (figure F.3).

Figure F.3 Hospital-acquired BSIs in South Australia by sector, 2003–2008

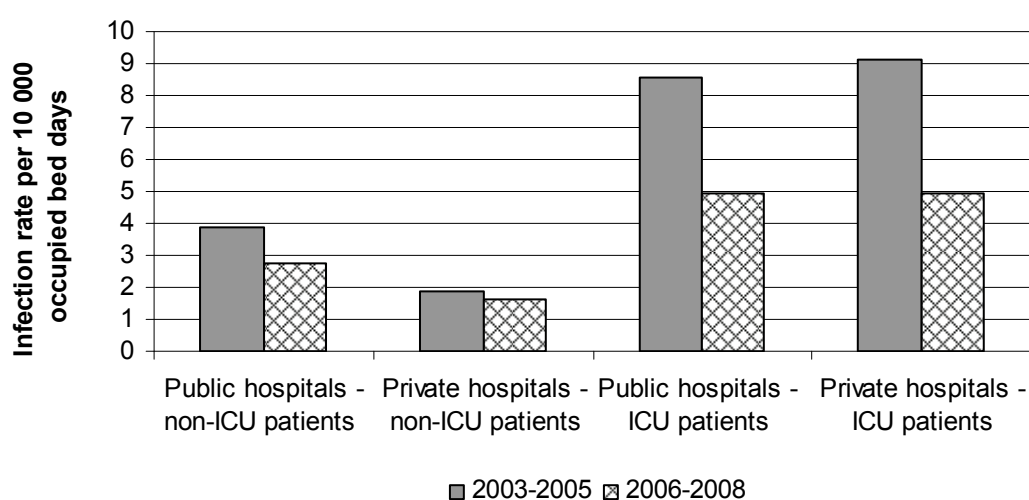


Source: SA Department of Health (unpublished data).

⁶ Targeted MROs are MRSA, VRE, *Staphylococcus aureus* with reduced susceptibility to vancomycin (VISA), *Staphylococcus aureus* resistant to vancomycin (VRSA), multi-resistant *Pseudomonas aeruginosa*, extended spectrum beta-lactamase producers (ESBL, including gram-negative organisms, carbapenem-resistant *Enterobacteriaceae* and *Acinetobacter* species. MRO definitions are based on those developed by the AICA (SA Department of Health 2005a).

Likewise, MRSA infection rates for patients who were not admitted to an ICU were lower in private hospitals (figure F.4). MRSA infection rates for patients admitted to an ICU were marginally higher in private hospitals in 2003–05 but were similar in both public and private hospitals over the period 2006–08. However, caution should be exercised in interpreting infection rates for patients admitted to an ICU, as the small number of affected patients means that one additional case can cause a significant change in infection rates.

Figure F.4 Hospital-acquired MRSA infections in South Australia by sector and ICU status, 2003–2008



Source: SA Department of Health (unpublished data).

F.4 Western Australia

In 2005, public and private hospitals in Western Australia began reporting infection rates on a voluntary basis to the Healthcare Infection Surveillance Western Australia (HISWA) program. The HISWA program is managed by the Health Care Associated Infection Unit (HCAIU) within the WA Department of Health. Reporting of some of the HISWA infection indicators was made mandatory in 2007 for public hospitals and private hospitals that provide services for public patients. Private hospitals treating only private patients continue to report data voluntarily.

The HISWA program currently collects data on six different infection rates:

1. healthcare-associated MRSA
2. SSIs following elective hip and knee arthroplasty (surgical joint repair)
3. healthcare-associated SAB

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4. central-line-associated BSIs in an ICU
 5. central-line-associated BSIs in haematology/oncology/outpatient intravenous therapy units
 6. haemodialysis-associated BSIs from access devices.

All but one of these indicators is, or will soon be, mandatory for public hospitals and private hospitals that provide services for public patients (WA Department of Health 2009a). The one exception is central-line-associated BSIs in haematology/oncology/outpatient intravenous therapy units. Data on healthcare-associated *Clostridium difficile* will be collected from January 2010.

The Australian Health Insurance Association (AHIA) claimed that the WA mandatory reporting regime had helped to keep MRSA infection rates relatively low:

It is the strongly held view of the AHIA that it is not coincidental that the lowest rate of MRSA infection in Australia is in Western Australia, which is the only state or territory where notification of MRSA infection is mandatory. (sub. 18, p. 6)

The HISWA indicators are based on nationally- and internationally-recommended surveillance definitions. Results are collated and analysed by the HCAIU. Individual hospital and aggregate reports are generated quarterly and more detailed reports are published annually. Infection rates are risk adjusted where possible to better reflect differences in clinical casemix between participating hospitals (WA Department of Health 2008). Nevertheless, the HCAIU stressed that:

... the prime purpose of the HISWA surveillance program is to support internal improvement, rather than performance comparison. This implies an emphasis on collecting data over time to monitor progress, and internal validity within a facility. (sub. 38, p. 3)

The published HCAIU reports have only a limited amount of information about the relative performance of public and private hospitals. That information suggests that, after using the NHSN/NNIS risk index to stratify data by risk groups, private hospitals had lower SSI rates for hip and knee arthroplasty than public hospitals during the period 2002–08 (WA Department of Health 2009b). The difference was considered to be statistically significant, but the HCAIU cautioned that the NHSN/NNIS risk index may not control for all risk differences between hospitals:

The reasons behind this variation may relate to a variety of practices and procedures that are in place at these hospitals; however there is also likely to be differences in the prevalence of risk factors for SSI such as smoking, obesity, diabetes and other co-morbidities between institutions that are not incorporated into the risk adjustment. Comparison therefore must be made carefully, and many factors will not necessarily be modifiable by the hospitals involved. (WA Department of Health 2009b, p. 17)

The published data also suggest that WA private hospitals tend to have lower rates of hospital-acquired MRSA infections than public hospitals.⁷ However, the difference may be largely due to private hospitals tending to have lower-risk procedures, treatments and patients.

The Commission obtained unpublished data from the HCAIU on SAB BSIs, MRSA, and SSIs following elective hip and knee arthroplasty. The data show that private hospitals had lower rates of hospital-acquired MRSA infections than public hospitals from 2006 to 2008 (table F.8). However, this difference was only statistically significant in 2007. Furthermore, the HCAIU cautioned that:

This [MRSA infection] rate will depend on both the risk of a healthcare-associated infection (which varies according to casemix as well as aspects of the quality of care provided); and the risk of that infection being due to MRSA (which reflects endemic MRSA rates in the patient population and the risk of acquiring MRSA in the hospital). Comparison must therefore be made considering differences in case mix and MRSA rates in the admitted patient population before associating differences in rates to variation in the quality of care provided. Public hospitals may have both a more complex patient case mix with an inherently higher risk of developing an HAI [hospital-acquired infection] and a higher prevalence of MRSA carriage on admission to hospital. (sub. 38, p. 5)

Table F.8 Hospital-acquired MRSA in Western Australia by sector, 2006–2008^a

	<i>No. of events</i>	<i>Occupied bed days</i>	<i>Infection rate^b</i>
2006			
Public	100	836 463	1.20 (0.98–1.46)
Private	40	482 633	0.83 (0.61–1.13)
Total	140	1 319 096	1.06 (0.90–1.25)
2007			
Public	80	875 396	0.91 (0.73–1.14)
Private	23	508 023	0.45 (0.30–0.68)
Total	103	1 383 419	0.74 (0.61–0.90)
2008			
Public	115	895 890	1.28 (1.07–1.54)
Private	43	521 618	0.82 (0.61–1.11)
Total	158	1 417 508	1.11 (0.95–1.30)

^a Inpatient events only. ^b Infections per 10 000 occupied bed days. Numbers in parentheses are 95 per cent confidence intervals.

⁷ In 2007-08, reporting private hospitals had an MRSA infection rate of 0.68 per 10 000 bed days (95 per cent confidence interval of 0.48–0.95). This was compared to four (public) area health services, which had rates that ranged from 0.19 (0.00–1.19) to 1.26 (0.92–1.71). The only area health service with a lower rate than private hospitals was the Child and Adolescent Health Service, which reported just one MRSA case in 2007-08.

Source: HCAIU (unpublished data).

The unpublished data show that private hospitals also had lower rates of hospital-acquired SAB BSIs than public hospitals (table F.9). However, this difference was only statistically significant in 2008. Furthermore, the HCAIU cautioned that:

The risk of an individual patient acquiring a *Staphylococcus aureus* bacteraemia is related to their underlying medical condition, complexity of care and the invasive procedures they are subject to, as well as the quality of care provided. (sub. 38, p. 5)

Table F.9 Hospital-acquired SAB BSIs in Western Australia by sector, 2007–2008^a

	No. of events	Occupied bed days	Infection rate ^b
2007			
Public	28	875 396	0.32 (0.22–0.47)
Private	7	508 023	0.14 (0.06–0.29)
Total	35	1 383 419	0.25 (0.18–0.35)
2008			
Public	113	895 890	1.26 (1.05–1.52)
Private	35	521 618	0.67 (0.48–0.94)
Total	148	1 417 508	1.04 (0.89–1.23)

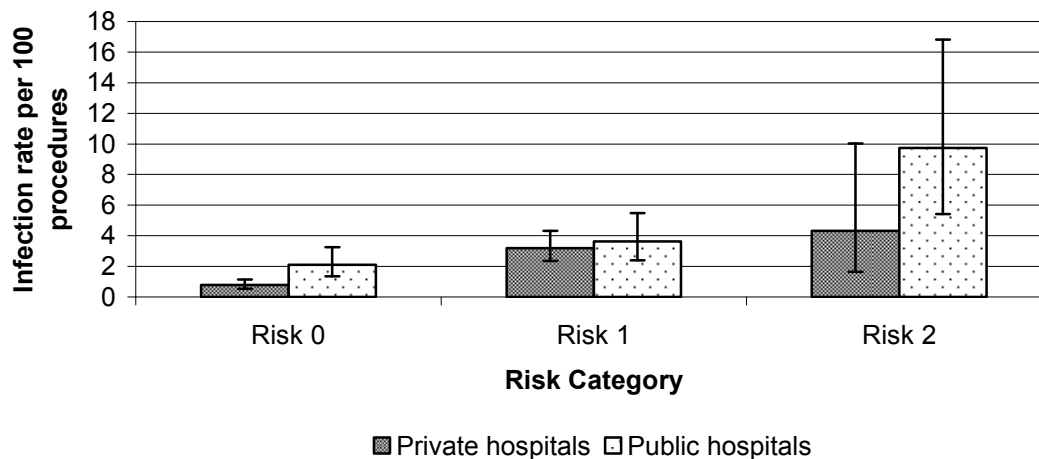
^a Inpatient events only. ^b Infections per 10 000 occupied bed days. Numbers in parentheses are 95 per cent confidence intervals.

Source: HCAIU (unpublished data).

The unpublished data suggest that public hospitals had higher SSI rates across all risk categories for both hip and knee procedures (figures F.5 and F.6). However, this difference was only statistically significant for hip procedures in risk category zero. Furthermore, the HCAIU cautioned that while WA data on SSI rates are risk adjusted using the NHSN/NNIS methodology, this does not control for all risk factors:

SSI rates that are risk-adjusted using NHSN stratification do *not* account for systematic differences in patient, operator and unit characteristics that raise the inherent or underlying SSI risk of public hospitals. They are subject to bias, and while useful, must be interpreted with this understanding. (sub. 38, p. 4)

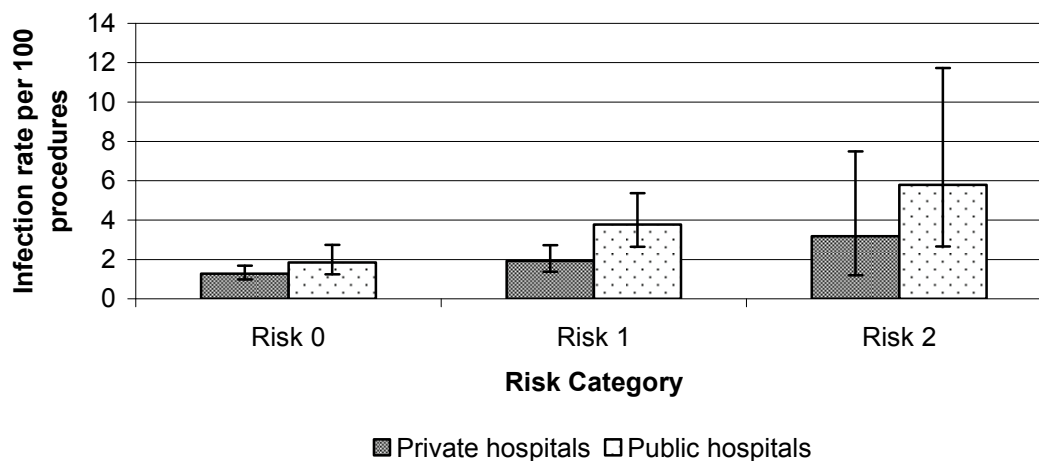
Figure F.5 Hip SSIs in Western Australia by risk category and sector, 2006–2008^a



^a Risk categories are based on the NNIS risk index. The vertical lines for each risk category indicate the 95 per cent confidence interval.

Source: HCAIU (unpublished data).

Figure F.6 Knee SSIs in Western Australia by risk category and sector, 2006–2008^a



^a Risk categories are based on the NNIS risk index. The vertical lines for each risk category indicate the 95 per cent confidence interval.

Source: HCAIU (unpublished data).

F.5 Tasmania

In 2008, the Tasmanian Infection Prevention and Control Unit (TIPCU) was established by the Department of Health and Human Services to manage a surveillance program for hospital-acquired infections. Four infection rates are currently monitored — SAB BSIs, MRSA, *Clostridium difficile* and VRE (TIPCU 2009). The definitions used for these indicators are based on those recommended by the ACSQHC.

VRE has been a notifiable disease in Tasmania since 2000, and SAB BSIs since December 2008. Thus, VRE and SAB reporting is mandatory for both public and private hospitals. Private hospitals have volunteered to also report the MRSA and *Clostridium difficile* indicators along with public hospitals. The Commission understands that data are collected from four public hospitals and five private hospitals.

TIPCU provides confidential reports back to all reporting hospitals. Its first public report was released in March 2009. To date, only data for public hospitals have been published (summarised in table F.10). On the basis of the published data, TIPCU (2009) concluded that Tasmanian acute public hospitals have similar infection rates for MRSA and SAB BSIs as public hospitals in other states. The rate of *Clostridium difficile* in Tasmanian public hospitals was considered to be slightly higher than that reported in other states, but there is limited data with which to make comparisons.

Table F.10 **Rate of hospital-acquired infections in Tasmanian public hospitals by organism, 2005–2008^a**

	2006	2007	2008
<i>Staphylococcus aureus</i> bacteraemia (SAB) ^b	0.92	1.11	1.07
SAB caused by methicillin-resistant <i>Staphylococcus aureus</i> (MRSA) ^b	0.14	0.04	0.21
<i>Clostridium difficile</i> ^c	2.20	1.80	3.20

^a Infection rates are expressed as infections per 10 000 occupied bed days. ^b Based on six months of data for 2008. ^c Based on six months of data for both 2006 and 2008.

Source: TIPCU (2009).

The Commission requested comparative infections data for public and private hospitals but the Tasmanian Department of Health and Human Services was unable to provide such information in time for this report.