

Critical Antimicrobial Resistances (CARs) are defined as resistance mechanisms, or profiles, known to be a serious threat to the effectiveness of last-line antimicrobial agents. CARs have been detected across Australia; they can result in significant morbidity and mortality in healthcare facilities, and in the community.

OBJECTIVE

The National Alert System for Critical Antimicrobial Resistances (CARAlert) is part of the Commission's Antimicrobial Use and Resistance in Australia Surveillance System. The primary objective of CARAlert is to provide timely communication on critical antimicrobial resistances (CARs) to the health departments in each state and territory in order to inform appropriate response strategies.

METHODS

CARAlert uses existing testing and confirmation systems to capture data on critical antimicrobial resistances – resistances that are uncommon or rare, but with the capacity to become established in Australia.

Laboratories confirming CARs enter the results into a national database at the time of confirmation, and summaries are reported weekly to the Commission, and to nominated state, territory and Commonwealth health personnel.

RESULTS

- From March 2016 to March 2018, over 2,500 CARs have been confirmed. Nationally, carbapenemase-producing Enterobacterales (CPE), either alone or with ribosomal methyltransferases, and azithromycin non-susceptible *Neisseria gonorrhoeae* (ANSNG) are the most frequently reported CARs (Table 1)
- There was significant variation in the proportion of carbapenemase types seen by state and territory (Box 1); overall 54% of CPE were from clinical specimens (Box 1)
- Although carbapenemases were found in 27 species of Enterobacterales, representing 11 genera; six species accounted for 94.0%. CPE continue to be dominated by those of the IMP type (56.2%), NDM (17.5%) and OXA-48-like types (17.0%). IMP types were found most often in the *E. cloacae* complex
- A notable outbreak of OXA-48 producing *E. coli* ST38 in Queensland was reported between May 2017 and July 2017. A small cluster of IMP producing Enterobacterales was confirmed among six neonates in New South Wales
- ANSNG with low level resistance (MIC < 256 mg/L) dominated reports over a 12-month period from December 2016 to November 2017 but have shown a steady decline over the last six months (Figure 1)

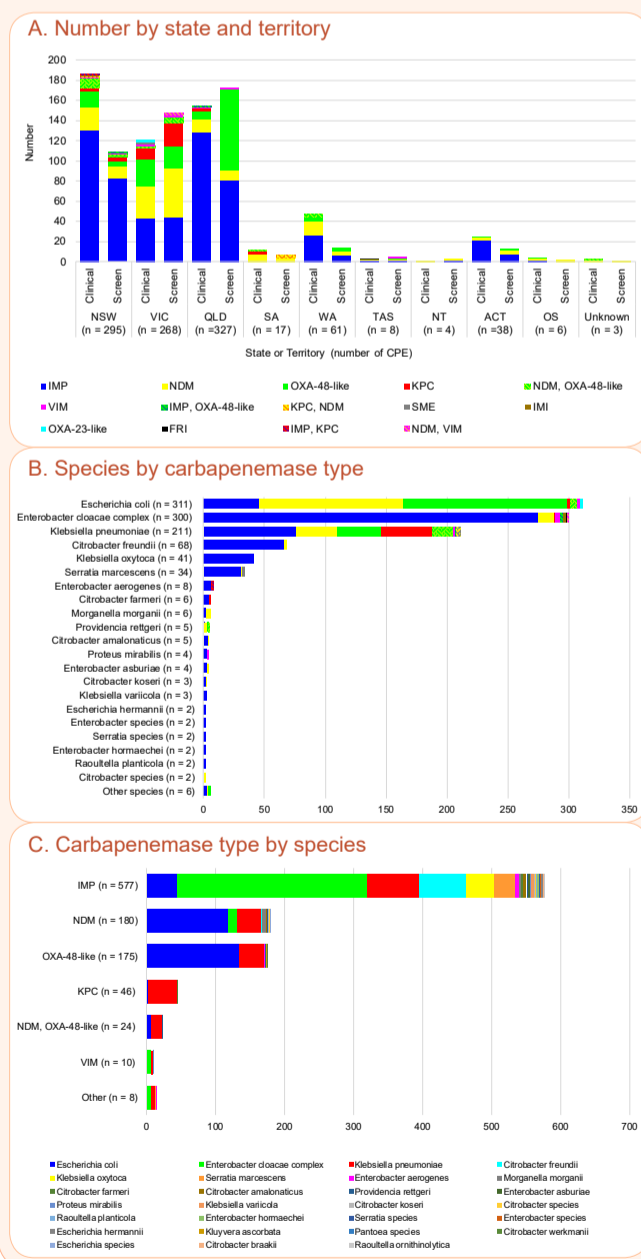
Table 1. Number of critical antimicrobial resistances reported to CARAlert, by state and territory, 17 March 2016 to 31 March 2018

Critical antimicrobial resistance	NSW	Vic	Qld	SA	WA	Tas	NT	ACT	OS	Unk	Total	Trend*
Azithromycin non-susceptible (LLR < 256 mg/L) <i>Neisseria gonorrhoeae</i>	387	407	98	59	94	4	4	6	6	0	1,065	
Carbapenemase-producing Enterobacterales	281	237	325	12	59	8	4	38	4	3	971	
Daptomycin non-susceptible <i>Staphylococcus aureus</i>	38	80	37	4	53	0	0	0	1	1	214	
Ceftriaxone non-susceptible <i>Salmonella</i> species	13	23	21	2	2	1	0	1	0	0	63	
Multidrug-resistant <i>Shigella</i> species	17	26	10	2	2	1	0	1	0	1	60	
Carbapenemase and ribosomal methyltransferase-producing Enterobacterales	14	31	2	5	2	0	0	0	2	0	56	
Ribosomal methyltransferase-producing Enterobacterales	12	14	5	1	3	1	0	1	0	2	39	
Multidrug-resistant <i>Mycobacterium tuberculosis</i>	3	7	7	2	2	3	1	1	3	0	29	
Linezolid non-susceptible <i>Enterococcus</i> species	8	3	1	0	2	0	0	1	1	1	17	
Azithromycin non-susceptible (HLR > 256 mg/L) <i>Neisseria gonorrhoeae</i>	4	7	1	1	0	0	0	0	0	0	13	
Ceftriaxone non-susceptible <i>Neisseria gonorrhoeae</i>	4	0	0	0	0	0	0	0	0	0	4	
Ceftriaxone non-susceptible and azithromycin non-susceptible (HLR > 256 mg/L) <i>N. gonorrhoeae</i>	0	0	2	0	0	0	0	0	0	0	2	
Linezolid non-susceptible <i>Staphylococcus aureus</i>	0	0	1	0	0	0	0	0	0	0	1	
Vancomycin non-susceptible <i>Staphylococcus aureus</i>	0	1	0	0	0	0	0	0	0	0	1	
Total (as at 31 March 2018)	781	836	510	88	219	18	9	49	17	8	2,535	

* Trend = quarterly trend, 1 April 2016 to 31 March 2018

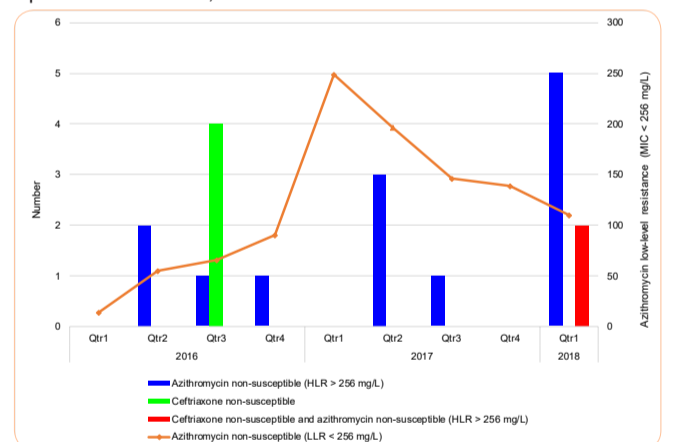
RESULTS (CONTINUED)

Box 1. Carbapenemase-producing Enterobacterales, number by state and territory and specimen type (A), species by carbapenemase type (B), and carbapenemase type by species (C), 2017



- Of concern is the increasing number of ANSNG with high level azithromycin resistance (MIC > 256 mg/L) and the confirmation of two isolates with both ceftriaxone non-susceptibility and azithromycin high level azithromycin resistance

Figure 1. *Neisseria gonorrhoeae*, number reported by state and territory and quarter of collection, March 2016 to March 2018



- The number of multidrug resistant *Shigella* species peaked in December 2017 and January 2018 but has now subsided.

The Commission regularly publishes data updates and analyses of CARAlert data on its website at <https://www.safetyandquality.gov.au/antimicrobial-use-and-resistance-in-australia/>

CONCLUSIONS

- Some CARs are being detected in Australia on a regular basis, especially CPE and ANSNG.
- There were some outbreaks detected in the second year of operation.
- CARAlert has improved the timely identification of CARs nationally. It will support a systematic and coordinated approach to the identification of CARs and appropriate responses.