Antimicrobial stewardship in Victorian hospitals: a statewide survey to identify current gaps

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Abstract

Objective: To determine antimicrobial stewardship (AMS) activities currently being undertaken at Victorian hospitals, identifying gaps when assessed against the Australian Commission on Safety and Quality in Health Care criteria for effective AMS.

Design, setting and participants: A survey open to all Victorian health services, conducted between January and March 2012.

Main outcome measures: Availability of the endorsed prescribing guidelines, antimicrobial prescribing policies, formularies, approval systems for restricted antimicrobials, procedures for postprescription review, auditing and selective reporting of sensitivities.

Results: Response rates were 96.4% for public health services and 67.7% for private hospitals. Guidelines were available at all public and 88.1% of private hospitals, and 90.6% of public metropolitan, 45.7% of public regional and 21.4% of private hospitals had antimicrobial prescribing policies. Antimicrobial approval systems were used in 93.8% of public metropolitan, 17.3% of public regional and 4.8% of private hospitals. Prescribing audits were conducted by 62.5% of public metropolitan, 35.8% public regional and 52.4% of private hospitals. Nearly all hospitals had selective laboratory reporting of antimicrobial sensitivities. Few hospitals had dedicated funding for AMS personnel.

Conclusions: We identified wide differences between hospital AMS activities. Additional support for AMS is particularly required in the public regional and private hospital sectors, principally in the key areas of policy development, antimicrobial approval systems, prescription review and auditing. Further research is required to develop recommendations for implementation of AMS within the regional and private hospital settings.

The association between antimicrobial resistance and antimicrobial use is long established.[1-3] Recognition of widespread inappropriate prescription of antimicrobials in hospitals has prompted action addressing this important patient safety issue. Antimicrobial stewardship (AMS) aims to improve the quality of care and clinical outcomes of patients requiring treatment or prevention of infection, while reducing adverse events and preventing the emergence of antibiotic resistance in local pathogens.[4] In 2011, the Australian Commission on Safety and Quality in Health Care (ACSQHC) published recommendations for effective AMS programs in Australian hospitals, outlining five essential AMS strategies and four additional activities (Box 1).[5] The new National Safety and Quality Health Service (NSQHS) Standards,[6] which include specific criteria for AMS, have further heightened the sense of urgency around implementing these programs.

AMS typically uses combinations of strategies, including implementing guidelines, using formularies, restriction policies, audits, education, and encouraging de-escalation of therapy and parenteral-to-oral conversion where appropriate.[7,8] Successful AMS requires multidisciplinary and interdepartmental collaboration.[9,10] A 2008 snapshot survey of AMS activities in Australian hospitals[11] found that there was a variety of AMS programs implemented with varying degrees of success. This was a modest survey with only 80 respondents, mainly from metropolitan public hospitals, but it provided generalised insight into some programs. The aim of the current study was to perform a more in-depth survey, to describe AMS activities currently being undertaken by Victorian hospitals, and to elucidate specific gaps when assessed against the ACSQHC criteria.

Methods

The survey was developed by the Quality, Safety and Patient Experience Branch of the Victorian Department of Health (Vic DoH), together with the Melbourne Health AMS Research Group, consisting of infectious diseases physicians, clinical microbiologists and pharmacists. The questions were developed with reference to the ACSQHC recommendations, following a review of the literature and in conjunction with discussion among the investigators, who have extensive experience in AMS implementation. Included was information on hospital demographics, AMS activities, governance structure, resources, workforce capacity and other cultural and organisational barriers. Usability testing for the survey was conducted at six pilot hospitals, selected to ensure generalisability. Positive feedback was received regarding the ease of use and time taken to complete the survey, therefore no changes were made.

A letter was sent to the chief executives of 84 public health services and 63 private hospitals by the Vic DoH in November 2011, requesting a qualified staff member to respond to the survey. A link to the secure online survey, hosted by the Vic DoH, was sent via e-mail to all nominees in January 2012, and data submission closed on 31 March 2012. All Victorian public and private hospitals offering overnight stays to patients were included in the study, with mental health facilities excluded due to low levels of antimicrobial prescribing. The survey consisted of 38 questions, which were mainly close-ended, some with the option of a free-text response, and two comment-style questions at the end relating to current AMS program improvements and barriers. All questions were compulsory and completed by all respondents. As this was a self-reported

survey, in order to improve the accuracy of the data, answers were reviewed for inconsistencies; if inconsistencies were perceived to be present, a researcher would call to seek clarification. Data were then sorted into three groups: public metropolitan, public regional and private hospitals, according to the Australian Institute of Health and Welfare remoteness classification,[12] allowing the determination of possible gaps across different sectors and locations. Results were reported descriptively and no statistical analysis was performed.

As the survey was a low-risk audit and quality assurance activity, ethics approval was not required. The Vic DoH Quality, Safety and Patient Experience Branch was involved throughout the survey development, data collection and analysis. Hospital data was de-identified before reporting and involvement in the survey was voluntary.

Results

The response rate for public hospitals was 96.4% (81 of 84 eligible health service networks covering 113 sites) and 67.7% for private hospitals (42 of 62 hospitals). The overall response rate was 84.2% (123 of 146 health services). The private hospital non-respondents did not differ systematically from respondents in geographical location, classification, co-location with a public hospital or the presence of an intensive care unit. Data on participating hospital characteristics are presented in Box 2.

Responses directly related to the ACSQHC five essential AMS strategies[5] are shown in Box 3. The consensus guidelines for prescribing in Australia, *Therapeutic guidelines: antibiotic*,[13] were readily accessible in almost all Victorian hospitals, although endorsement of their use was lacking in hospital antimicrobial prescribing policies, particularly in public regional and private hospitals, and few hospitals had a dedicated AMS committee. Most public metropolitan hospitals had an antimicrobial formulary in place that included restrictions on broad-spectrum antimicrobials, compared with few public regional and private hospitals. Post-prescription review occurred in only half the hospitals surveyed. Only 5.2% of hospitals had a dedicated antimicrobial management team (a multidisciplinary team involving at least one doctor and one pharmacist or nurse) in place. Performance monitoring through regular antimicrobial audits and providing feedback to prescribers was carried out by less than half the hospitals surveyed. A very high proportion of hospitals reported receiving selective antimicrobial susceptibility results from the microbiology laboratory.

Responses to supplementary AMS strategies recommended by the ACSQHC[5] and the governance structure for AMS programs are presented in Box 4. Data on point-of-care interventions were not included in the analysis, as these questions were answered poorly, due to ambiguity with interpreting the word "regularly". Most public metropolitan health services provided staff education on antimicrobial prescribing, compared with very few regional public hospitals and only some private hospitals, with senior medical staff the least likely to receive education. Electronic decision support systems were available in some metropolitan public hospitals, and antibiograms were more commonly available in the private hospital setting.

Perceived barriers to the implementation of AMS programs are outlined in Box 5. Responses were selected from a list of prepared options compiled by the investigators, and respondents could choose multiple options if desired.

1 Effective antimicrobial stewardship[5]

Five essential strategies

- Implementing clinical guidelines that are consistent with the latest version of *Therapeutic guidelines: antibiotic*,[13] and which take into account local microbiology and antimicrobial susceptibility patterns.
- Establishing formulary restriction and approval systems that include restricting broad-spectrum and later-generation antimicrobials to patients in whom their use is clinically justified.
- Reviewing antimicrobial prescribing with intervention and direct feedback to the prescriber — this should, at a minimum, include intensive care unit patients.
- Monitoring performance of antimicrobial prescribing by collecting and reporting unit- or ward-specific use data, auditing antimicrobial use and using quality use of medicines indicators.
- Ensuring the clinical microbiology laboratory uses selective reporting of susceptibility testing results that is consistent with hospital antimicrobial treatment guidelines.

Activities that may be undertaken depending on local priorities and available resources

- Educating prescribers, pharmacists and nurses about good antimicrobial prescribing practice and antimicrobial resistance.
- Using point-of-care interventions, including streamlining or de-escalation of therapy, dose optimisation or parenteral-to-oral conversion.
- Using information technology such as electronic prescribing with clinical decision support or online approval systems.
- Annually publishing facility-specific antimicrobial susceptibility data. ◆

Discussion

With a public hospital response rate of 96.4%, these results may be regarded as census data for the sector, while the private hospital response rate (67.7%) can be regarded as representative data. However, with an overall response rate of 84.2% of eligible Victorian hospitals, this survey provides valuable insight into current AMS activities and highlights key areas for improvement when compared with the ACSQHC AMS strategies.

All health services are required to comply with the NSQHS accreditation standards effective from 1 January 2013, and the role of AMS is clearly outlined in Standard 3.14.[6] At the time of this survey, hospitals

2 Characteristics of participating hospitals

Hospitals, by location

	No. (%)		
Location	Public	Private	Total
Metropolitan	32 (28.3%)	28 (66.7%)	60 (38.7%)
Regional	81 (71.7%)	14 (33.3%)	95 (61.3%)
Total	113	42	155

Public hospitals (n = 113), by classification[11]

Classification	No. (%)
Principal referral	19 (16.8%)
Large major cities	6 (5.3%)
Specialist women's and children's	2 (1.8%)
Large regional and remote	7 (6.2%)
Medium (group 1)	6 (5.3%)
Medium (group 2)	13 (11.5%)
Small regional acute	22 (19.5%)
Small non-acute	9 (8.0%)
Multipurpose services	9 (8.0%)
Unpeered and other	20 (17.7%)

3 Number of respondents answering "yes" to the presence of elements of the five essential antimicrobial stewardship strategies,[5] by hospital type

Essential strategy	No. of respondents (%)			
	Public metropolitan (*n* = 32)	Public regional (*n* = 81)	Private (*n* = 42)	Total (*n* = 155)
Implementing clinical guidelines that are consistent with the latest version of *Therapeutic guidelines: antibiotic*,[13] and which take into account local microbiology and antimicrobial susceptibility patterns				
Therapeutic guidelines: antibiotic is available (online or paper-based copies or both)*	32 (100%)	81 (100%)	37 (88.1%)	150 (96.8%)
Establishing formulary restriction and approval systems that include restricting broad-spectrum and later-generation antimicrobials to patients in whom their use is clinically justified				
Antibiotic guidelines are promoted or included in hospital antimicrobial policy	29 (90.6%)	37 (45.7%)	9 (21.4%)	75 (48.4%)
A formulary covering antimicrobials is available	30 (93.8%)	31 (38.3%)	7 (16.7%)	68 (43.9%)
The formulary specifies restrictions on the use of broad-spectrum antimicrobials	30 (93.8%)	14 (17.3%)	2 (4.8%)	46 (29.7%)
Reviewing antimicrobial prescribing with intervention and direct feedback to the prescriber — this should, at a minimum, include intensive care unit patients				
Feedback is provided to prescriber following the review of antimicrobial prescription	24 (75.0%)	41 (50.6%)	16 (38.1%)	81 (52.3%)
The hospital has a dedicated antimicrobial management team	7 (21.9%)	0	1 (2.4%)	8 (5.2%)
Monitoring performance of antimicrobial prescribing by collecting and reporting unit- or ward-specific use data, auditing antimicrobial use and using quality use of medicines indicators				
Regular audits of antimicrobial prescribing are conducted	20 (62.5%)	29 (35.8%)	22 (52.4%)	71 (45.8%)
Feedback is provided to prescribers on outcomes of antimicrobial prescribing audits	13 (40.6%)	21 (25.9%)	15 (35.7%)	49 (31.6%)
Ensuring the clinical microbiology laboratory uses selective reporting of susceptibility testing results that is consistent with hospital antimicrobial treatment guidelines				
The microbiology service selectively reports antimicrobial sensitivities†	31 (96.9%)	74 (91.4%)	39 (92.9%)	144 (92.9%)

* All public hospitals had access to the electronic version of *Therapeutic guidelines: antibiotic*,[13] via the Clinicians Health Channel (the Victorian public health online information portal); some private hospitals had electronic access, but 24 (57.1%) had paper-based copies only. † As selective reporting is standard practice in Australian laboratories, it is likely that the remainder also do this, but that the respondent was unaware. ◆

across Victoria are at very different stages of implementing AMS; public metropolitan hospitals are generally well advanced, while there are considerable gaps in public regional and private hospitals.

It is evident that additional work is required in some key areas, such as the implementation and promotion of antimicrobial guidelines through inclusion in hospital policies and staff education programs. There is also a need to establish antimicrobial formularies with restrictions in public regional and private hospitals. These have been shown to improve consumption patterns of broad-spectrum antimicrobials, adverse drug reactions and expenditure,[14] while reducing the local prevalence of some resistant pathogens.[15,16] Further, there is an observed gap in the ability to perform postprescription review and audits, including dissemination of findings to prescribing clinicians, an element considered essential for successful AMS.[17] This shortcoming is possibly due to limited staffing and resources. As lack of training and education in safe and effective antimicrobial use was perceived to be the number one barrier to implementing an AMS program in all hospital sectors, there is a need to extend antimicrobial education, particularly to senior clinicians, and to make education an essential strategy rather than supplementary activity.

Lack of resources, including pharmacy, infectious diseases and clinical microbiology services, was among the top three barriers reported. Lack of leadership and unwillingness of doctors to change their prescribing practices were the other major barriers, confirming previous findings.[11] Building effective workforce capacity requires funding for dedicated AMS staff and activities, and is key to program success and sustainability. Without executive and senior staff support, implementing change into an organisation is challenging. Creating the correct governance structure and developing policies and procedures for the program with support from relevant hospital committees are important change management strategies.[18-20]

These data represent the situation in Victorian health services. However, we expect that other Australian states and territories face similar challenges; there has also been a recent AMS survey of Queensland hospitals with similar findings (Minyon Avent, AMS Pharmacist, Mater Pharmacy Services, Brisbane, personal communication). The introduction of AMS as an accreditation criterion within the new NSQHS standards will play an important role in driving the organisational changes required to meet the challenge of implementing AMS in Australian hospitals. To assist with the gaps and barriers outlined here, the Melbourne Health AMS Research Group is currently undertaking research into developing evidence-based recommendations to guide the national implementation of AMS programs in regional and private hospitals.

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4 Number of respondents answering "yes" to the presence of elements of the recommended supplementary antimicrobial stewardship strategies[5] and other governance issues, by hospital type

Supplementary strategy	No. of respondents (%)			
	Public metropolitan (*n* = 32)	Public regional (*n* = 81)	Private (*n* = 42)	Total (*n* = 155)
Educating prescribers, pharmacists and nurses about good antimicrobial prescribing practice and antimicrobial resistance				
Senior medical staff	12 (37.5%)	7 (8.6%)	2 (4.8%)	21 (13.5%)
Junior medical staff	22 (68.8%)	9 (11.1%)	0	31 (20.0%)
Pharmacy	21 (65.6%)	6 (7.4%)	2 (4.8%)	29 (18.7%)
Nursing	8 (25.0%)	16 (19.8%)	9 (21.4%)	33 (21.3%)
No education provided	5 (15.6%)	59 (72.8%)	29 (69.0%)	93 (60.0%)
Using information technology such as electronic prescribing with clinical decision support or online approval systems				
An electronic clinical decision support or approval system is available	21 (65.6%)	0	0	21 (13.5%)
Annually publishing facility-specific antimicrobial susceptibility data				
Antibiograms are provided by the microbiology service	8 (25.0%)	8 (9.9%)	14 (33.3%)	30 (19.4%)
Other governance issues pertaining to good antimicrobial stewardship				
There is an antimicrobial prescribing policy in place	29 (90.6%)	38 (46.9%)	9 (21.4%)	76 (49.0%)
A dedicated committee to oversee antimicrobial stewardship exists*	22 (68.8%)	11 (13.6%)	6 (14.3%)	39 (25.2%)
Funding is available for antimicrobial stewardship activities				
Pharmacist	10 (31.3%)	1 (1.2%)	0	11 (7.1%)
Medical staff	9 (28.1%)	0	0	9 (5.8%)

* Some regional health services reported that although they did not have a dedicated antimicrobial stewardship committee, other associated committees such as infection control or drug and therapeutics oversee antimicrobial use at their hospital. ◆

5 Perceived barriers to antimicrobial stewardship implementation, by hospital type

Perceived barrier	No. of respondents (%)			
	Public metropolitan (*n* = 32)	Public regional (*n* = 81)	Private (*n* = 42)	Total (*n* = 155)
Lack of training and education in antimicrobial use	23 (71.9%)	47 (58.0%)	26 (61.9%)	96 (61.9%)
Lack of leadership to promote antimicrobial stewardship	11 (34.4%)	33 (40.7%)	19 (45.2%)	63 (40.6%)
Lack of support from senior clinicians	7 (21.9%)	12 (14.8%)	7 (16.7%)	26 (16.8%)
Lack of infectious diseases/clinical microbiology services	15 (46.9%)	40 (49.4%)	18 (42.9%)	73 (47.1%)
Lack of pharmacy resources	18 (56.3%)	58 (71.6%)	14 (33.3%)	90 (58.1%)
Lack of willingness from doctors to change their prescribing practices	12 (37.5%)	23 (28.4%)	18 (42.9%)	53 (34.2%)
Lack of enforcement by hospital management	12 (37.5%)	10 (12.3%)	12 (28.6%)	34 (21.9%)
High level of transient/seconded staff	11 (34.4%)	10 (12.3%)	2 (4.8%)	23 (14.8%)

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