AURA 2021:

A resource for infection prevention and control teams

Antimicrobial resistance (AMR) is one of the greatest threats to human and animal health, as well as for food safety and agriculture. This has been recognised in *Australia's National Antimicrobial Resistance Strategy – 2020 and Beyond* and internationally, by the World Health Organization. AMR threatens the ability to provide safe healthcare now and in the future.

AMR can develop through the use of antimicrobials or exposure to AMR organisms in the environment. Unlike other medications, antibiotics can affect not only your patient but also other people and the wider community. Antibiotic use inevitably leads to resistance, but overuse of antibiotics has accelerated this process.

Enterobacterales resistance and infection prevention and control

Resistance in gram-negative organisms can arise through transferrable plasmids that carry resistance genes such as extended-spectrum β-lactamases (ESBLs) and carbapenemases (known as carbapenemase-producing *Enterobacterales* [CPE]).

Resistance is clinically important because first-line antibiotic choices for common infections caused by these organisms may be limited, leading to treatment failure and subsequent increases in morbidity and mortality. Increased length of hospital stay and increased healthcare costs are also potential outcomes.

Infection prevention and control strategies are critical as part of a multi-faceted approach to limit the spread of resistant organisms.

What is the AURA Surveillance System and why is it important?

The Antimicrobial Use and Resistance in Australia (AURA) Surveillance System monitors and reports on Australia's antimicrobial use and resistance patterns to inform clinical and public health policy and practice.

The AURA Team at the Commission works with stakeholders to inform action at the local, state and territory, and national levels to prevent and contain the spread of AMR.

The *Fourth Australian report on antimicrobial use and resistance in human health* (AURA 2021) gives the most current and comprehensive picture of AMR in Australia.

Infection prevention and control teams have an important role in containing AMR. This factsheet describes components of the AURA Surveillance System relevant to monitoring AMR and informing infection prevention and control actions and response.
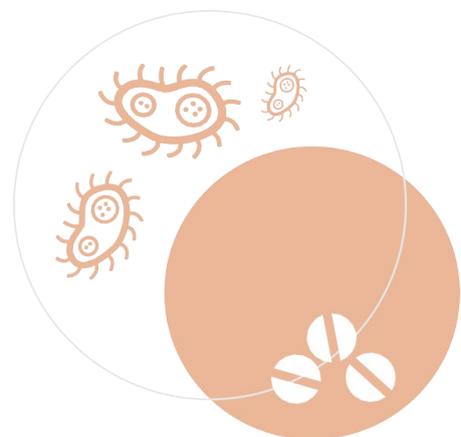
AURA 2021 highlights - *Escherichia coli* and other *Enterobacterales*[1]

E. coli resistance to multiple agents, such as ceftriaxone and fluoroquinolones continues to increase

- Multidrug-resistant *E. coli* from patients with bacteraemia increased from 24.2% in 2015 to 26.0% in 2019
- Ciprofloxacin and ceftriaxone resistance have increased over the last 5 years
- Resistance to fluoroquinolones is more striking in hospital-onset bacteraemia, with a change from 13.7% to 21.3% between 2015 and 2019
- 83% of all *E. coli* bacteraemia episodes were community onset; 11.9% of these isolates were ceftriaxone resistant.

ESBL phenotypes in *E. coli* and *Klebsiella pneumoniae* vary by state and territory

- In 2019, the proportion of ESBL phenotypes found in *E. coli* varied from 7% in Tasmania to 18% in Victoria and the Australian Capital Territory
- There is similar variation in *K. pneumoniae* from 5% in Queensland and Western Australia to 18% Victoria (Figure 1).
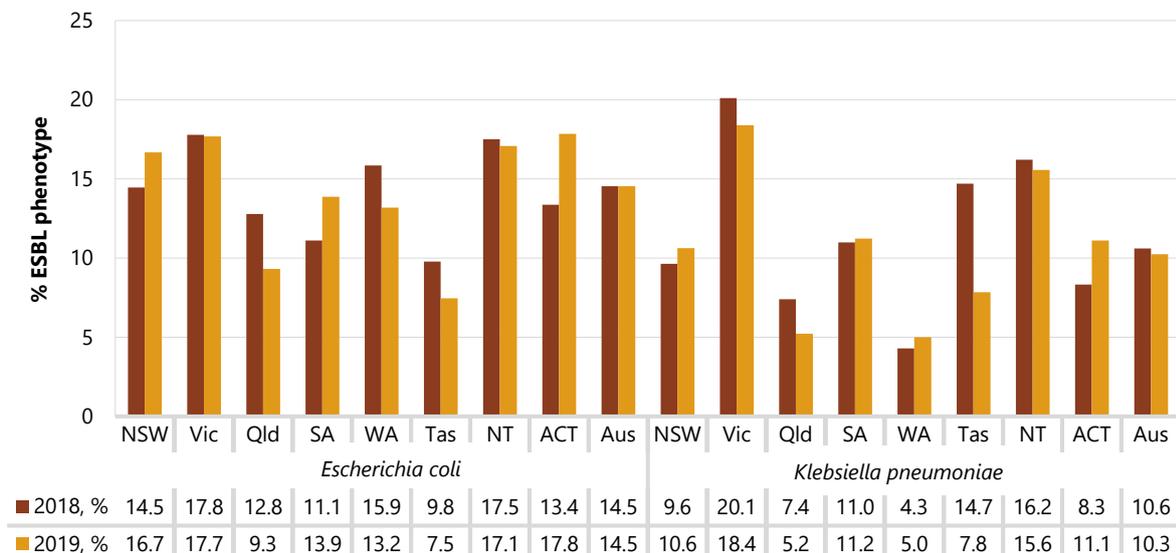
The proportion of CPE reported from screening samples varied in each state and territory

- CARAlert data highlights the difference in screening for CPE between states and territories. The percentage of screening for CPE varied from 60% in South Australia to 39.4% in Western Australia

- The *Recommendations for the control of carbapenemase-producing Enterobacterales: a guide for acute health service organisations* (2021) recommend an appropriate screening strategy is selected, based on the burden and epidemiology of CPE.

CPE is the most common critical antimicrobial resistance seen in bloodstream specimens

- CPE comprised 81% of all critical antimicrobial resistances (CARs) confirmed from blood culture specimens and reported to the National Alert System for Critical Antimicrobial Resistances (CARAlert) in 2019–2020. This high percentage of CPE-positive blood cultures highlights the clinical spectrum of CPE infections compared with other CARs

Figure 1. *Escherichia coli* and *Klebsiella pneumoniae* with extended-spectrum β-lactamase phenotype (blood culture isolates), by state and territory and nationally, 2018–2019

	NSW	Vic	Qld	SA	WA	Tas	NT	ACT	Aus	NSW	Vic	Qld	SA	WA	Tas	NT	ACT	Aus
	Escherichia coli									*Klebsiella pneumoniae*								
2018, %	14.5	17.8	12.8	11.1	15.9	9.8	17.5	13.4	14.5	9.6	20.1	7.4	11.0	4.3	14.7	16.2	8.3	10.6
2019, %	16.7	17.7	9.3	13.9	13.2	7.5	17.1	17.8	14.5	10.6	18.4	5.2	11.2	5.0	7.8	15.6	11.1	10.3

Note: ESBL phenotype refers to strains that are resistant to ceftriaxone and/or ceftazidime (MIC >1 mg/L).

Source: AGAR Sepsis Outcome Reports for 2018 and 2019

---

[1] Data cited in this fact sheet are sourced from Chapters 4 and 5 of AURA 2021 and the 2019 AGAR Sepsis Outcome Programs Report.

How the AURA Surveillance System can be used to inform local policy and practice

Compare local and state or territory and national findings

The proportions of CPE identified in screening samples, ESBL phenotypes or multidrug-resistant *E. coli* infections, are available through the AURA Surveillance System. If there are differences with your local setting, examine whether they can be explained by local screening practices or compliance with environmental cleaning guidance or effectiveness of environmental cleaning or antimicrobial use or a combination of these factors, and decide whether action is needed to prevent and control these infections.

### Identify differences in CPE types between states or territories

Details of CPE types by jurisdiction are available within CARAlert that illustrate the different CPE types within the states and territories - travel related, locally endemic or other factors. This information can assist in formulating local screening strategies and inform infection prevention and control plans.

Review changes in resistance over time

Longitudinal data from AURA can be used to track changes over time. There has been variation in infection control precautions over time for a number of multidrug-resistant organisms (MROs), including ESBLs. Reviewing changes in resistance can help with assessment of the impact of infection prevention and control practices on MROs in your state or territory.

Explore other multidrug resistant organism data

AURA data can also be used to review the proportion of vancomycin resistance in *Enterococcus faecium*, and methicillin resistance in *Staphylococcus aureus*. These data can be used to compare and contrast local, state or territory and national data to help focus on the most important interventions for your organisation.
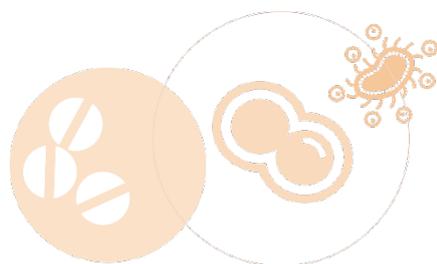
Actions for change

- Ensure that standard and transmission-based precautions are used
- Ensure appropriate patient placement
- Promote compliance with environmental cleaning guidance
- Implement national and/or local guidance on preventing and controlling CPE
- Include CPE in local outbreak management plans
- Collaborate with your local infectious diseases and microbiology experts to obtain information on local resistance patterns you can use to determine the need for targeted infection prevention and control and surveillance strategies
- Promote appropriate surgical prophylaxis prior to gastrointestinal surgery, and aseptic technique, and appropriate invasive device use and management, and consider pre-surgical screening for CPE
- Discuss strategies with your Antimicrobial Stewardship (AMS) team to assist in the containment of antimicrobial resistance for your service.

Further information

AURA Surveillance System:
https://www.safetyandquality.gov.au/AURA

Preventing and Controlling Infections Standard:
https://www.safetyandquality.gov.au/standards/nsqhs-standards/preventing-and-controlling-infections-standard

Carbapenemase-producing *Enterobacterales*:
https://www.safetyandquality.gov.au/our-work/healthcare-associated-infection/cpe-guide

Environmental cleaning:
https://www.safetyandquality.gov.au/our-work/infection-prevention-and-control/environmental-cleaning-and-infection-prevention-and-control

Contact **AURA@safetyandquality.gov.au** with enquiries