

AUSTRALIAN COMMISSION ON SAFETY AND QUALITY IN HEALTH CARE



CARAlert Update

1 July 2017–31 August 2017

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Summary

The Australian Government funded the Australian Commission on Safety and Quality in Health Care (the Commission) to establish 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.

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 July 2017 and 31 August 2017, and the results reported into CARAlert by 30 September 2017.

Carbapenemase-producing Enterobacteriaceae (CPE) and azithromycin resistant (low-level resistance, MIC \leq 256 mg/L) *Neisseria gonorrhoeae* (ARNG) were the most commonly reported in CARs in this period.

The number of CARs in each state and territory is approximately in line with their populations. Fifty percent of CARs were detected from patients in the community (non-hospital patients or aged care home residents). There has been an increase in the number of CARs reported compared with the same period last year (199 versus 145). This was due almost entirely to increases in CPE and ARNG.

Figures 3 to 5 show details of carbapenemase type and the species of CPE, and Figure 6 the distribution of azithromycin resistant *Neisseria gonorrhoeae*, by state and territory. The large number of reports of OXA-48 CPE observed in Queensland during May-June 2017 has now subsided.

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

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.

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.¹

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

¹ 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, complementing the *CARAlert First Annual Report March 2016–March 2017* (<https://www.safetyandquality.gov.au/wp-content/uploads/2017/07/CARAlert-Report-March-2016-to-March-2017.pdf>).

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

Results

This data update includes information about 199 isolates collected between 1 July 2017 and 31 August 2017 and the results reported into CARAlert by 30 September 2017. From 17 March 2016 to 31 August 2017, 1,778 results from 85 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 91 azithromycin resistant (low-level resistance, MIC \leq 256 mg/L) *Neisseria gonorrhoeae* and 83 carbapenemase-producing Enterobacteriaceae (CPE) during this three-month period. These two resistances were the most commonly reported (87%). The great majority (86%) of reported cases were from the New South Wales, Victoria and Queensland.

Figure 2 shows the CARs reported by species and month, year on year, 17 March 2016 to 31 August 2017.

Figures 3 to 5 show details of carbapenemase type and the species of CPE, by state and territory, 1 July 2017 to 31 August 2017. IMP (51.8%), NDM (21.7%) and OXA-48 (18.1%) types accounted for 91.6% of all CPE reported during this period, with 90.4% from New South Wales, Victoria and Queensland. The high number of OXA-48 producing *Escherichia coli* observed in Queensland during May-June 2017 has now subsided. The distribution of azithromycin resistant *Neisseria gonorrhoeae*, by state and territory, is shown in Figure 6.

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 July 2017 to 31 August 2017

Critical antimicrobial resistance	NSW	Vic	Qld	SA	WA	Tas	NT	ACT	OS	Unk	2017 Jul–Aug	2017 YTD	2016 Jul–Aug	2016 Mar–Dec*	Trend† Sep-16 Aug-17
Carbapenemase-producing Enterobacteriaceae	25	24	26	1	2	0	0	4	1	0	83	388	57	312	
Azithromycin resistant (LLR < 256 mg/L) <i>Neisseria gonorrhoeae</i>	29	47	4	0	8	0	1	0	2	0	91	536	49	225	
Daptomycin non-susceptible <i>Staphylococcus aureus</i>	2	1	2	1	4	0	0	0	0	0	10	72	6	62	
Carbapenemase and ribosomal methyltransferase-producing Enterobacteriaceae	0	6	0	0	0	0	0	0	0	0	6	18	4	21	
Ceftriaxone non-susceptible <i>Salmonella</i> species	0	0	1	1	1	0	0	0	0	0	3	14	3	17	
Ribosomal methyltransferase-producing Enterobacteriaceae	2	1	1	0	0	0	0	0	0	0	4	14	8	16	
Multidrug-resistant <i>Mycobacterium tuberculosis</i>	0	0	0	0	0	0	0	0	0	0	0	5	6	20	
Multidrug-resistant <i>Shigella</i> species	0	0	0	0	0	0	0	0	0	0	0	7	6	15	
Linezolid non-susceptible <i>Enterococcus</i> species	0	0	0	0	1	0	0	0	0	0	1	4	1	9	
Azithromycin resistant (HLR > 256 mg/L) <i>Neisseria gonorrhoeae</i>	1	0	0	0	0	0	0	0	0	0	1	4	1	4	
Ceftriaxone non-susceptible <i>Neisseria gonorrhoeae</i>	0	0	0	0	0	0	0	0	0	0	0	0	4	4	
Vancomycin non-susceptible <i>Staphylococcus aureus</i>	0	0	0	0	0	0	0	0	0	0	0	0	0	1	
Total (as at 30 September 2017)	59	79	34	3	16	0	1	4	3	0	199	1,062	145	706	

HLR = high-level resistance; LLR = low-level resistance; OS = overseas; Unk = unknown; YTD = year to date

* CARAlert commenced on 17 March 2016. Data for 2016 are for the period 17 March 2016 to 31 December 2016

† Trend Sep-16 Aug-17 = 12-month trend, 1 September 2016 to 31 August 2017

Figure 1: Critical antimicrobial resistances (CARs), number and distribution reported nationally, and by state and territory, 1 January 2017 to 31 August 2017

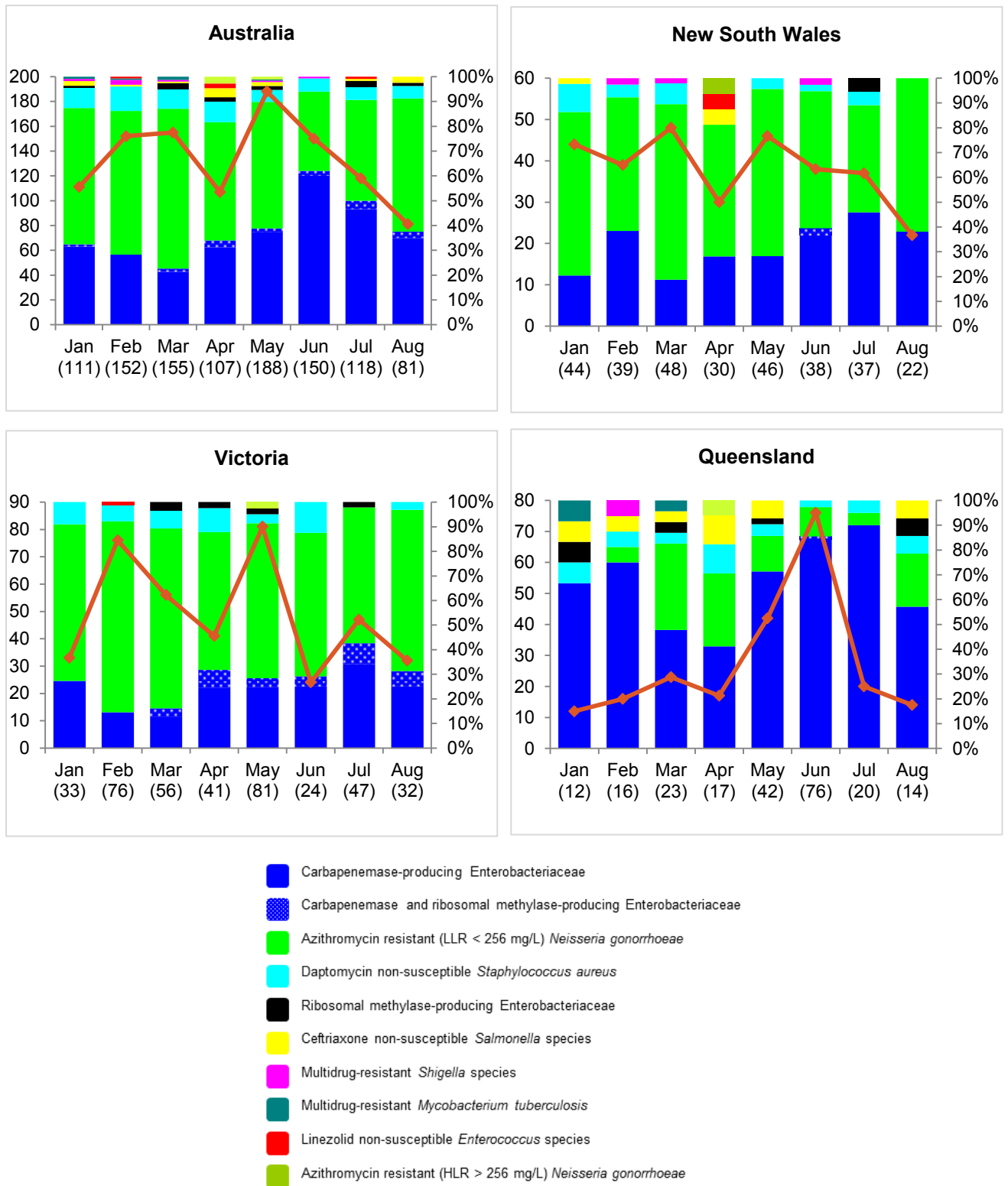


Figure 1 (continued): Critical antimicrobial resistances (CARs), number and distribution reported nationally, and by state and territory, 1 January 2017 to 31 August 2017

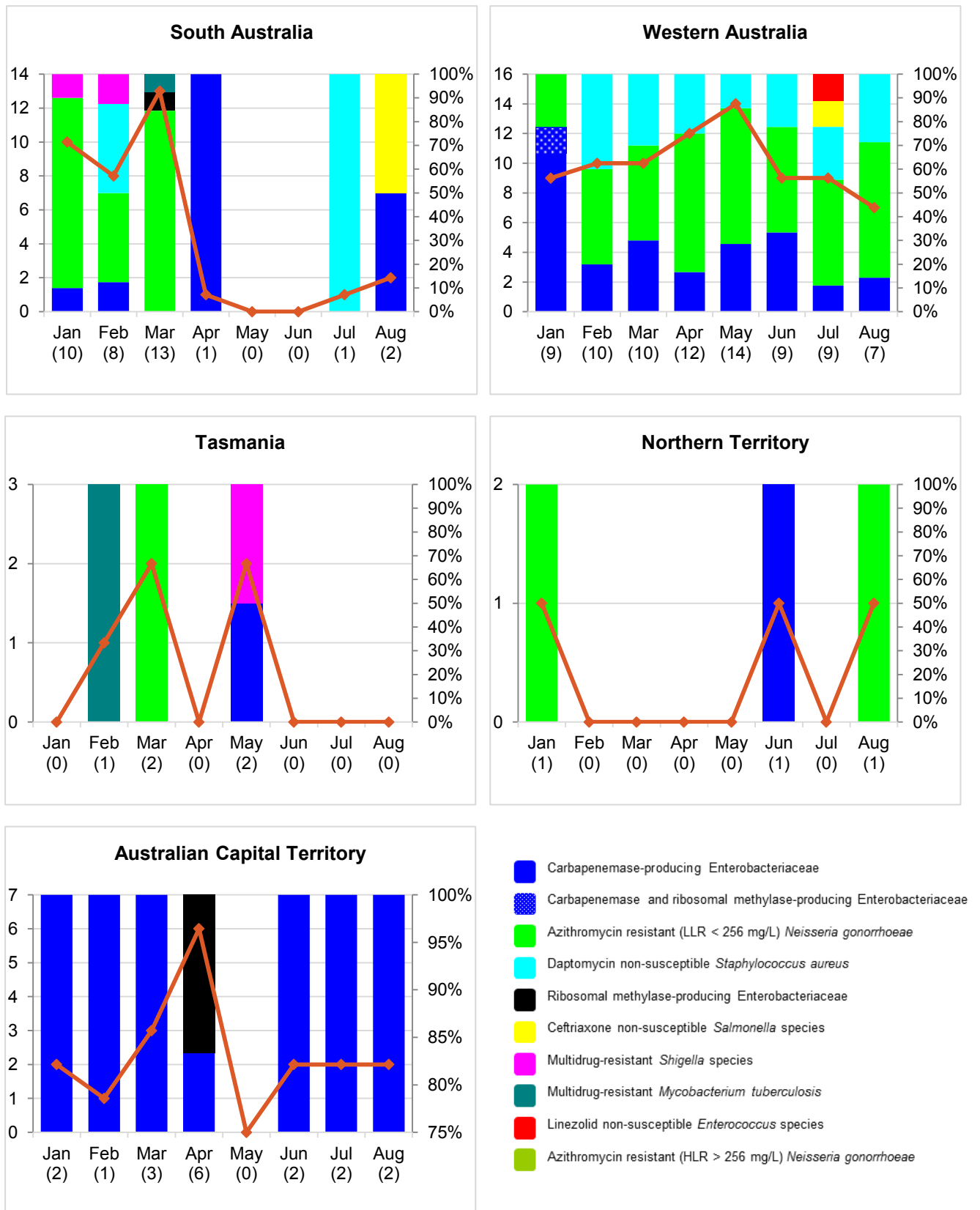
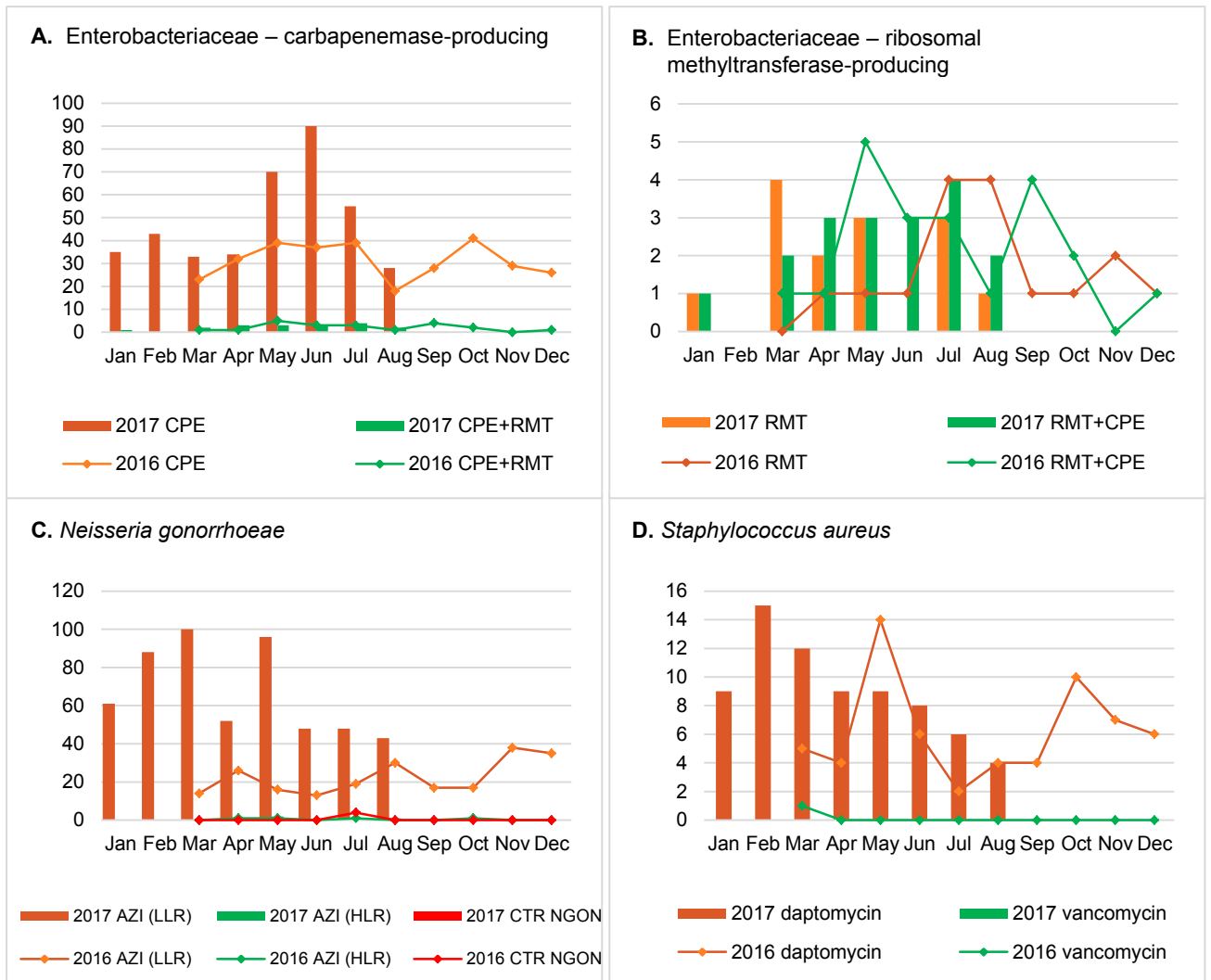


Figure 2: Critical antimicrobial resistances, number reported by species and month, year on year, 17 March 2016 to 31 August 2017

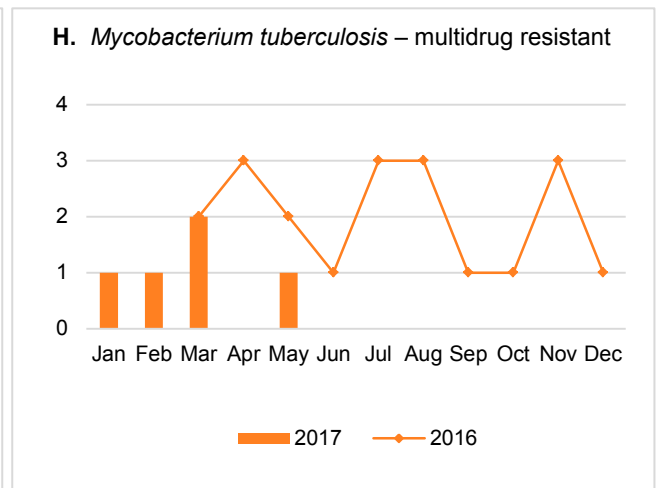
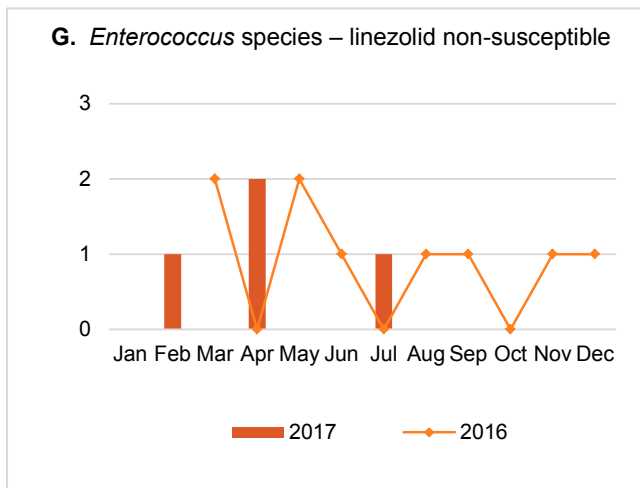
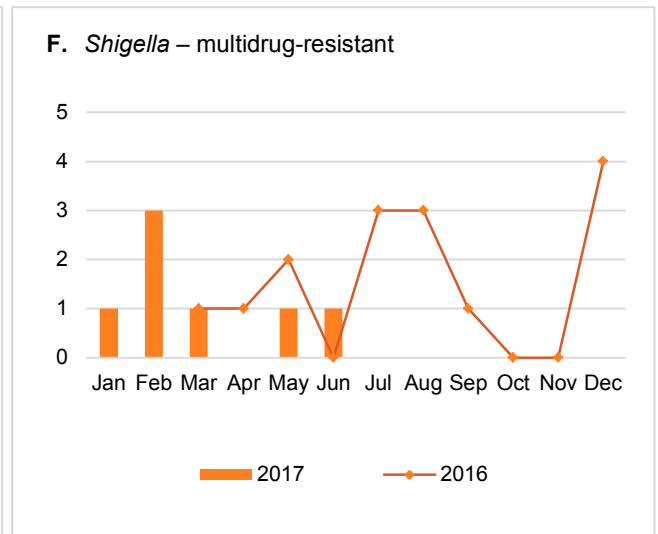
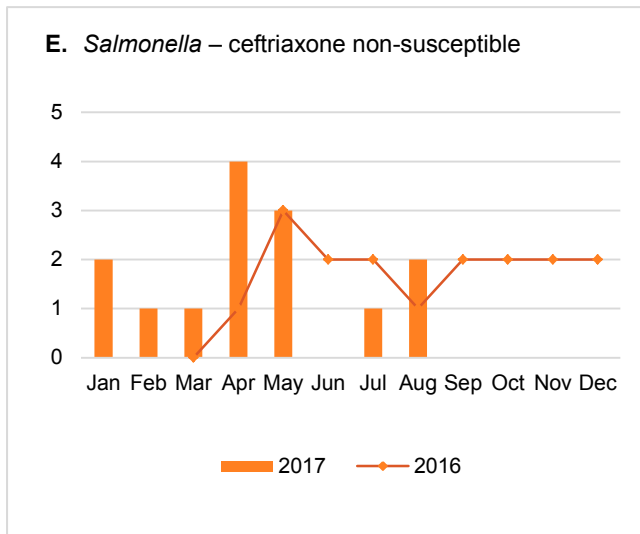


Bars: number of each CAR for 2017 (January to August)

Lines: number of each CAR for 2016 (March to December)

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

Figure 2 (continued): Critical antimicrobial resistances, number reported by species and month, year on year, 17 March 2016 to 31 August 2017

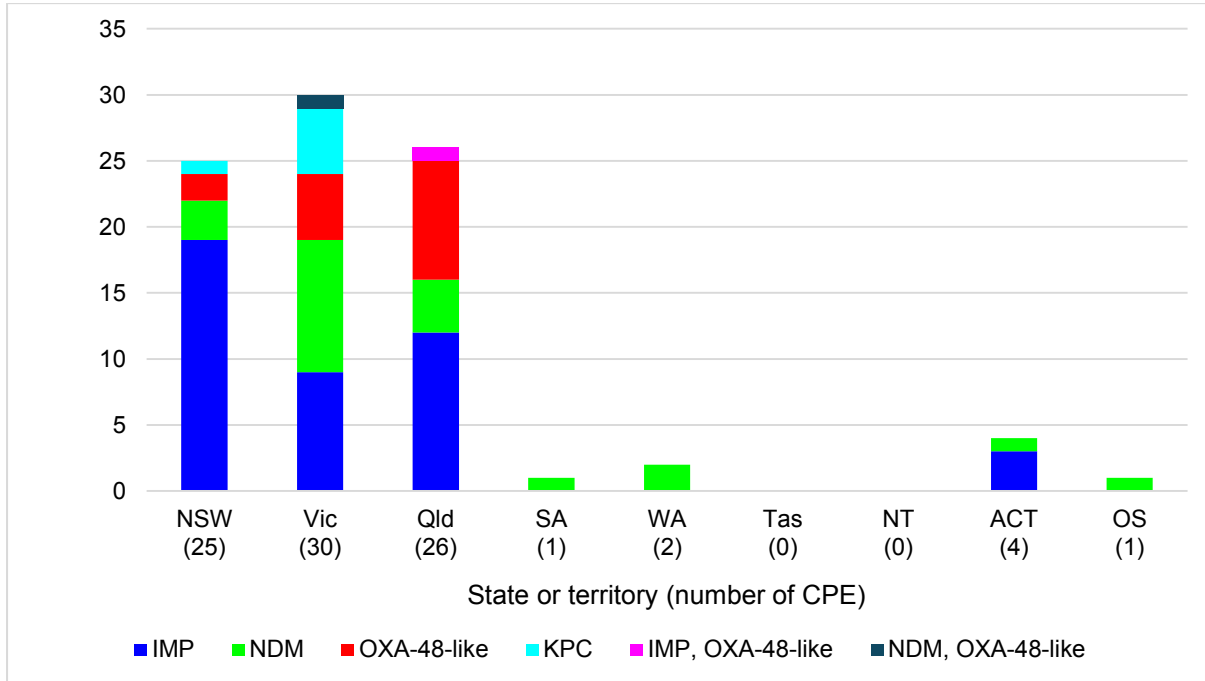


Bars: number of each CAR for 2017 (January to August)

Lines: number of each CAR for 2016 (March to December)

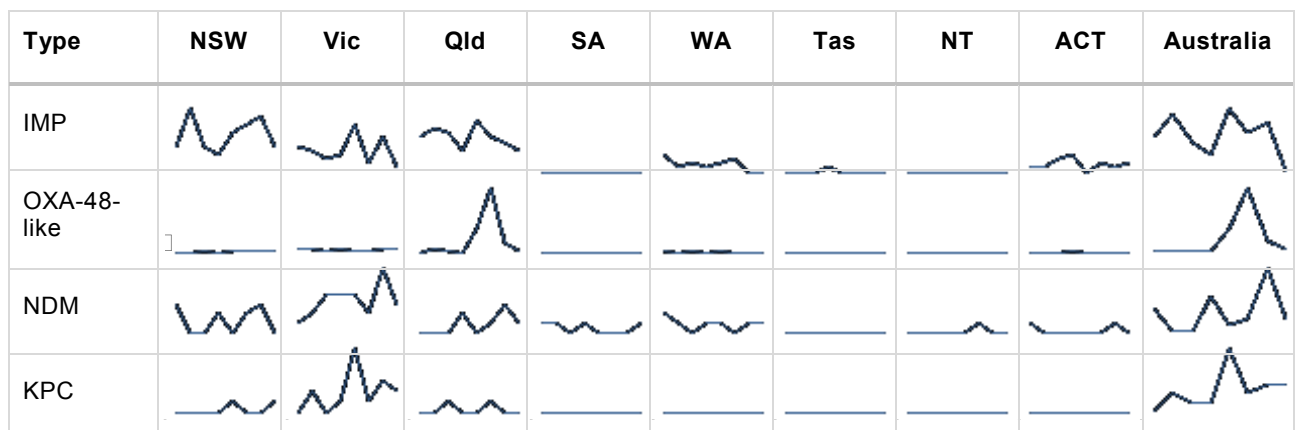
Carbapenemase-producing Enterobacteriaceae type, by state and territory

Figure 3: Carbapenemase-producing Enterobacteriaceae*, by carbapenemase type, number reported by state and territory, 1 July 2017 to 31 August 2017



* Carbapenemase-producing Enterobacteriaceae (n = 83), carbapenemase- and ribosomal methyltransferase-producing Enterobacteriaceae (n = 6)

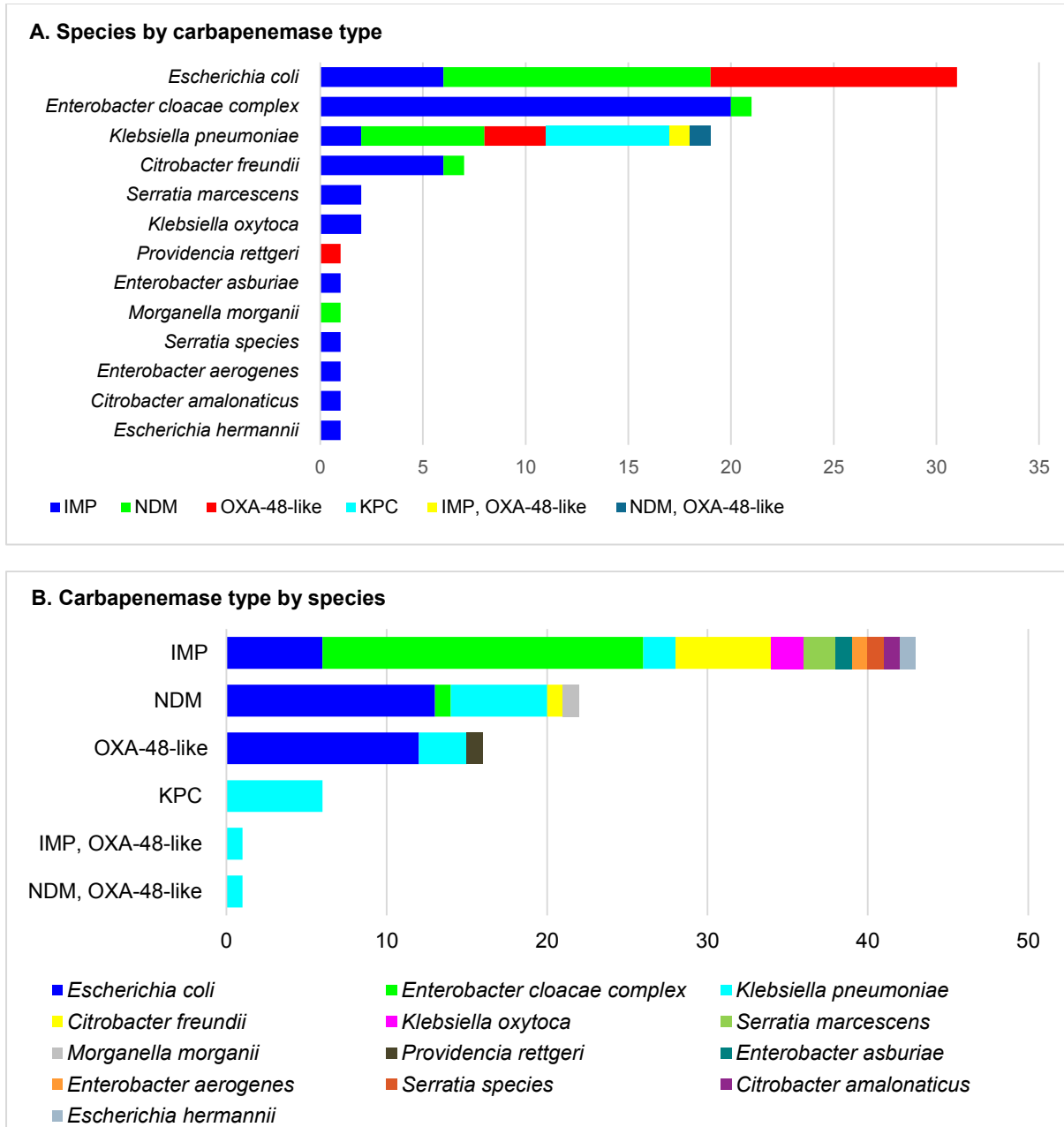
Figure 4: Trend data for the top four carbapenemase types, by state and territory and nationally, 1 January 2017 to 31 August 2017



Line graphs for the period 1 January 2017 to 31 August 2017, for each type

Carbapenemase-producing Enterobacteriaceae by species and carbapenemase type

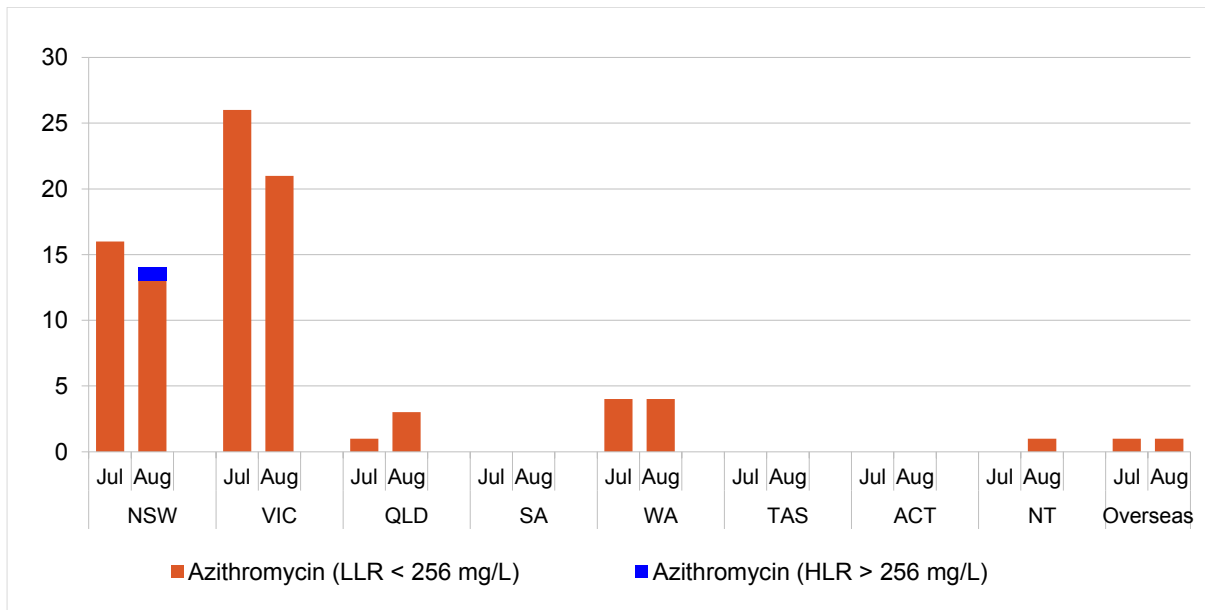
Figure 5: Carbapenemase-producing Enterobacteriaceae, number reported by (A) species and (B) carbapenemase type, 1 July 2017 to 31 August 2017



* Carbapenemase-producing Enterobacteriaceae (n = 83), carbapenemase- and ribosomal methyltransferase-producing Enterobacteriaceae (n = 6)

Neisseria gonorrhoeae by state and territory

Figure 6: *Neisseria gonorrhoeae*, number reported by state and territory, and month of collection*, 1 July 2017 to 31 August 2017



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

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