

Antimicrobial Use and Resistance in Australia

# What are antibiograms?

Antibiograms provide an overview of how susceptible specific microorganisms are to different antimicrobials. These microorganisms include bacteria, fungi and viruses. Antibiograms are usually presented as tables (Table1).

	Amikaain		Amovioillin		Coftriayona		Cofforidimo		Cofolothin		Ciproflovooin	
Organism	Amikacin		Amoxiciiiii		Centraxone		Centaziuline		Cerdiotinin		Cipronoxacin	
	%S	n	%S	n	%S	n	%S	n	%S	n	%S	n
Acinetobacter baumannii	90. 2	41	3.1	32	42.9	42	50	38	0	32	70.5	44
Escherichia coli	100	484	54.7	525	99.8	492	100	428	69.4	520	99.0	514

#### Table 1: Example of an extract from an antibiogram

%S = percentage of isolates susceptible to the antimicrobial; n = number of isolates tested for susceptibility. For example, of the 514 *E. coli* isolates tested, 99% were able to be treated by the antimicrobial ciprofloxacin

Antibiograms summarise the cumulative proportions of pathogenic organisms that are susceptible to particular antimicrobials. This provides a profile of the susceptibilities of specific pathogenic bacteria to antimicrobial agents, as tested in routine clinical microbiology practice.

Producing annual cumulative antibiograms is a key strategy for antimicrobial stewardship, providing health service organisations with information on the effectiveness of antimicrobials for different organisms. This informs antimicrobial choices for formularies and antimicrobial prescribing policies for health service organisations.

Producing a series of antibiograms can also be used to track changes in resistance patterns, over time, and inform the development of guidelines at local, regional and national levels.

### How are antibiograms developed?

Antibiograms are based on susceptibility testing data that are routinely collected by microbiology laboratories. For each pathogenic organism that undergoes susceptibility testing, the pattern of susceptibility and resistance is recorded in the laboratory information system. Some, or all, of this information can be reported to the treating clinician to guide therapy. By analysing large amounts of such data, over time, a cumulative antibiogram can be generated for each organism of interest.

Antibiograms summarise the susceptibilities of isolates (organisms islolated from a individual patient sample), but only from the first pathology test from an individual's patient sample, whether it be urine, non-urine or blood patient samples during a hospital visit. Only one kind of sample i.e. blood should be collated for any one antibiogram. This is despite how many patients samples are taken during the hospital stay. This eliminates duplicates by including only the first

isolate of a species/patient/analysis period, irrespective of body site or antimicrobial profile. The pathogens extracted from the patient samples do need to be in sufficient numbers to be considered statistically reliable data.

Standards for analysis and presentation of antibiograms are provided in the reference documents, the Clinical and Laboratory Standards Institute guideline M39-A4 and the *Specification for a Hospital Cumulative Antibiogram 2019*. Tabulated cumulative antibiograms should be produced for hospitals and other institutions annually.

## **Caveats for interpretation**

Individual antibiograms do not detect trends because they are a summary of data accumulated over a fixed interval (usually one year).

The method used for susceptibility testing will influence the susceptibility rates reported in cumulative antibiograms. Users should be aware of the susceptibility testing methods employed by the laboratory to generate the antibiograms, because susceptibility test interpretive criteria, that define susceptibility and resistance (breakpoints), differ between methods, and are also subject to review and change.

Cumulative hospital-wide antibiograms that aggregate data from diverse patient populations and locations can obscure differences in patient populations. Antibiograms stratified by population, age or hospital unit may have more potential to influence antimicrobial selection. Cumulative antibiograms support antimicrobial stewardship (AMS) programs in the development of local antimicrobial prescribing guidelines and formulary management.

A hospital antibiogram is specific to that hospital and its findings should not be applied to another organisation.

Antibiograms are only intended for use by clinicians who have specialised microbiology, infectious diseases or AMS expertise. This expertise is required because of the factors that need to be considered in interpreting antibiograms.

### **Further information**

Specification for a hospital-level cumulative antibiogram 2019: https://www.safetyandquality.gov.au/publications-and-resources/resource-library/specificationhospital-cumulative-antibiogram-2019

Antimicrobial Use and Resistance in Australia (AURA) Surveillance System:

https://www.safetyandquality.gov.au/our-work/antimicrobial-resistance/antimicrobial-use-and-resistance-australia-surveillance-system

Antimicrobial Stewardship resources and links: <u>https://www.safetyandquality.gov.au/our-</u>work/antimicrobial-stewardship/antimicrobial-stewardship-ams-resources-and-links