AUSTRALIAN COMMISSION ON SAFETY AND QUALITY IN HEALTH CARE

Specification for a Hospital Cumulative Antibiogram

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DOCUMENT INFORMATION

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Abbreviations and acronyms

AAPP	Australian Association of Pathology Practices
ACSQHC	Australian Commission on Safety and Quality in Health Care
AHPPC	Australian Health Protection Principal Committee
AMR	Antimicrobial resistance
AMRSC	Antimicrobial Resistance Standing Committee
AMS	Antimicrobial stewardship
CDS	Calibrated dichotomous susceptibility
CEC	Clinical Excellence Commission
CHRISP	Centre for Healthcare Related Infection Surveillance and Prevention
CLSI	Clinical and Laboratory Standards Institute
CMS	Clinical microbiology services
CRE	Carbapenem Resistant *Enterobacteriacae*
EDW	Enterprise data warehouse
ESBL	Extended spectrum beta lactamase
EUCAST	European Committee on Antimicrobial Susceptibility Testing
HAI	Healthcare associated infection
MROs	Multi-resistant organisms
MRSA	Methicillin resistant *Staphylococcus aureus*
NCOPP	National Coalition of Public Pathology
NATA	National Association of Testing Authorities
NPAAC	National Pathology Accreditation Advisory Council
NSQHSS	National Safety and Quality Health Service Standards
PAQ	Performance Activity and Quality
SDS	Specialist Diagnostic Services
VICNISS	Victorian Infection Control Nosocomial Infection Surveillance
VISA	Vancomycin intermediate-susceptible *Staphylococcus aureus*
VRSA	Vancomycin resistant *Staphylococcus aureus*
VRE	Vancomycin resistant *Enterococcus*

1 Introduction

1.1 Purpose

The purpose of this document is to describe the specification for a hospital-level, cumulative antibiogram. *National Safety and Quality Health Service Standard* Action 3.14.3 requires hospitals to monitor antimicrobial resistance.

1.2 Recommendation

This specification is proposed as a simple, minimum guide for an antibiotic stewardship group in a small, acute, in-patient healthcare setting. It can be scaled up for larger institutions with more complex stewardship challenges.

Summary antimicrobial susceptibility tables, known as cumulative antibiograms, are used by clinicians to inform empirical antimicrobial choice (Appendix 1). These should be available to clinicians and groups who are responsible for local antimicrobial stewardship (AMS) and antimicrobial prescribing guidelines to inform local empirical therapy recommendations and formulary management.

Tabulated cumulative antibiograms will ideally be produced for hospitals each calendar year. They should summarise susceptibilities of first isolates from individual patients for urine, non-urine (all other body sites) and blood isolates where there are sufficient numbers to provide statistically reliable data.

Specifically it is recommended:

- for non-urine isolates, for each calendar year to report susceptibilities for at least the five most commonly isolated species, regardless of numbers isolated, and to report all isolates where the number tested is greater than 30
- for urine isolates, to report each calendar year at least the three most commonly isolated species with their susceptibilities, regardless of numbers isolated, and to report all isolates where the number tested is greater than 30
- to report susceptibilities for any species isolated more than 30 times in blood cultures

It is also recommended that the frequency of certain specified microorganism-antimicrobial susceptibility combinations (“signal resistances”) be listed annually (Section 3.3 signal resistances).

The cumulative antibiogram can include admitted patient and emergency department isolates, and may include those from outpatients.

1.3 Relationship with CLSI M39-A3 guideline

This specification is based largely on the document *Analysis and Presentation of Cumulative Antimicrobial Susceptibility Test Data; Approved Guideline – Third Edition*, otherwise known as CLSI M39-A3 (http://www.clsi.org).[1] The Clinical and Laboratory Standards Institute (CLSI) is an international, educational organisation based in the United States of America that promotes the development and use of standards and guidelines within the health care community.

CLSI M39-A3 provides:

- guidelines for clinical laboratories and their data analysis software providers for the routine generation and storage of susceptibility data and for the compilation of susceptibility statistics
- suggestions to clinical laboratories for effective use of their cumulative susceptibility statistics

This specification differs from CLSI M39-A3 by recommending:

- combined tables of Gram-positive and Gram-negative bacteria (see CLSI M39-A3 section 7.2)
- primary presentation by specimen site (non-urine, urine, blood) rather than as a supplemental mode (see CLSI M39-A3 section 6.8.4)
- the publication of data when there may be fewer than 30 isolates (see CLSI M39-A3 section 6.7.2)
- using the terminology from the Australian Medicines Handbook [2]
- compliance with Australian Guidelines for the Prevention and Control of Infection in Healthcare [3] for standard precautions, rather than CLSI M39-A3, section 3.

This specification also varies from CLSI M39-A3 in that it does not discourage the presentation of supplemental antibiotic resistance, provided that the number of isolates actually tested against the antibiotic is included, and does not advise presenting overall estimated percentage susceptibility in these circumstances.

The specification recommends readers refer to certain relevant sections of CLSI M39-A3 for technical information:

- advice on laboratory information system design (see CLSI M39-A3, section 5)
- data verification and validation procedures (see CLSI M39-A3, section 6.1, Appendix C)
- the reason for including only the first isolate from each individual for the year (see CLSI M39-A3 section 6.4, Appendix B)
- the limitations of this type of data and their statistical analysis (see CLSI M39-A3, section 9).

2 Context

2.1 Antimicrobial stewardship

According to *Antimicrobial stewardship in Australian hospitals*,[4] the inappropriate use of antimicrobials leads to the emergence of resistant bacteria, an increase in the risk of patient harm from avoidable adverse reactions and interactions with other drugs, infection with multiresistant bacteria or *Clostridium difficile*, and unnecessary costs. Patients with infections due to resistant bacteria experience delayed recovery, treatment failure and even death.

Up to half of antimicrobial regimens prescribed in Australian hospitals are considered inappropriate. [4] An effective approach to improving antimicrobial use in hospitals is an organised antimicrobial management program known as antimicrobial stewardship (AMS). [4]

AMS involves a systematic approach to optimising the use of antimicrobials. It is used by healthcare institutions to reduce inappropriate antimicrobial use, to improve patient outcomes and to reduce the adverse consequences of antimicrobial use (including antimicrobial resistance, toxicity and unnecessary costs).[4]

Effective hospital AMS programs have been shown to decrease antimicrobial use and improve patient care. [5-6] Such programs are essential to local and national efforts to prevent the emergence of antimicrobial resistance and decrease preventable healthcare associated infection.

The development of a standard approach to antimicrobial susceptibility testing and cumulative analysis and reporting of antibiograms requires agreement and implementation by clinical microbiology services to achieve antimicrobial stewardship at a national level.

At a local level, regular analyses of antimicrobial resistance should be provided to groups with responsibility for local antimicrobial guidelines (such as an antimicrobial stewardship committee, drug and therapeutics committee) to inform local empirical therapy recommendations and formulary management.

2.2 AMR surveillance in Australian hospitals

A specification for acute hospital-level cumulative antibiogram is an essential step toward achieving detailed, accurate, efficient, national antimicrobial resistance (AMR) surveillance. National AMR surveillance is essential to effective national antimicrobial stewardship. Dependencies for achieving national surveillance include:

- development of a standard technical specification of a hospital-level cumulative antibiogram for Australian hospitals
- ongoing maintenance and revision of the cumulative antibiogram specification
- development of a business case and costed, high-level design of a national AMR surveillance system. This includes assessment of the capacity, risk and benefit of developing an AMR surveillance capacity.

This specification is the first step of the process towards achieving AMR surveillance.

3 Antibiogram recommendations

3.1 Terminology

Within the specification:

- generic antibiotic names should be used, preferably following the terminology of the *Australian Medicines Handbook* [2]
- the antibiotic-organism combinations reported should be in accordance with those recommendations for treatments in *Therapeutic Guidelines: Antibiotic* [7]
- it is also recommended that the terminology for bacteria follow the terminology of the Royal College of Pathologists of Australasia,[8] although this is at the discretion of the antimicrobial stewardship group who will use the data

3.2 Threshold volumes and statistical considerations

The structure of the antibiogram will be affected by local epidemiology and laboratory practices. In general, however:

- Only initial patient isolates should be used. The use of multiple isolates from the same patient would bias results to reflect the susceptibility data. This does not preclude the separate analysis of sequential patient isolates to determine resistance trends.
- Fewer than 30 isolates of any grouping of bacteria do not provide statistically significant information. When data from fewer than 30 isolates are presented, a comment should be appended to reflect this. In these cases, it is desirable to provide confidence intervals for the point estimate of percentage susceptibility.
- When there are fewer than 30 isolates, an antimicrobial stewardship group may refer to regional, jurisdictional or national data. However, it is still essential that each institutional antimicrobial stewardship group review its own resistance data in this recommended format, rather than depending uncritically on regional, jurisdictional or national data.

3.3 Signal resistances

The occurrence of particular antimicrobial resistances in certain species at any frequency may be critical for determining stewardship policies. These antibiotic-resistant microorganisms are listed at Section 4.2.

If these resistant organisms occur at a frequency too low to appear in either the urinary, non-urinary or blood culture antibiograms, then the numbers that occur could be reported in a text report or as tabulated data (see Appendix 2).

Although this is not strictly part of a cumulative antibiogram, it is necessary to know the numbers of these organisms in order to direct antimicrobial stewardship programs.

It will also be important to report zero occurrences, especially in institutions where these resistant organisms have been present in the past.

The ability to detect these resistances is, to a variable degree, dependent on molecular methods, and whether or not these methods have been applied should be noted in the report.

3.4 Regarding certain classes of antibiotics

The following principles should be considered in the preparation and presentation of the hospital antibiogram:

1. Tetracycline and fluoroquinolone antibiotics should not be administered to children except on specialist advice. This can be emphasised in cumulative antibiograms by means such as a highlighted background colour, different font colour or key. See Tables 1A, 1B, 2A and 2B in Section 4 Antibiogram tables and text.

2. Similarly, it can be indicated that certain antibiotics should be reserved for specific purposes. The publication of susceptibility data for carbapenems and fluoroquinolones does not imply they are first line antibiotics for empiric treatment. In practice in Australia, except for the few indications recommended by *Therapeutic Guidelines: Antibiotic*,[7] these classes of antibiotics should almost never be used as empirical therapy. They should be reserved for infections with organisms with laboratory confirmed resistance to alternative antibiotics or where the patient has a significant allergy to narrower spectrum antibiotics that would otherwise be appropriate.

3. Antimicrobial agents may be included in a test panel which are ineffective for treatment of infections with species that they are tested against. (such as sulphamethoxazole/trimethoprim for *Psedomonas aeruginosa*). In particular certain species may test as apparently susceptible to antimicrobial agents *in vitro* (such as first and second generation cephalosporins and aminoglycosides for *Salmonella* and *Shigella*). These antibiotic-microrganism combinations should not be reported.

4. Structure of the antibiogram

The structure of the antibiogram should be a table format as shown in the example at Figure 1, and in Tables 1B (pg 16) and 2B (pg 19). Colour coding can be used to identify organisms and antibiotics and distinguish between gram positive and gram negative and their susceptibility percentage.

Figure 1 – Example of a cumulative, hospital-level antibiogram

Hospital Urine Antibiogram 2012:% Susceptible (does not include Intermediate Susceptibility).
Please note that where less than 95% of all isolates have been tested susceptibility may be falsely low because of cascade testing.

			Routinely Reported Antibiotics									Restricted or 2nd Line Antibiotics									
Organism Group	No. Strains	%Total	Amoxycillin	Amoxycillin/Clavulanate	Cefalexin	Flucloxacillin	Gentamicin	Gentamicin (High Level)	Nitrofurantoin	Ticarcillin/Clavulanate	Trimethoprim	Amikacin	Ceftazidime	Ceftriaxone	Fosfomycin	Fusidic Acid	Norfloxacin	Meropenem	Quinupristin/dalfopristin	Rifampicin	Vancomycin
All isolates	1794	100																			
Escherichia coli	778	43.4	55	84	90		94		97	77	76	98	100	92	96		90	100			
			778	778	##		729		778	735	##	73	8	##	57		##	60			
Enterococcus spp	343	19.1	89	4	R		R	49	89		R		R	R		R	68		24	15	91
			343	23				342	343								##		302	33	324
Klebsiella spp	172	9.6	R	90	90		93		64	80	86	100		93	100		93	100			
				172	##		158		171	145	##	11		##	8		##	10			
Pseudomonas aeruginosa	145	8.1	R	R	R		93		R	86	R	66	94	R	100		91	80			
							145			145		6	##		3		##	5			
Proteus mirabilis	103	5.7	90	100	100		100		R	100	74		100	100			99				
			103	103	##		90			103	##		4	90			##				
Enterobacter spp	61	3.4	R	R	R		96		42	63	73	100	25	74	66		98	85			
							59		61	61	61	7	4	58	6		61	7			
Citrobacter koseri	32	1.8	R	96	96		100		87	94	96			100			100				
				32	32		30		32	32	32			30			32				
Coagulase negative Staphylococci	31	1.7	11	54		0	0		100		48		R		R		70				100
			31	31		5	13		31		31						31				13
Staphlococcus aureus	28	1.6	10	82		0	83		100		92					100	78			100	100
			28	28		2	6		28		28					6	28			5	5
Citrobacter freundii	23	1.3	R	R	R		61		91	25	56	77	0	52	100		86	87			
							21		23	5	23	9	2	21	6		23	8			
Morganella spp	19	1.1	R	0	0		84		R	100	63	100	100	100	0		94	100			
				19	19		19			1	19	3	1	19	1		19	2			
β haemolytic Streptococci	14	0.8	100						100		71						57				
			14						14		14						14				
Serratia spp	11	0.6	R	R	R		100		18		90			100			100				
							11		11		11			11			11				

	Gram Positive Organism
	Gram Negative Organism
	Restricted Antibiotics
	≥90% of isolates susceptible
	70-90% of isolates susceptible
	<70% of isolates susceptible
	Antibiotic Not recommended to be used in children without specialist advice
R	Intrinsic Resistance is present with this organism-antibiotic combination combination

4.1 Antibiogram tables within the specification

1. Tabulated cumulative antibiograms should be produced for urine isolates, non-urine isolates and if there are more than 30 isolates of a genus, species or other grouping from blood culture for blood isolates as well. Each cumulative antibiogram would consist of data for one calendar year and be published early in the following year.

2. Each cumulative antibiogram table should be annotated with name of the institution that the isolates reported were derived from, the time period over which the isolates were collected and the standard used by the laboratory to determine antibiotic susceptibility. These may include calibrated dichotomous susceptibility (CDS), Clinical and Laboratory Standards Institute (CLSI), European Committee on Antimicrobial Susceptibility Testing (EUCAST). [9] If multiple or non-standardised methods were used, this should be stated.

3. Only antibiotic susceptibility data of all first isolates from samples collected for a clinical purpose should be included, not isolates from surveillance programs.

4. If the 'breakpoint' for any antimicrobial-organism pair has changed since the last publication of a cumulative antibiogram for an institution, then the date the change was implemented could be indicated in a footnote to the table.

5. Only the antibiotic susceptibility data from the first isolate of a bacterial species from each individual each year should be included. Multiples should be eliminated by including only the initial microbial isolate of a particular species recovered from a patient during the time period analysed, regardless of antimicrobial susceptibility profile. Where the analysis is performed on a subset of isolates (for example isolates from urine or blood cultures) 'first isolate' would refer to the first isolate in that particular subset (that is the patient's first urine or blood isolate). If the same microorganism is isolated from urine, a non-urine site or blood from an individual, then the susceptibility data from the first isolate from each site should be included in their respective antibiogram.

6. Only finalised, validated test results are included. Unusual antimicrobial resistances should be verified before inclusion (see CLSI M39A-3 Appendix A).

7. In general, only "percentage susceptible" data should be reported. Exceptions to this are the following species: vancomycin intermediate susceptible *Staphylococcus aureus* (VISA) and percentage penicillin intermediate susceptibility for *Streptococcus pneumoniae* and viridans *Streptococci,* if these species are reported.

8. For each genus, species or other grouping, the number of isolates (the denominator) used in determining the percentage can be noted on the antibiogram report (see Tables 1B, 2B and example antibiograms in Appendix 1).

9. The antibiogram should report antibiotic susceptibilities for the antibiotics in actual clinical use, not the susceptibility to any surrogate antibiotic used in the laboratory for example laboratories using CLSI methods, the antibiogram should report as percentage susceptible to flucloxacillin and not percentage susceptible to cefoxitin for *Staphylococcus aureus*.

10. The antibiogram should only report antibiotic susceptibilities for a microorganism where they are clinically relevant for that microorganism. For example, the antibiogram should not report trimethoprim for *Pseudomonas aeruginosa* or first and second generation cephalosporins and aminoglycosides for *Salmonella* and *Shigella*.

11. For a cumulative antibiogram, the percentage susceptibility for all clinically relevant antibiotics tested on an isolate should be reported. It should not be restricted to susceptibilities to the narrow-spectrum, first-line antibiotics that might be included in routine individual patient reports to clinicians.

12. Laboratories frequently only test susceptibility to second-line, broader spectrum antibiotics when an isolate has tested non-susceptible to antibiotics in a first-line, narrower spectrum panel. This results in a smaller denominator number of isolates tested. Where this occurs, or there is any other systematic cause for a difference in the number of isolates of the same type tested against different antibiotics, this should be annotated and explained in the presentation of the cumulative antibiogram.

13. Susceptibility data from isolates which are most often contaminants or normal flora (such as coagulase negative *Staphylococcus* species*, Corynebacterium* species and viridans *Streptococcus* species) is discouraged. Ordinarily these would not be included in a cumulative antibiogram even if there are more than 30 isolates. However, for particular circumstances (such as when a hospital having a neonatal intensive care unit with 30 or more individual blood isolates of coagulase negative *Staphylococcus* species in a year) these data may be included at the discretion of the microbiology laboratory and the antibiotic stewardship group. In this circumstance it is recommended that the data be presented by species and not accumulated into genus.

14. When the antibiotic data from less than 30 isolates is presented, it is recommended it be annotated with the advice that these results may not have attained a statistically significant measure of susceptibility in that microbial population.

15. With subsequent antibiograms, graphs and charts for trends that are monitored from year to year are useful to highlight significant changes. Such graphs and charts can be used to highlight significant changes in susceptibility. (See CLSI M39-A3 Appendix F and Appendix H).

4.2 Signal resistances

Certain combinations of microorganism and antibiotic resistance should be reported separately if the microorganism occurs at a frequency too low (less than 30) to appear in either the urinary, non-urinary or blood culture antibiograms. The numbers that occur can be listed either in a separate table (see Appendix 2) or as text appended to the cumulative antibiograms for urine and non-urine isolates. Zero occurrences should also be reported.

Signal Resistances are:

- vancomycin resistant *Enterococci* (VRE)
- methicillin resistant *Staphylococcus aureus* (MRSA)
- vancomycin intermediate and vancomycin resistant *Staphylococcus aureus* (VISA, VRSA). Note that the method used for identifying VRSAs should be reported

- carbapenem resistant *Enterobacteriaceae* (CRE)[10] and other plasmid mediated carbapenamase producing gram negatives (such as *Acinetobacter* spp and *Pseudomonas aeruginosa*)
- *Streptococcus pneumoniae* with a penicillin MIC ≥0.06mg/L. These should be categorised as I and R (MIC>2mg/L) making reference in the commentary to the fact that breakpoints for meningitis differ
- *Enterobacteriaceae* resistant to third or later generation cephalosporins. Where the genetic mechanism for this resistance has been phenotypically confirmed determined (such as with extended spectrum beta-lactamase (ESBL)), this should be reported

4.3 Specification for non-urine isolates

1. **Required**: For each calendar year the antibiogram should report susceptibilities for at least the five most commonly isolated species, regardless of numbers isolated, and to report all isolates where the number tested is greater than 30

2. **Desirable**: If there are less than 30 isolates of any of the five most commonly isolated species, then accumulated antibiotic susceptibility data should be reported. This can be done first by genus, then by grouping *Enterobacteriaceae* into groups that do or do not usually carry inducible or derepressed chromosomal β-lactamases. Refer to the *Manual of Clinical Microbiology, 10th Edition.*[11]

3. **Note**: It is important not to combine data from *Staphylococcus aureus* with data from coagulase negative *Staphylococcus* species.

Table 1A – Recommended antibiotics to report for non-urinary isolates

Organism	Total nos. of isolates most to least	Antibiotics: Usually unrestricted: Ampicillin / Penicillin	Amoxycillin+clavulanate	Cephalothin/cefazolin/cephalexin	Clindamycin / Erythromycin	Flucloxacillin	Gentamicin / Aminoglycoside	Ticarcillin+clavulanate / Piperacillin+tazobactam	Trimethoprim+sulfamethoxazole	Usually more restricted: Amikacin	Carbapenem (eg Meropenem)	Cefepime	Ceftazidime	Ceftriaxone	Ciprofloxacin / Norfloxacin	Fusidic Acid	Rifampicin	Tetracycline	Vancomycin
Staphylococcus aureus - ALL	eg 200																		
eg Methicillin sensitive S. aureus	eg 160	✓	O	✓	O	✓	O	O	O				R		O	O	O	O	O
eg Methicillin resistant S. aureus	eg 40	✓	O	✓	✓	✓	✓	O	✓				R		✓	✓	✓	✓	✓
Streptococcal species eg Streptococcus pyogenes	eg 100	✓	O	✓	✓	O	R	O	O	R	O			✓		R		O	✓
Pseudomonas aeruginosa	eg 60	R	R	R	R	R	✓	✓	R	O	✓	O	✓	R	✓	R	R	R	R
Enterobacteriaceae isolates eg Escherichia coli	eg 40	✓	✓	✓	R		✓	✓	✓	O	O	O	O	✓	✓	R	R	O	R
Enterococcus species eg E. faecalis	eg 30	✓	✓	R	R		R	O	O	R	O	R	R	R	O	O	O	O	✓

KEY	
O	Optional antibiotics to report in Antibiogram report
	Antibiotics that are not usually reported against this organism
R	Organism has intrinsic Resistance to this antibiotic
R*	Exception of high level aminoglycoside use with a penicillin: synergistic
✓	Percentage susceptibility given in each 'ticked' box
Suggested color scheme for susceptibility ranges in less-restricted antibiotic group	
>90% of isolates sensitive	green shading
70-89% of isolates sensitive	yellow shading
<70% of isolates sensitive	red shading
Antibiotics usually restricted	stippled shading
Antibiotic not recommended to be used in children without specialist advice	
The Antibiogram report requires that the percentage susceptibility is given for each ticked box with denominator numbers (ie nos. tested)	

Table 1B – Example of a hospital cumulative antibiogram for non-urinary isolates

Hospital Non - Urine Antibiogram 2012: % Susceptible (does not include Intermediate Susceptibility).
Please note that where less than 95% of all isolates have been tested susceptibility may be falsely low because of cascade testing.

			Routinely Reported Antibiotics													Restricted or 2nd Line Antibiotics											
Organism Group	Total No. of Strains	% of Total	Amoxycillin	Amoxycillin/Clavulanate	Cefazolin	Cephalothin	Clindamycin	Erythromycin/Clarithromycin	Flucloxacillin	Gentamicin	Gentamicin (High Level)	Penicillin	Ticarcillin/Clavulanate	Sulphamethoxazole/Trimethoprim	Tetracycline	Amikacin	Cefepime	Ceftazidime	Ceftriaxone	Ciprofloxacin	Fusidic Acid	Levofloxacin/Norfloxacin	Meropenem	Mupirocin	Quinupristin/dalfopristin	Rifampicin	Vancomycin
All isolates	2013	100																									
Staphlococcus aureus	603	30.0	14	83		83	82	80	83	98		14		98	95					86	95			99		82	100
			603	602		603	603	603	603	559		603		603	603					558	560			524		93	564
Pseudomonas aeruginosa	356	17.7	R	R	R	R				94			63	R	R	96	95	94	R	91		100	96				
										356			334			278	322	355		356		7	356				
Coagulase negative Staphylococci	223	11.1	9	38		38	65	47	38	51		9		65	74			R		72							100
			223	221		221	221	223	221	218		223		223	223					216							217
Escherichia spp (e.g E.coli)	171	8.5	42	77	80					93			53	73	91	97	91	92	90	88		84	100				0
			171	171	171					171			158	171	12	149	170	154	171	171		145	171				1
Haemophilus influenzae	124	6.2	71	82				R						66	100				100	100	R		100			100	
			124	122										123	124				12	3			2			2	
viridans Streptococci	57	2.8	97			95	87	75				92		92	75				100								100
			44			49	57	57				57		57	57				1								14
Klebsiella spp	53	2.6	R	88	81					94			83	86	100	97	92	89	84	90		86	100				
				53	53					53			46	53	3	46	53	48	53	53		45	53				
β haemolytic Streptococci	51	2.5	100			100	90	86				100		100	52												100
			51			51	51	51				51		51	51												10
Enterobacter spp	49	2.4	R	R	R					91			48	79		100	85	55	57	97		86	93				
										49			42	49		46	49	47	49	49		46	49				
Enterococcus spp	38	1.9	65	73		R	R	28		100	52	70		R	28		R	R	R						44		81
			38	30				38		1	48	37			38										18		38
Streptococcus pneumoniae	31	1.5				75		64				51		77	80				100			89					100
						8		31				31		31	31				2			29					1
Moraxella catarrhalis	28	1.4		100				100						100	100												
				28				28						28	28												
Serratia spp	25	1.2	R	R	R					100			95	100	100	100	100	95	96	100		100	96				
										25			22	25	1	22	25	24	25	25		22	25				
Stenotrophomonas maltophilia	24	1.2	R	R	R	R				R				95	100		50	R	R	80	R		R				
														24	1		4			5							
Campylobacter spp	23	1.1				R		100													R	91			R		
								1														23					

	Gram Positive Organism
	Gram Negative Organism
	Restricted Antibiotics
	≥90% of isolates susceptible
	70-90% of isolates susceptible
	<70% of isolates susceptible
	Antibiotic Not recommended to be used in children without specialist advice
R	Intrinsic Resistance is present with this organism-antibiotic combination combination

See Appendix 1 for more examples of cumulative antibiograms.

4.4 Specification for urine isolates

1. **Required**: The antibiogram should report all isolates with more than 30 in number or at least the three most commonly isolated species with their susceptibilities, regardless of numbers isolated or all isolates where the number tested is greater than thirty.

2. **Desirable:** if there are less than 30 isolates of any of the three most commonly isolated species, then accumulated antibiotic susceptibility data should be reported. This can be done first by genus, then by grouping *Enterobacteriaceae* into groups that do or do not usually carry inducible or derepressed chromosomal β-lactamases. Refer to the *Manual of Clinical Microbiology, 10th Edition.*[11]

3. **Note**: It is important not to combine data from *Staphylococcus aureus* with data from coagulase negative *Staphylococcus* species.

Table 2A – Recommended antibiotics to report for urine isolates

Organism	Total nos. of isolates tested	Antibiotics: Usually unrestricted: Ampicillin / Penicillin	Amoxycillin+clavulanate	Cephalothin/cefazolin/cephalexin	Clindamycin / Erythromycin	Flucloxacillin	Gentamicin / Aminoglycoside	Nitrofurantoin	Ticarcillin+clavulanate / Piperacillin+tazobactam	Trimethoprim / Trimethoprim+sulfamethoxazole	Usually more restricted: Amikacin	Carbapenem (eg Meropenem)	Cefepime	Ceftazidime	Ceftriaxone	Norfloxacin	Fusidic Acid	Rifampicin	Vancomycin
Enterobacteriaceae isolates																			
eg Escherichia coli	eg 500	✓	✓	✓	R	R	✓	✓	O	✓	O	O	O	O	✓	✓	R	R	R
Enterococcus species																			
eg E. faecalis	eg 200	✓	O	R	R		R*	✓	O	R	R*	O	R	R	R	O	R	O	✓
Pseudomonas aeruginosa	eg 100	R	R	R	R	R	✓		✓	R	O	✓	O	✓	R	✓	R	R	R

KEY	
O	Optional antibiotics to report in Antibiogram report
	Antibiotics are not usually reported against the organism
R	Organism has intrinsic Resistance to this antibiotic
R*	Exception of high level aminoglycoside use with a penicillin: synergistic
✓	Percentage susceptibility given in each 'ticked' box
Suggested color scheme for susceptibility ranges in less-restricted antibiotic group	
>90% of isolates sensitive	green shading
70-89% of isolates sensitive	yellow shading
<70% of isolates sensitive	red shading
Antibiotics usually restricted	stippled shading
Antibiotic not recommended to be used in children without specialist advice	

The Antibiogram report requires that the percentage susceptibility is given for each ticked box with denominator numbers (ie nos. tested)

Table 2B – Example of a hospital cumulative antibiogram for isolates from urine cultures

Hospital Urine Antibiogram 2012:% Susceptible (does not include Intermediate Susceptibility).
Please note that where less than 95% of all isolates have been tested susceptibility may be falsely low because of cascade testing.

			Routinely Reported Antibiotics									Restricted or 2nd Line Antibiotics									
Organism Group	No. Strains	%Total	Amoxycillin	Amoxycillin/Clavulanate	Cefalexin	Flucloxacillin	Gentamicin	Gentamicin (High Level)	Nitrofurantoin	Ticarcillin/Clavulanate	Trimethoprim	Amikacin	Ceftazidime	Ceftriaxone	Fosfomycin	Fusidic Acid	Norfloxacin	Meropenem	Quinupristin/dalfopristin	Rifampicin	Vancomycin
All isolates	1794	100																			
Escherichia coli	778	43.4	55	84	90		94		97	77	76	98	100	92	96		90	100			
			778	778	##		729		778	735	##	73	8	##	57		##	60			
Enterococcus spp	343	19.1	89	4	R		R	49	89		R		R	R		R	68		24	15	91
			343	23				342	343								##		302	33	324
Klebsiella spp	172	9.6	R	90	90		93		64	80	86	100		93	100		93	100			
				172	##		158		171	145	##	11		##	8		##	10			
Pseudomonas aeruginosa	145	8.1	R	R	R		93		R	86	R	66	94	R	100		91	80			
							145			145		6	##		3		##	5			
Proteus mirabilis	103	5.7	90	100	100		100		R	100	74		100	100			99				
			103	103	##		90			103	##		4	90			##				
Enterobacter spp	61	3.4	R	R	R		96		42	63	73	100	25	74	66		98	85			
							59		61	61	61	7	4	58	6		61	7			
Citrobacter koseri	32	1.8	R	96	96		100		87	94	96			100			100				
				32	32		30		32	32	32			30			32				
Coagulase negative Staphylococci	31	1.7	11	54		0	0		100		48		R		R		70				100
			31	31		5	13		31		31						31				13
Staphlococcus aureus	28	1.6	10	82		0	83		100		92					100	78			100	100
			28	28		2	6		28		28					6	28			5	5
Citrobacter freundii	23	1.3	R	R	R		61		91	25	56	77	0	52	100		86	87			
							21		23	5	23	9	2	21	6		23	8			
Morganella spp	19	1.1	R	0	0		84		R	100	63	100	100	100	0		94	100			
				19	19		19			1	19	3	1	19	1		19	2			
β haemolytic Streptococci	14	0.8	100						100		71						57				
			14						14		14						14				
Serratia spp	11	0.6	R	R	R		100		18		90			100			100				
							11		11		11			11			11				

	Gram Positive Organism
	Gram Negative Organism
	Restricted Antibiotics
	≥90% of isolates susceptible
	70-90% of isolates susceptible
	<70% of isolates susceptible
	Antibiotic Not recommended to be used in children without specialist advice
R	Intrinsic Resistance is present with this organism-antibiotic combination combination

Commentary

Tables 1B and 2B are examples of 2012 cumulative antibiograms for a 570 bed acute care private hospital. Isolates are grouped as non-urines and urines. The antibiogram lists organisms in descending organism of frequency. Duplicate isolates for individual patients for the year 2012 have been removed for both urine and non -urine groups.

The antibiograms were derived from susceptibility data using European Committee on Antimicrobial Susceptibility Testing Breakpoint tables for interpretation of MICs and zone diameters Version 2.0, valid from 1 January 2012. EUCAST[9] rules in Antimicrobial Susceptibility testing have been applied.

Antibiotic susceptibility data where only a subset (< 95%) of isolates have been tested for a particular organism group are usually not indicative of the true susceptibility because of cascade testing of only more resistant isolates. Susceptibility data for those isolates where less than 30 were reported are not statistically valid and the percentage susceptibility should be interpreted with caution. These data are provided in the antibiogram so that cumulative data may be summated over a longer time frame and because these organisms (Table 1B non urines: *Enterococcus spp, S.pneumoniae, Moraxella catarrhalis, and Campylobacter spp*; Table 2B urines: *Staphylococcus aureus* and *Citrobacter freundii*) may potentially contain important resistance elements. Some of these are included in the signal resistances tables in Appendix 2.

APPENDIX 1 – Antibiogram examples

This appendix contains examples of antibiograms.

Figure 2 – Example of urine isolates

CUMULATIVE ANTIBIOGRAM

Susceptibility of common urine isolates from the XXX Hospital & Health Service region 2012 for the Antimicrobial Stewardship Team

		Less restricted antibiotics																Restricted Antibiotics									
	No. of isolates	Ampicillin		Amoxicillin / clavulanate		Cefalotin		Tri methoprim		Sulfamethoxazole & tri methoprim		Nitrofurantoin		Gentamicin		Ticarcillin / clavulanate		Piperacillin / tazobactam		Amikacin		Ceftriaxone		Meropenem		Norfloxacin		Vancomycin	
Organism		%S	n	%S	n	%S	n	%S	n	%S	n	%S	n	%S	n	%S	n	%S	n	%S	n	%S	n	%S	n	%S	n	%S	n
Escherichia coli	821	54	821	84	821	87	816	77	821	79	801	96	821	97	821	76	802	92	53	100	803	96	804	100	804	94	806	R	
Klebsiella pneumoniae	133	R		89	133	85	131	84	133	88	130			95	133	88	130	98	118	99	130	88	130	100	130	85	130	R	
Pseudomonas aeruginosa	105	R		R		R		R		R				92	105	60	104	95	97	95	100	R		91	105	90	100	R	
Enterococcus faecalis	80	100	80			R						100	80									R					100	79
Proteus mirabilis	58	93	58	100	58	86	58	90	58	91	58	R		98	58	100	58	100	54	100	58	100	58	100	58	100	58	R	
ESCAPPM group	68	R						79	68	81	67			93	68	75	68	79	62	100	68	81	68	99	68	90	68	R	

<70% of isolates sensitive | 70-89% of isolates sensitive | >90% of isolates sensitive | not tested or not clinically effective | antibiotic not recommended to be used in children without specialist advice

R intrinsic resistance

E.coli ESBL = 2.8% of isolates

K.pneumonia ESBL = 10.5% of isolates

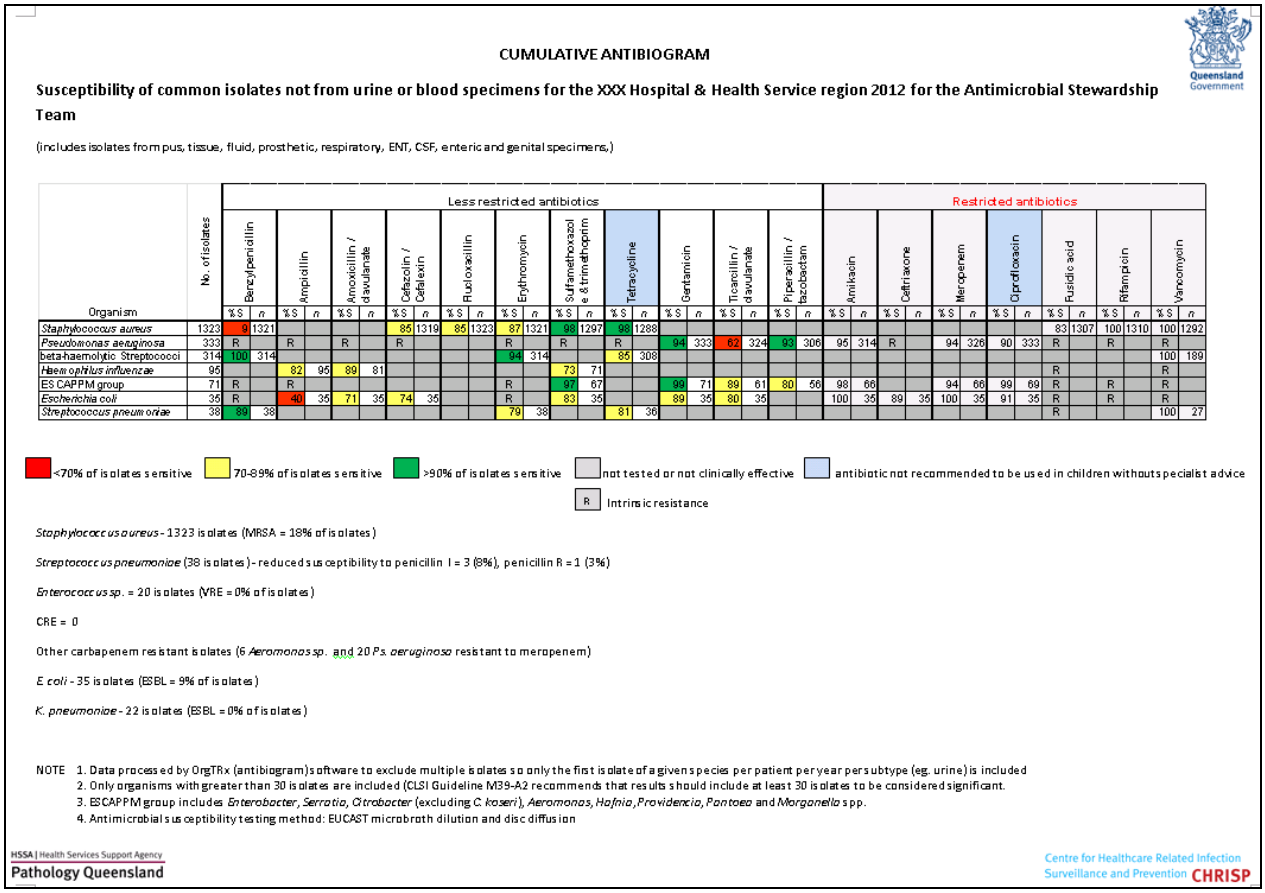
CRE - 1 isolate of *Enterobacter cloacae*

Enterococcus sp - 85 isolates
Enterococcus faecalis - 80 isolates (VRE = 0% of isolates)
Enterococcus faecium - 4 isolates (VRE = 50% of isolates)

Staphylococcus aureus - 27 isolates (MRSA = 26% of isolates)

NOTE
1. Data processed by OrgTRx (antibiogram) software to exclude multiple isolates so only the first isolate of a given species per patient per year per subtype (eg. urine) is included
2. Only organisms with greater than 30 isolates are included (CLSI Guideline M39-A2 recommends that results should include at least 30 isolates to be considered significant.
3. ESCAPPM group includes *Enterobacter*, *Serratia*, *Citrobacter* (excluding *C. koseri*), *Aeromonas*, *Hafnia*, *Providencia*, *Pontoea* and *Morganella* spp.
4. Antimicrobial susceptibility testing method: EUCAST microbroth dilution and disc diffusion

Figure 3 – Example of non - urine isolates



CUMULATIVE ANTIBIOGRAM

Susceptibility of common isolates not from urine or blood specimens for the XXX Hospital & Health Service region 2012 for the Antimicrobial Stewardship Team

(includes isolates from pus, tissue, fluid, prosthetic, respiratory, ENT, CSF, enteric and genital specimens,)

		Less restricted antibiotics																		Restricted antibiotics															
	No. of isolates	Benzylpenicillin		Ampicillin		Amoxicillin / clavulanate		Cefazolin / Cefalexin		Flucloxacillin		Erythromycin		Sulfamethoxazole & trimethoprim		Tetracycline		Gentamicin		Ticarcillin / clavulanate		Piperacillin / tazobactam		Amikacin		Ceftriaxone		Meropenem		Ciprofloxacin		Fusidic acid		Rifampicin		Vancomycin	
Organism		%S	n	%S	n	%S	n	%S	n	%S	n	%S	n	%S	n	%S	n	%S	n	%S	n	%S	n	%S	n	%S	n	%S	n	%S	n	%S	n	%S	n	%S	n
Staphylococcus aureus	1323	9	1321					85	1319	86	1323	87	1321	98	1297	98	1288															83	1307	100	1310	100	1292
Pseudomonas aeruginosa	333	R		R		R		R				R		R		R		94	333	62	324	93	306	95	314	R		94	326	90	333	R		R		R	
beta-haemolytic Streptococci	314	100	314									94	314			86	308																		100	189
Haemophilus influenzae	98			82	95	89	81							73	71																	R				R	
ES CAPPM group	71	R		R								R		97	67			99	71	89	61	80	56	98	66			94	66	99	69	R		R		R	
Escherichia coli	35	R		40	35	71	35	74	35			R		83	35			89	35	80	35			100	35	89	35	100	35	91	35	R		R		R	
Streptococcus pneumoniae	38	89	38									79	38			81	36																		100	27

Staphylococcus aureus - 1323 isolates (MRSA = 18% of isolates)

Streptococcus pneumoniae (38 isolates) - reduced susceptibility to penicillin I = 3 (8%), penicillin R = 1 (3%)

Enterococcus sp. = 20 isolates (VRE = 0% of isolates)

CRE = 0

Other carbapenem resistant isolates (6 *Aeromonas sp.* and 20 *P.s. aeruginosa* resistant to meropenem)

E coli - 35 isolates (ESBL = 9% of isolates)

K. pneumoniae - 22 isolates (ESBL = 0% of isolates)

NOTE 1. Data processed by OrgTRx (antibiogram) software to exclude multiple isolates so only the first isolate of a given species per patient per year per subtype (eg. urine) is included
2. Only organisms with greater than 30 isolates are included (CLSI Guideline M39-A2 recommends that results should include at least 30 isolates to be considered significant.
3. ESCAPPM group includes *Enterobacter, Serratia, Citrobacter* (excluding *C. koseri*), *Aeromonas, Hafnia, Providencia, Pantoea* and *Morganella* spp.
4. Antimicrobial susceptibility testing method: EUCAST microbroth dilution and disc diffusion

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Pathology Queensland

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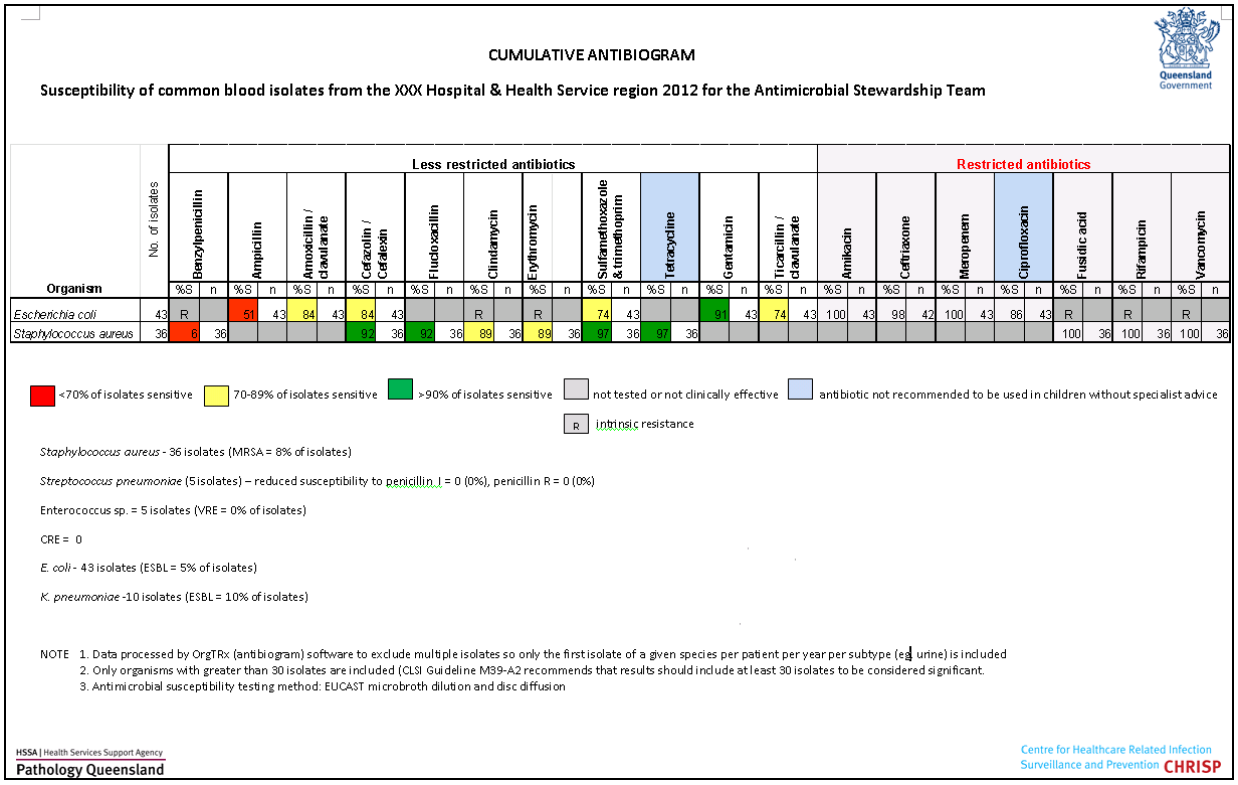
Figure 4 – Example of blood isolates



CUMULATIVE ANTIBIOGRAM

Susceptibility of common blood isolates from the XXX Hospital & Health Service region 2012 for the Antimicrobial Stewardship Team

		Less restricted antibiotics																				Restricted antibiotics															
	No. of isolates	Benzylpenicillin		Ampicillin		Amoxicillin / clavulanate		Cefazolin / Cefalexin		Flucloxacillin		Clindamycin		Erythromycin		Sulfamethoxazole & trimethoprim		Tetracycline		Gentamicin		Ticarcillin / clavulanate		Amikacin		Ceftriaxone		Meropenem		Ciprofloxacin		Fusidic acid		Rifampicin		Vancomycin	
Organism		%S	n	%S	n	%S	n	%S	n	%S	n	%S	n	%S	n	%S	n	%S	n	%S	n	%S	n	%S	n	%S	n	%S	n	%S	n	%S	n	%S	n
Escherichia coli	43	R		51	43	84	43	84	43			R		R		74	43			91	43	74	43	100	43	98	42	100	43	86	43	R		R		R	
Staphylococcus aureus	36	0	36					92	36	92	36	89	36	89	36	97	36	97	36													100	36	100	36	100	36

<70% of isolates sensitive; 70-89% of isolates sensitive; >90% of isolates sensitive; not tested or not clinically effective; antibiotic not recommended to be used in children without specialist advice; R intrinsic resistance

Staphylococcus aureus - 36 isolates (MRSA = 8% of isolates)

Streptococcus pneumoniae (5 isolates) – reduced susceptibility to penicillin I = 0 (0%), penicillin R = 0 (0%)

Enterococcus sp. = 5 isolates (VRE = 0% of isolates)

CRE = 0

E. coli - 43 isolates (ESBL = 5% of isolates)

K. pneumoniae -10 isolates (ESBL = 10% of isolates)

NOTE 1. Data processed by OrgTRx (antibiogram) software to exclude multiple isolates so only the first isolate of a given species per patient per year per subtype (eg urine) is included
2. Only organisms with greater than 30 isolates are included (CLSI Guideline M39-A2 recommends that results should include at least 30 isolates to be considered significant.
3. Antimicrobial susceptibility testing method: EUCAST microbroth dilution and disc diffusion

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APPENDIX 2 – Examples of a tabulated presentation of multi-resistant organisms (Optional)

Signal resistances

Table 3 - Multi resistant organisms isolated from non urines: Hospital X 2012

(Refer to Table 1B)

Extended spectrum beta lactamase producing *Enterobacteriaceae*			
Organism	Total no. tested	No. ESBL positive	% ESBL positive
Escherichia coli	158	10	6.3
Klebsiella spp	46	6	13.0
Enterobacter spp	42	2	4.8
Citrobacter freundii	3	1	33.3
Plasmid mediated Carbapenamase producing *Enterobacteriaceae*			
Organism	Total no. tested	No. CRE positive	% CRE positive
Enterobacter spp	42	1	2.4
Citrobacter spp	3	1	33.3
Vancomycin Resistant *Enterococci* (VRE)			
Organism	Type	No. VRE positive	% VRE positive
Enterococcus spp total		28	
	E. faecalis VRE	0	0.0
	E. faecium VRE*	5	17.2
*all vanB			
Methicillin Resistant *Staphylococcus aureus* (MRSA)			
Organism	Type	No. MRSA positive	% MRSA positive
S. aureus total		574	
	S.aureus (UKMRSA-15)	52	9.1
	S.aureus (non multiresistant)	42	7.3
	S.aureus – multiresistant hospital associated	5	0.9

S.pneumoniae Penicillin Susceptibility**			
S. pneumonia (Oral penicillin V breakpoints)	MIC category	No.	%
	Sensitive ≤ 0.06 mg/L	13	54.2
	Intermediate 0.12 - 1 mg/L	10	41.7
	Resistant ≥ 2 mg/L	1	4.2
** Note differing breakpoints for non meningitis parenteral Rx (R ≥ 8) and meningitis parenteral Rx (R ≥ 0.12)			
Streptococcus spp Viridans Group Penicillin Susceptibility			
Streptococcus spp Viridans Group	MIC category	No.	%
	Sensitive ≤ 0.12 mg/L	47	94.0
	Intermediate 0.25 - 2 mg/L	3	6.0
	Resistant ≥ 4 mg/L	0	0.0

T*able 4 - Multi resistant organisms isolated from urines: Hospital X 2012*

(Refer to Table 2B)

Extended spectrum beta lactamase producing *Enterobacteriaceae*			
Organism	Total no. tested	No. ESBL positive	% ESBL positive
Escherichia coli	786	35	4.5
Klebsiella spp	176	6	3.4
Enterobacter spp	62	1	1.6
Citrobacter freundii	24	6	25.0
Plasmid mediated Carbapenamase producing *Enterobacteriaceae*			
Organism	Total no. tested	No. CRE positive	% CRE positive
Enterobacteriaceae (total non duplicates reported)	1234	0	0.0
Vancomycin Resistant *Entococci* (VRE)			
Organism	Subset	No.	% VRE Positive
Enterococcus spp total		345	
	E.faecalis VRE	0	
	E.faecium VRE*	17	4.9
*all vanB			
Methicillin Resistant S*taphylococcus aureus* (MRSA)			
Organism	Type	No.	% MRSA Positive
S. aureus total		29	
	S.aureus (UKMRSA-15)	3	10.3
	S.aureus (non multiresistant)	1	3.4
	S.aureus – multiresistant hospital associated	0	0

APPENDIX 3 – Guideline development process

The steps undertaken to develop the *Specification* included:

- a literature scan
- expert consultation through groups such as Healthcare Associated Infection (HAI) Advisory Committee of the Commission and the Antimicrobial Resistance Subcommittee (AMRSC) which reports directly to the Australian Health Protection Principal Committee (AHPPC)
- site visits to agencies and laboratories with AMR surveillance roles and systems
- consultation and engagement with peak agencies and expert bodies including public National Coalition of Public Pathology (NCOPP) and private Australian Association of Pathology Practices (AAPP) pathology organisations, and national microbiology, infection control and scientific professional associations
- engagement with members of the Royal Australasian College of Pathologists
- documentation of current examples
- preparation of a discussion paper
- analysis of the Clinical and Laboratory Standards Institute (CLSI) *Guideline for Analysis and Presentation of Cumulative Antimicrobial Susceptibility CLSI M39-A3* (2009)
- consultation and engagement with public and private hospitals and laboratories sectors
- drafting a “strawman” antibiogram specification
- convening an expert round table to review the “strawman” and draft the clinical antibiogram specification
- specification in detail of the clinical antibiogram for hospitals
- expert and jurisdictional and laboratory review
- revision and sign off of clinical specification
- technical specification of national antibiogram
- publication of specification for cycle of comment and review.

APPENDIX 4 – Draft specification hospital-level cumulative antibiogram expert roundtable workshops

On December 11, 2012 the Commission convened an expert roundtable to consider approaches to achieving a cumulative hospital-level antibiogram. The roundtable was represented by members from each jurisdiction, private hospitals, microbiology and laboratory sectors (Table 6). The roundtable considered presentations on national AMS work, and local and international approaches to hospital-level antibiogram reporting. In addition, issues and barriers pertaining to uptake of antibiogram reporting for some sectors was considered.

The roundtable was chaired by Dr Rod Givney. A time-limited working group was established to draft a 'straw man' specification hospital-level cumulative antibiogram, and consider key issues. Members are shown in Table 5.

Table 5 – Members of the Expert Working Group

Name	Title	Representing
Dr Rod Givney	Medical Microbiologist	Hunter New England Local Health District
Ms Louise Davis	Project Officer	CHRISP
Dr Patrick Harris	Clinical Microbiologist	Hunter New England Local Health District
Prof Alison Kesson	Department Head, Diagnostic Division, Infectious Diseases and Microbiology	Children's Hospital, Westmead
Mr Michael Osborne	Program Manager Pathology	Mater Hospital, Brisbane
Dr Catherine Pitman	National Project Manager, Infection Control and Antibiogram Reports	SDS Pathology
Dr Jenny Robson	Department Head Microbiology, Sullivan Nicolaides Pathology	AAPP representative
Dr Morgyn Warner	Consultant Physician, Microbiology and Infectious Diseases	South Australia Health
Ms Cate Quoyle	Senior Project Officer, HAI	ACSQHC
Secretariat		
Ms Siobhan McFadden	Senior Project Officer	ACSQHC

Table 6 – Roundtable participants, December 11 2012

Name	Title	Representing
Dr Rod Givney	Medical Microbiologist	Hunter New England Local Health District
Dr John Andrew	ASM Representative	The Australian Society for Microbiology
Assoc Prof Rob Baird	Director of Pathology	Royal Darwin Hospital
Ms Evette Buono	Antibiotic Stewardship Project Officer	CEC NSW
Dr Alex Chaudhuri	Infectious Diseases Specialist	Greenslopes Private Hospital Brisbane
Dr Louise Cooley	Director of Microbiology and Molecular Microbiology	Royal Hobart Hospital
Dr Victoria D'Abrera	Senior Medical Advisor, Safety and Quality Division	Department of Health WA
Ms Kathryn Daveson	Project Officer	ACT Health
Dr Chantal Ferguson	Principal Medical Officer	Department of Health WA
Dr Tom Gottlieb	Senior Specialist in Microbiology and Infectious Diseases	Concord Hospital
Ms Louise Davis	Project Officer	CHRISP
Dr Patrick Harris	Clinical Microbiologist	Hunter New England Local Health District
Ms Vicki Ibrahim	Director of Pharmacy Services	UnitingCare Health
Dr Peter Kelley	Clinical Microbiologist and Infectious Diseases Physician	Dorevitch Pathology
Prof Alison Kesson	Department Head/Chair, Diagnostic Division, Infectious Diseases and Microbiology	Children's Hospital, Westmead
Dr Tony Korman	Director, Monash Infectious Diseases Director, Microbiology, Southern Health	Monash Health
Dr Kylie McIntosh	Program Manager, Quality Use of Medicines Program	Victoria Department of Health
Prof Graeme Nimmo	Director of Microbiology, Pathology Queensland	Health Services Support Agency, Queensland Health
Mr Michael Osborne	Program Manager Pathology	Mater Hospital Brisbane
Dr Matthew O'Sullivan	Staff Specialist, Infectious Diseases and Microbiology	Sydney West Local Health District
Dr Catherine Pitman	National Project Manager: Infection Control and Antibiogram Reports	SDS Pathology
Dr Jenny Robson	Department Head Microbiology - Sullivan Nicolaides Pathology	AAPP representative

Name	Title	Representing
Dr Sanmarie Schlebusch	Medical Microbiologist	Mater Hospital Brisbane
Ms Jenny Sikorski	CEO	NCOPP
Dr Peter Taylor	Assistant Director Microbiology	South Eastern Area Laboratory Services (SEALS)
Professor John Turnidge	Clinical Director, Microbiology and Infectious Diseases	South Australia Health
Dr Lyn Waring	Medical Microbiologist	Melbourne Pathology
Dr Morgyn Warner	Consultant Physician, Microbiology and Infectious Diseases	South Australia Health
Assoc Prof Rob Baird	Director of Pathology	Royal Darwin Hospital
Ex-officio		
Mr Neville Board	Director, Information Strategy & Safety in eHealth	Australian Commission on Safety and Quality in Health Care (ACSQHC)
Dr Marilyn Cruickshank	Director – HAI and AMS	ACSQHC
Ms Sheila Matete-Owiti (observer)	Senior Project Officer	ACSQHC
Secretariat		
Ms Siobhan McFadden	Senior Project Officer	ACSQHC

On May 14, 2013 the Commission convened a second expert round table to review and comment on the draft specification for a Hospital Cumulative Antibiogram. The roundtable was represented by members from each jurisdiction, private hospitals, microbiology and laboratory sectors. Members provided feedback on the draft and gave examples of antibiograms that have been incorporated into the final version.

The roundtable was chaired by Dr Rod Givney.

Table 7 – Participants, Expert roundtable May 14, 2013

Name	Title	Representing
Dr Rod Givney	Medical Microbiologist	Hunter New England Local Health District
Dr John Andrew	ASM Representative	The Australian Society for Microbiology
Dr Robert Norton	Director of Pathology	The Townsville Hospital, Queensland
Ms Evette Buono	Antibiotic Stewardship Project Officer	CEC NSW
Dr Alex Chaudhuri	Infectious Diseases Specialist	Greenslopes Private Hospital Brisbane
Dr Louise Cooley	Director of Microbiology and Molecular Microbiology	Royal Hobart Hospital
Ms Louise Davis	Project Officer	CHRISP

Name	Title	Representing
Dr Tony Korman	Director, Monash Infectious Diseases Director, Microbiology, Southern Health	Monash Health
Dr Kylie McIntosh	Program Manager, Quality Use of Medicines Program	Victoria Department of Health
Prof Graeme Nimmo	Director of Microbiology, Pathology Queensland	Health Services Support Agency, Queensland Health
Mr Michael Osborne	Program Manager Pathology	Mater Hospital Brisbane
Dr Matthew O'Sullivan	Staff Specialist, Infectious Diseases and Microbiology	Sydney West Local Health District
Dr Catherine Pitman	National Project Manager, Infection Control and Antibiogram Reports	SDS Pathology
Dr Jenny Robson	Department Head Microbiology, Sullivan Nicolaides Pathology	AAPP representative
Dr Sanmarie Schlebusch	Medical Microbiologist	Mater Hospital Brisbane
Dr Peter Taylor	Assistant Director Microbiology	South Eastern Area Laboratory Services (SEALS)
Dr Lyn Waring	Medical Microbiologist	Melbourne Pathology
Dr Jan Bell	Medical Microbiologist	South Australia Health
Philippa Binns	Program Manager	NPS
Ex-officio		
Mr Neville Board	Director, Information Strategy & Safety in eHealth	ACSQHC
Dr Marilyn Cruickshank	Director – HAI and AMS	ACSQHC
Ms Cate Quoyle	Senior Project Officer, HAI	ACSQHC
Secretariat		
Ms Siobhan McFadden	Senior Project Officer	ACSQHC

APPENDIX 5 – References

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