AUSTRALIAN COMMISSION ON SAFETY AND QUALITY IN HEALTH CARE

CARAlert data update 7

1 May 2018–30 June 2018

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Summary

The National Alert System for Critical Antimicrobial Resistances (CARAlert) was established by the Australian Commission on Safety and Quality in Health Care (the Commission) in March 2016 as part of the Antimicrobial Use and Resistance in Australia (AURA) Surveillance System. AURA is funded by the Australian Government Department of Health and the Commission.

Critical antimicrobial resistances (CARs) are resistance mechanisms known to be a serious threat to the effectiveness of last-line antimicrobial agents, which can result in significant morbidity and mortality.

This data update is one of a series produced by the AURA National Coordination Unit (NCU) to provide regular data updates and six-monthly detailed analyses of CARAlert data. This summary report includes information about isolates collected between 1 May 2018 and 30 June 2018, and the results reported into CARAlert by 31 July 2018.

Carbapenemase-producing Enterobacterales[1] (CPE) and azithromycin non-susceptible (low-level resistance, MIC ≤256 mg/L) *Neisseria gonorrhoeae* were the most commonly reported in CARAlert.

The two-month report provides data on the number and distribution of critical antimicrobial resistance isolates, by state and territory. The majority (89%) of reported cases were from New South Wales, Victoria and Queensland – the three most populous states.

Figures 3 to 5 show details of carbapenemase type and the species of CPE, and Figure 6 shows the distribution of azithromycin non-susceptible *N. gonorrhoeae*, by state and territory.

The findings regarding CPE highlight the importance of implementation of the Commission's recently released CPE control guidelines. The findings regarding azithromycin non-susceptible *N. gonorrhoeae* highlight the importance of state and territory sexually transmitted infection control and prevention programs.

The next six-month report will provide more detailed analyses of each of the CARs and trends for each of the CARs reported in this update, across all states and territories.

Each state and territory health department has designated officers who have access to the CARAlert database to enable detailed review of CARs reported for their jurisdiction. This assists states and territories to determine whether infection prevention and control and/or follow-up response action is required.

The Commission has commenced consultation with all states and territories regarding the establishment of a network for coordination of response to outbreaks of resistant organisms in Australia. CARAlert will be one of the data sources to inform this process.

A review of CARs reported to CARAlert is underway to assess the resistances and species which are currently reported to CARAlert to determine that they continue to be priorities, and identify additional CARs that should be captured by CARAlert.

[1] Recent taxonomic studies have narrowed the definition of the family Enterobacteriaceae. Some previous members of this family are now included in other families within the Order Enterobacterales.

Background

The Australian Commission on Safety and Quality in Health Care (the Commission) established the National Alert System for Critical Antimicrobial Resistances (CARAlert) in March 2016 as part of the Antimicrobial Use and Resistance in Australia (AURA) Surveillance System. AURA is funded by the Australian Government Department of Health and the Commission.

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. They can result in significant morbidity and mortality in healthcare facilities, and in the community. The CARs reported under CARAlert are listed in Table 1. The CARs were drawn from the list of high-priority organisms and antimicrobials which are the focus of the AURA Surveillance System.[2]

The CARAlert system is based on the following routine processes used by pathology laboratories for identifying and confirming potential CARs:

- Collection and routine testing – the isolate is collected from the patient and sent to the originating laboratory for routine testing
- Confirmation – if the originating laboratory suspects that the isolate is a CAR, it sends the isolate to a confirming laboratory that has the capacity to confirm the CAR
- Submission to the CARAlert system – the confirming laboratory advises the originating laboratory of the result of the test, and the originating laboratory reports back to the health service that cared for the patient from whom the specimen was collected; the confirming laboratory then submits the details of the resistance and organism into the secure CARAlert web portal.

Table 1: List of critical antimicrobial resistances

Species	Critical Resistance
Enterobacterales	Carbapenemase-producing, and/or ribosomal methyltransferase-producing
Enterococcus species	Linezolid non-susceptible
Mycobacterium tuberculosis	Multidrug-resistant – resistant to at least rifampicin and isoniazid
Neisseria gonorrhoeae	Ceftriaxone or azithromycin non-susceptible
Salmonella species	Ceftriaxone non-susceptible
Shigella species	Multidrug-resistant
Staphylococcus aureus	Vancomycin, linezolid or daptomycin non-susceptible
Streptococcus pyogenes	Penicillin reduced susceptibility

Note: Enterobacterales (new taxonomy)

[2] Australian Commission on Safety and Quality in Health Care (ACSQHC). AURA 2017: Second Australian report on antimicrobial use and resistance in human health. Sydney: ACSQHC; 2017.

As there is a time-lag in confirmation for some isolates, the cut-off date for data that are included in updates and reports will be four weeks after the end of each reporting period. The data in each update and report are based on the date that the isolate with a confirmed CAR was collected.

This report provides a brief update, and complements previous analyses of and updates on CARAlert data.

The AURA NCU will produce both regular data updates and also six-monthly reports that will include more detailed analyses of CARAlert data.

Results

This data update includes information about 242 isolates collected between 1 May 2018 and 30 June 2018 and the results reported into CARAlert by 31 July 2018. From 17 March 2016 to 30 June 2018, 2,926 results from 91 originating laboratories across Australia were entered into the CARAlert system. Table 2 and Figure 1 show the number and distribution of critical antimicrobial resistance isolates by state and territory.

There were 98 carbapenemase-producing Enterobacterales (CPE) and 98 azithromycin non-susceptible (low-level resistance, MIC ≤ 256 mg/L) *Neisseria gonorrhoeae* during this two-month period. These two resistances were the most commonly reported (80%). The great majority (89%) of reported cases were from New South Wales, Victoria and Queensland.

Figure 2 shows the CARs reported by species and month, year on year, 1 May 2018 and 30 June 2018.

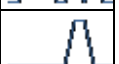
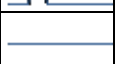
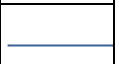
Figures 3 to 5 show details of carbapenemase type and the species of CPE, by state and territory, 1 May 2018 and 30 June 2018. IMP (53.8%), NDM (26.9%) and OXA-48 (13.5%), types accounted for 94.2% of all CPE reported during this period, with 83.7% from New South Wales, Victoria and Queensland. Fifty percent of CPE were from clinical specimens, although differences were seen between states and territories.

The distribution of azithromycin non-susceptible *Neisseria gonorrhoeae*, by state and territory, is shown in Figure 6.

There was an increase in the number of ceftriaxone non-susceptible *Salmonella* species reported compared to the same period in 2017 (16 vs 5). One *Salmonella* Typhi with confirmed ESBL (CTX-M-15) was reported from a patient residing in Tasmania who had a history of recent overseas travel.

The next six-month report will provide more detailed analyses of trends for each of the CARs, across all states and territories.

Table 2: Number of critical antimicrobial resistance isolates, by state and territory, 1 May 2018 and 30 June 2018.

Critical antimicrobial resistance	NSW	Vic	Qld	SA	WA	Tas	NT	ACT	OS	Unk	2018 May–Jun	2018 YTD	2017 May–Jun	2017	Trend† Jul-17 Jun-18
Carbapenemase-producing Enterobacterales	28	29	27	3	8	0	1	1	1	0	98	291	160	528	
Azithromycin non-susceptible (LLR < 256 mg/L) *Neisseria gonorrhoeae*	25	58	13	1	1	0	0	0	0	0	98	238	144	730	
Ceftriaxone non-susceptible *Salmonella* species	3	11	0	0	0	1	0	1	0	0	16	32	5	37	
Daptomycin non-susceptible *Staphylococcus aureus*	3	5	2	0	3	0	0	0	0	0	13	60	18	121	
Multidrug-resistant *Shigella* species	2	2	0	0	2	0	0	0	0	0	6	32	3	31	
Carbapenemase and ribosomal methyltransferase-producing Enterobacterales	2	1	0	2	0	0	0	0	1	0	6	8	6	33	
Linezolid non-susceptible *Enterococcus* species	2	1	0	0	0	0	0	0	0	0	3	9	0	5	
Ribosomal methyltransferase-producing Enterobacterales	0	1	0	0	0	0	0	0	0	0	1	2	3	22	
Azithromycin non-susceptible (HLR > 256 mg/L) *Neisseria gonorrhoeae*	1	0	0	0	0	0	0	0	0	0	1	6	2	4	
Multidrug-resistant *Mycobacterium tuberculosis*	0	0	0	0	0	0	0	0	0	0	0	2	1	9	
Ceftriaxone non-susceptible and azithromycin resistant (HLR > 256 mg/L) *Neisseria gonorrhoeae*	0	0	0	0	0	0	0	0	0	0	0	2	0	0	
Linezolid non-susceptible *Staphylococcus aureus*	0	0	0	0	0	0	0	0	0	0	0	0	0	1	
Ceftriaxone non-susceptible *Neisseria gonorrhoeae*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Vancomycin non-susceptible *Staphylococcus aureus*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Total (as at 31 July 2018)	**66**	**108**	**42**	**6**	**14**	**1**	**1**	**2**	**2**	**0**	**242**	**682**	**342**	**1,521**	

HLR = high-level resistance; LLR = low-level resistance; OS = overseas; Unk = unknown; YTD = year to date
† Trend Jul-17 Jun-18 = 12-month trend, 1 July 2017 to 30 June 2018

Figure 1: Critical antimicrobial resistances (CARs), number and distribution reported nationally, and by state and territory, 1 July 2017 to 30 June 2018

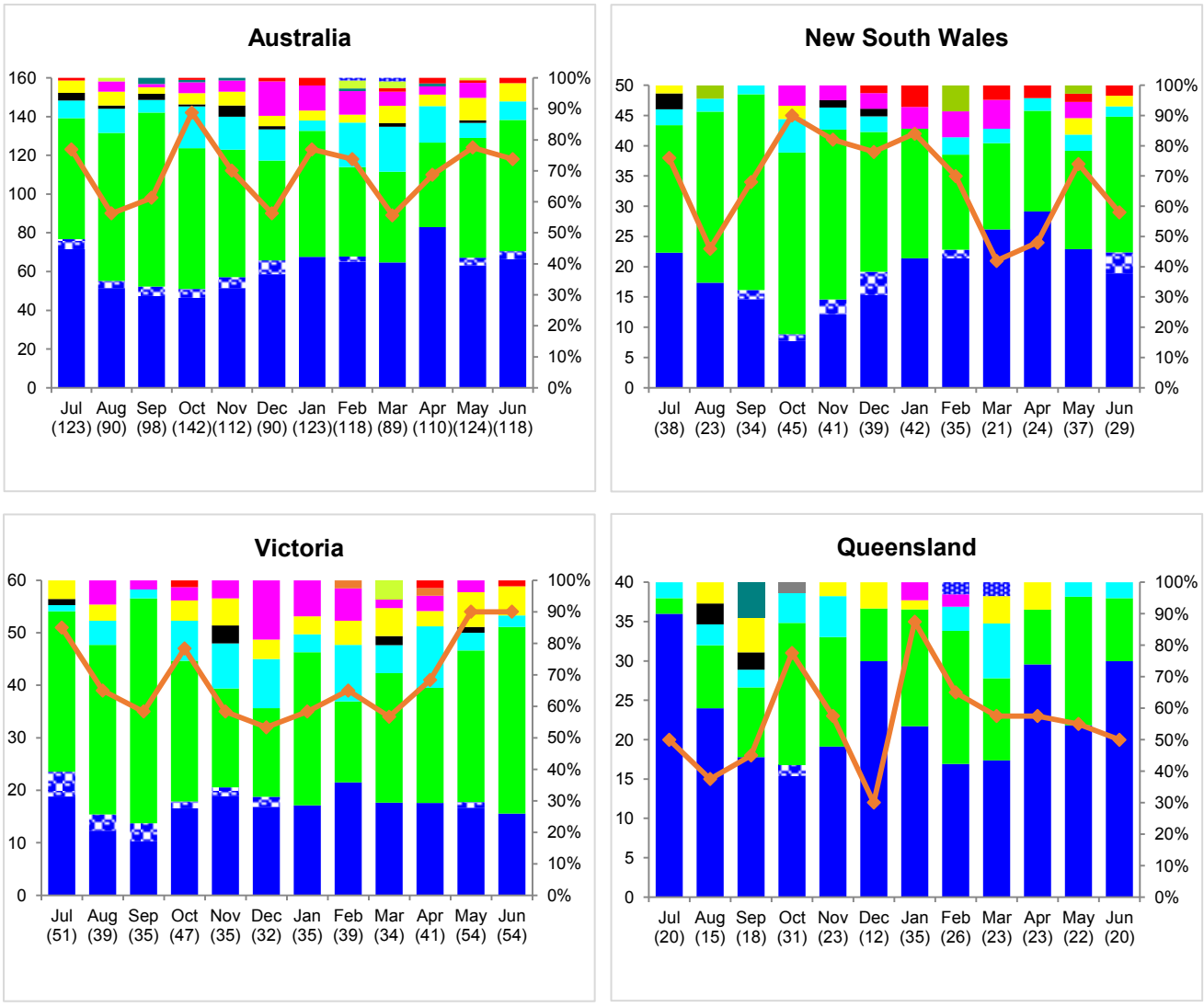


Figure 1 (continued): Critical antimicrobial resistances (CARs), number and distribution reported nationally, and by state and territory, 1 July 2017 to 30 June 2018

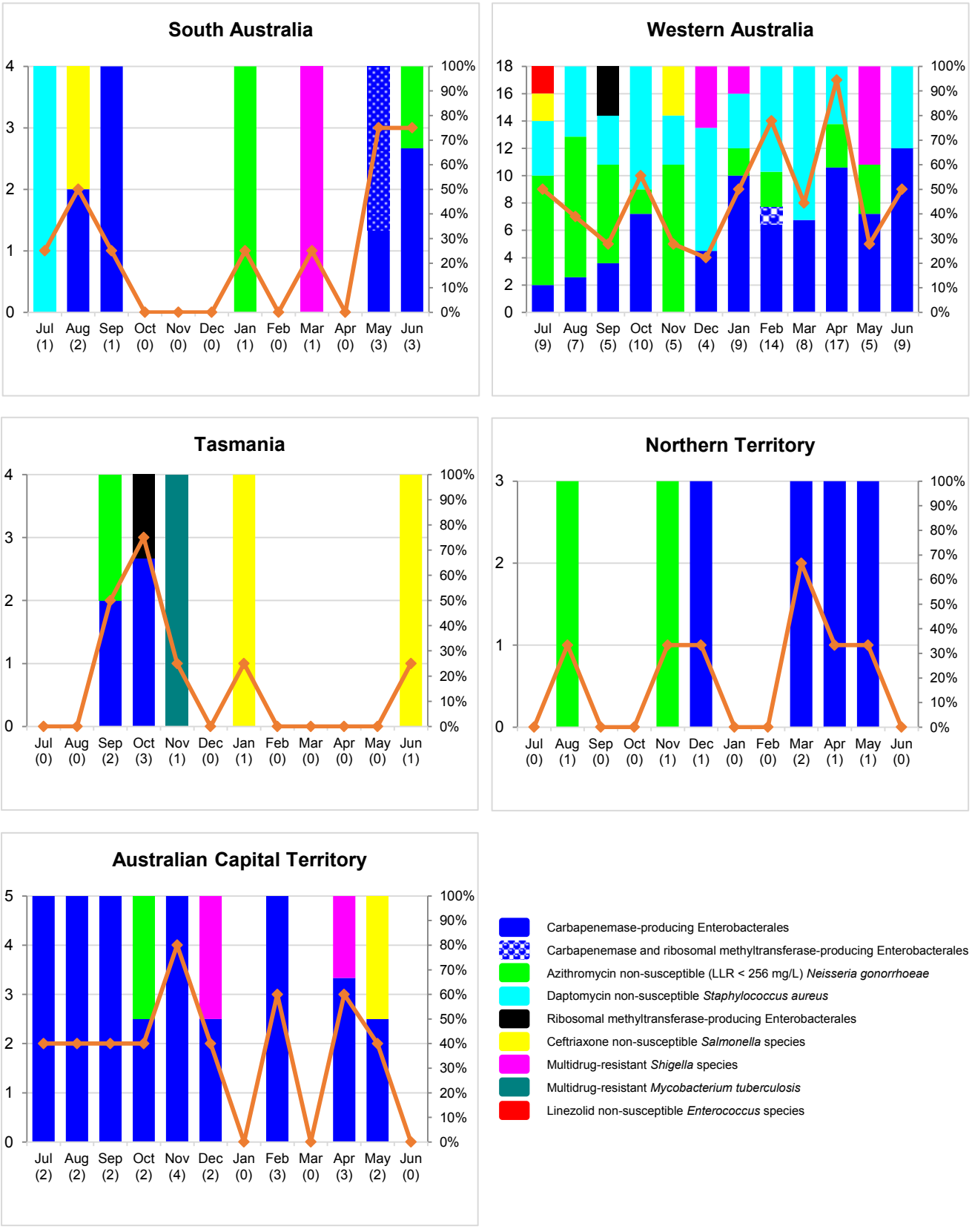
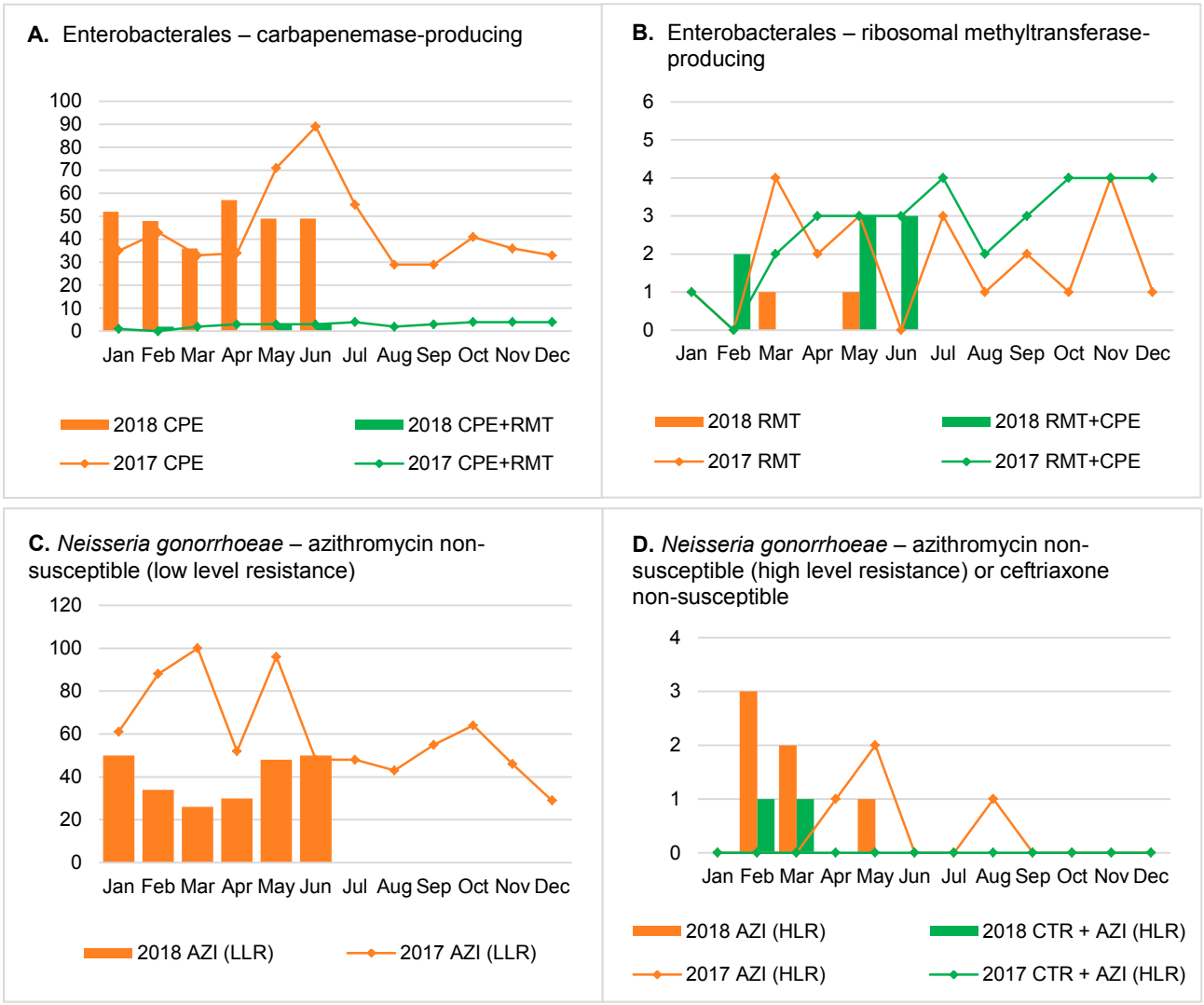


Figure 2: Critical antimicrobial resistances, number reported by species and month, year on year, 1 January 2017 to 30 June 2018



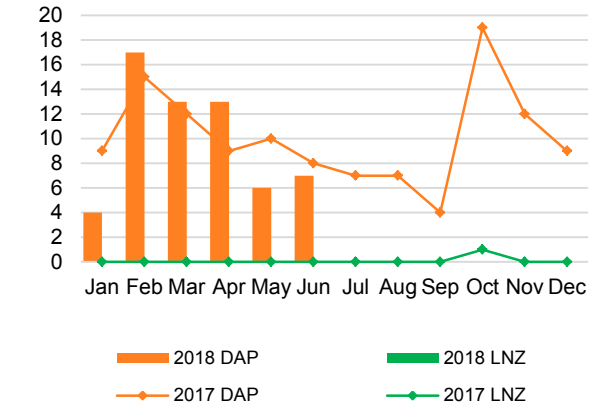
Bars: number of each CAR type reported for each organism for 2018 (January to February)

Lines: number of each CAR type reported for each organism for 2017 (January to December)

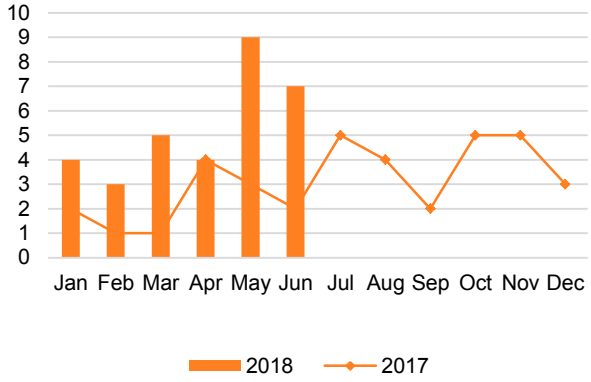
AZI (LLR) = azithromycin non-susceptible, low level resistance (LLR, MIC < 256 mg/L) *Neisseria gonorrhoeae*; AZI (HLR) = HLR =azithromycin non-susceptible, high level resistance (HLR, MIC > 256 mg/L) *Neisseria gonorrhoeae*; CPE =carbapenemase-producing Enterobacterales; CPE+RMT = carbapenemase- and ribosomal methyltransferase-producing Enterobacterales; CTR NGON = ceftriaxone non-susceptible *Neisseria gonorrhoeae*; CTR+AZI (HLR) NGON = ceftriaxone non-susceptible and azithromycin non-susceptible, high level resistance (HLR, MIC > 256 mg/L) *Neisseria gonorrhoeae*; RMT = ribosomal methyltransferase-producing Enterobacterales

Figure 2 (continued): Critical antimicrobial resistances, number reported by species and month, year on year, 1 January 2017 to 30 June 2018

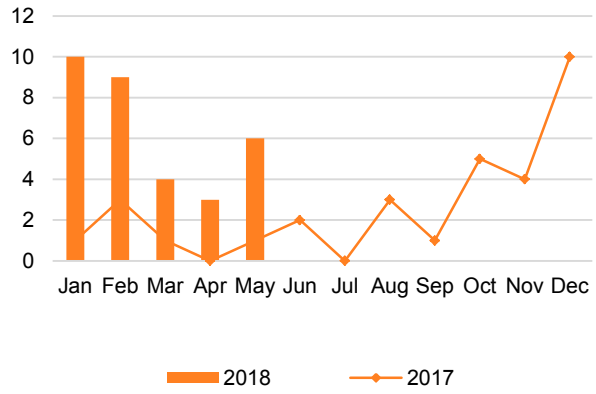
E. *Staphylococcus aureus*



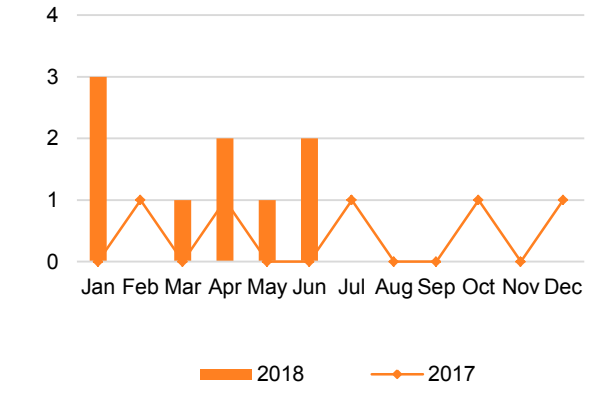
F. *Salmonella* – ceftriaxone non-susceptible



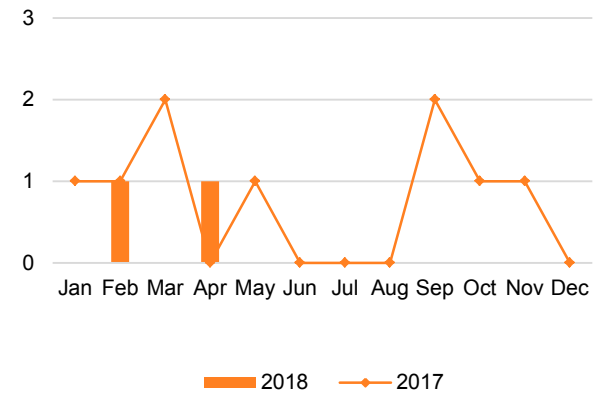
G. *Shigella* – multidrug-resistant



H. *Enterococcus* species – linezolid non-susceptible



I. *Mycobacterium tuberculosis* – multidrug resistant



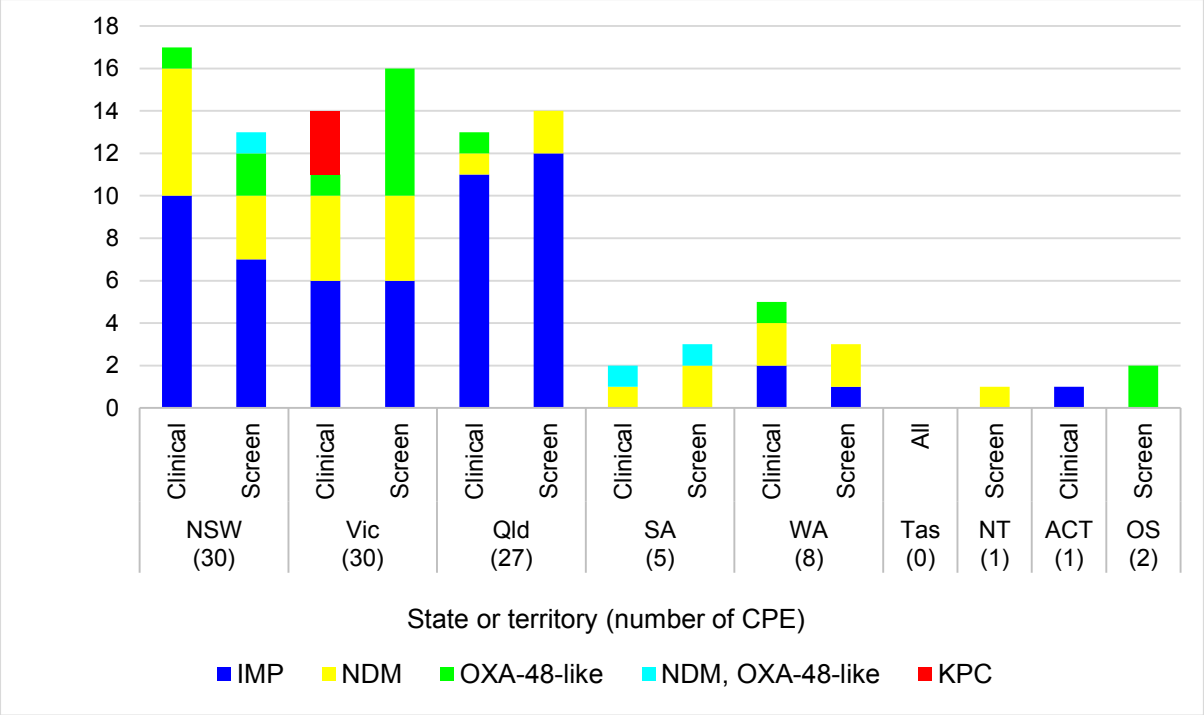
Bars: number of each CAR type reported for each organism for 2018 (January to February)

Lines: number of each CAR type reported for each organism for 2017 (January to December)

DAP = daptomycin non-susceptible *Staphylococcus aureus*; LNZ = linezolid non-susceptible *Staphylococcus aureus*

Carbapenemase-producing Enterobacterales type, by state and territory

Figure 3: Carbapenemase-producing Enterobacterales*, by carbapenemase type and specimen type, number reported by state and territory, 1 May 2018 and 30 June 2018.



* Carbapenemase-producing Enterobacterales (n = 98), carbapenemase- and ribosomal methyltransferase-producing Enterobacterales (n = 6)

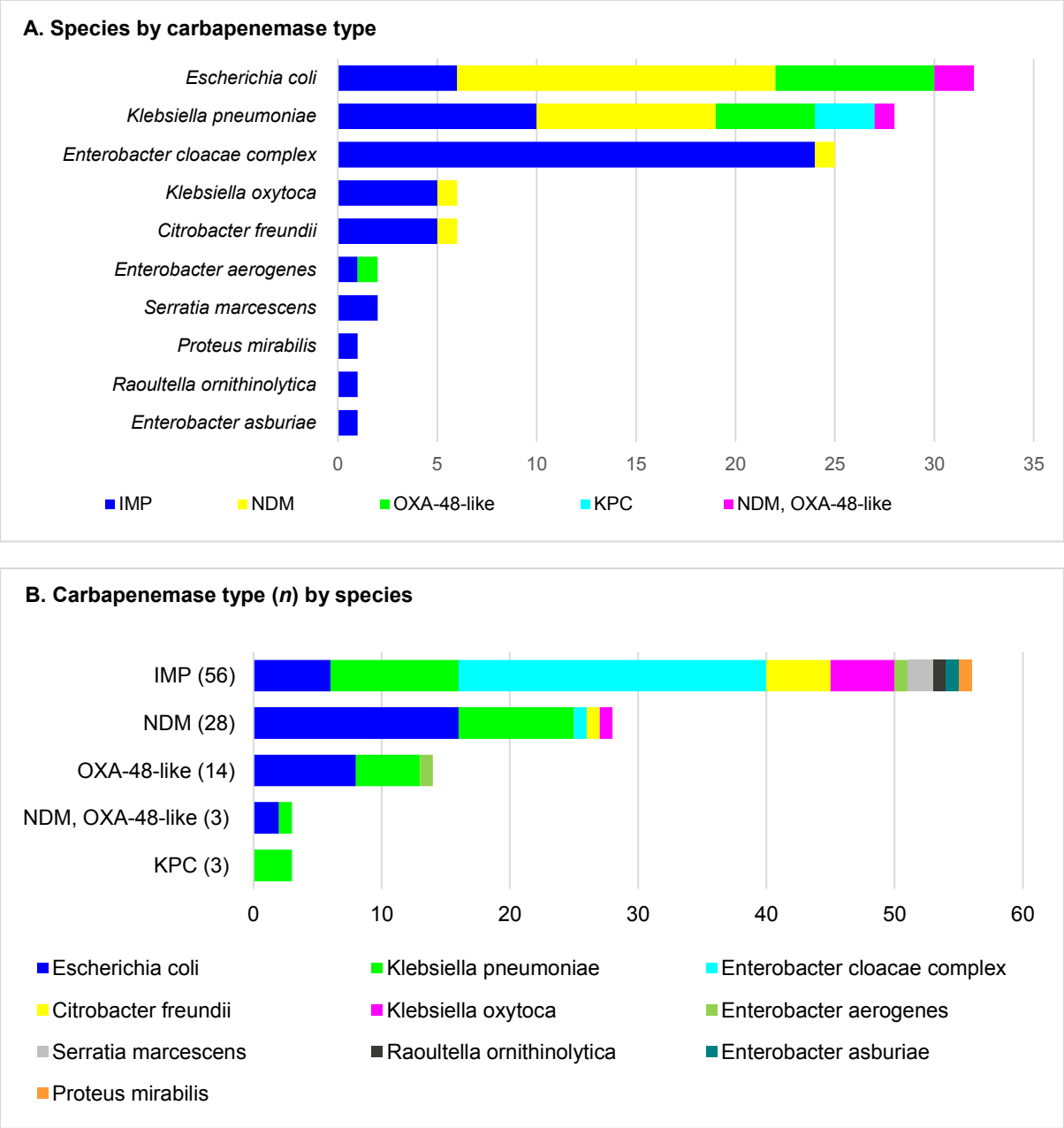
Figure 4: Trend data for the top four carbapenemase types, by state and territory and nationally, 1 July 2016 to 30 June 2018

Type	NSW	Vic	Qld	SA	WA	Tas	NT	ACT	Australia
IMP	12 5	7 1	12 7	0 0	4 0	0 0	0 0	3 0	30 18
NDM	4 0	5 1	2 0	1 0	2 0	0 0	1 0	1 0	13 4
OXA-48-like	2 0	4 1	26 0	0 0	1 0	0 0	0 0	0 0	29 2
KPC	1 0	3 0	0 0	0 0	0 0	0 0	0 0	0 0	4 1
All types	16 8	17 8	38 8	2 0	6 1	1 0	1 0	3 1	74 31

Line graphs represent three-month moving average for the period 1 July 2016 to 30 June 2018, for each type, where maximum monthly average was greater than one.

Carbapenemase-producing Enterobacterales by species and carbapenemase type

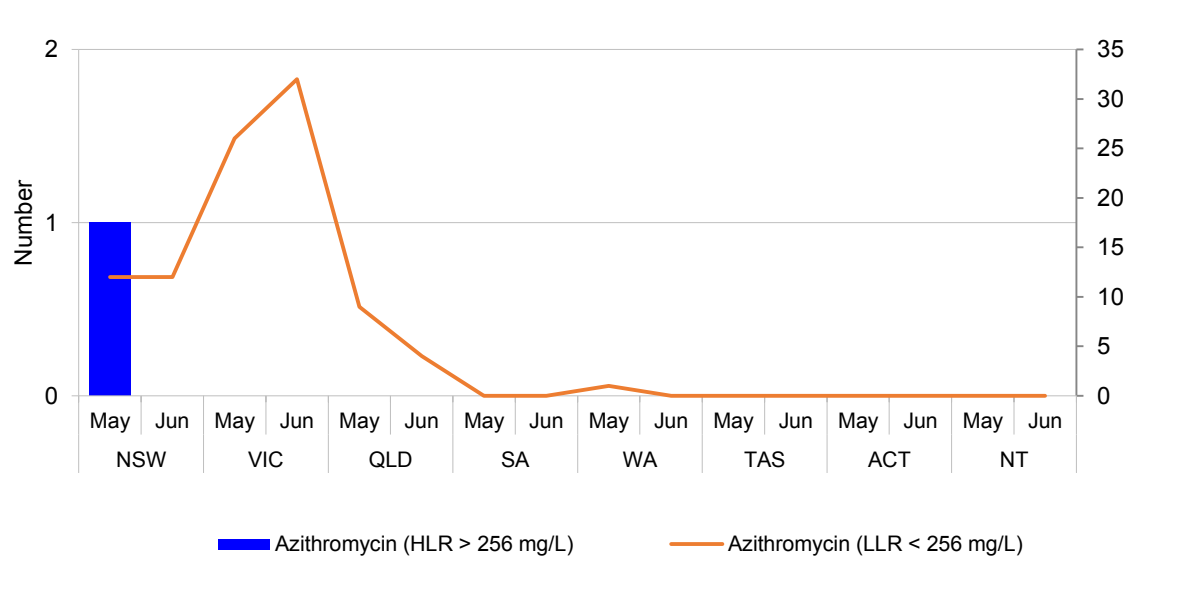
Figure 5: Carbapenemase-producing Enterobacterales, number reported by (A) species and (B) carbapenemase type, 1 May 2018 and 30 June 2018.



* Carbapenemase-producing Enterobacterales (n = 98), carbapenemase- and ribosomal methyltransferase-producing Enterobacterales (n = 6)

Neisseria gonorrhoeae by state and territory

Figure 6: *Neisseria gonorrhoeae*, number reported by state and territory, and month of collection*, 1 May 2018 and 30 June 2018.



* Where state and territory of residence is unknown, the state of the originating laboratory has been assigned

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