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ON SAFETY AND QUALITY IN HEALTH CARE**



CARAlert data update 5

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Summary

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 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 January 2018 and 28 February 2018, and the results reported into CARAlert by 31 March 2018.

Carbapenemase-producing Enterobacteriaceae and azithromycin non-susceptible (low-level resistance, MIC \leq 256 mg/L) *Neisseria gonorrhoeae* continue to be the most commonly reported in CARAlert.

This report provides data on the number and distribution of critical antimicrobial resistance isolates, by state and territory. The majority of reported cases were from the three most populous states.

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

The increase in multidrug-resistant *Shigella* species previously reported, peaked in December 2017 and January 2018 and now appears to be declining in February 2018.

The findings regarding CPE highlight the importance of effective implementation of the Commission's [CPE control guidelines](#). The findings regarding azithromycin non-susceptible and ceftriaxone non-susceptible *N. gonorrhoeae* complement the comprehensive long term Commonwealth and state and territory systems that monitor and report antimicrobial resistance as part of national surveillance activities to inform treatment guidelines and sexually transmitted infection prevention and control strategies.

The next six-month report will provide a more detailed analysis 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, 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 233 isolates collected between 1 January 2018 and 28 February 2018 and the results reported into CARAlert by 31 March 2018. From 17 March 2016 to 28 February 2018, 2,454 results from 88 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 100 carbapenemase-producing Enterobacteriaceae (CPE) and 81 azithromycin non-susceptible (low-level resistance, MIC \leq 256 mg/L) *Neisseria gonorrhoeae* during this two-month period. These two resistances were the most commonly reported (78%). The great majority (89%) 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, 1 March 2017 to 28 February 2018.

Figures 3 to 5 show details of carbapenemase type and the species of CPE, by state and territory, 1 January 2018 to 28 February 2018. IMP (61.8%), NDM (21.6%) and OXA-48 (10.8%) types accounted for 94.1% of all CPE reported during this period, with 87.3% from New South Wales, Victoria and Queensland. Over 64% 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. One *N. gonorrhoeae* that was both ceftriaxone non-susceptible and azithromycin non-susceptible (high-level resistance, MIC $>$ 256 mg/L) was reported for the first time in February 2018, from a patient who resided in Queensland. It had an identical antibiogram to a recent isolate in the United Kingdom.²

The increase in multidrug-resistant *Shigella* species previously reported peaked in December 2017 and January 2018 and now appears to be declining in February 2018.

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

² Public Health England. UK case of *Neisseria gonorrhoeae* with high-level resistance to azithromycin and resistance to ceftriaxone acquired abroad. Health Protection Report. 29 March 2018; 12(11).

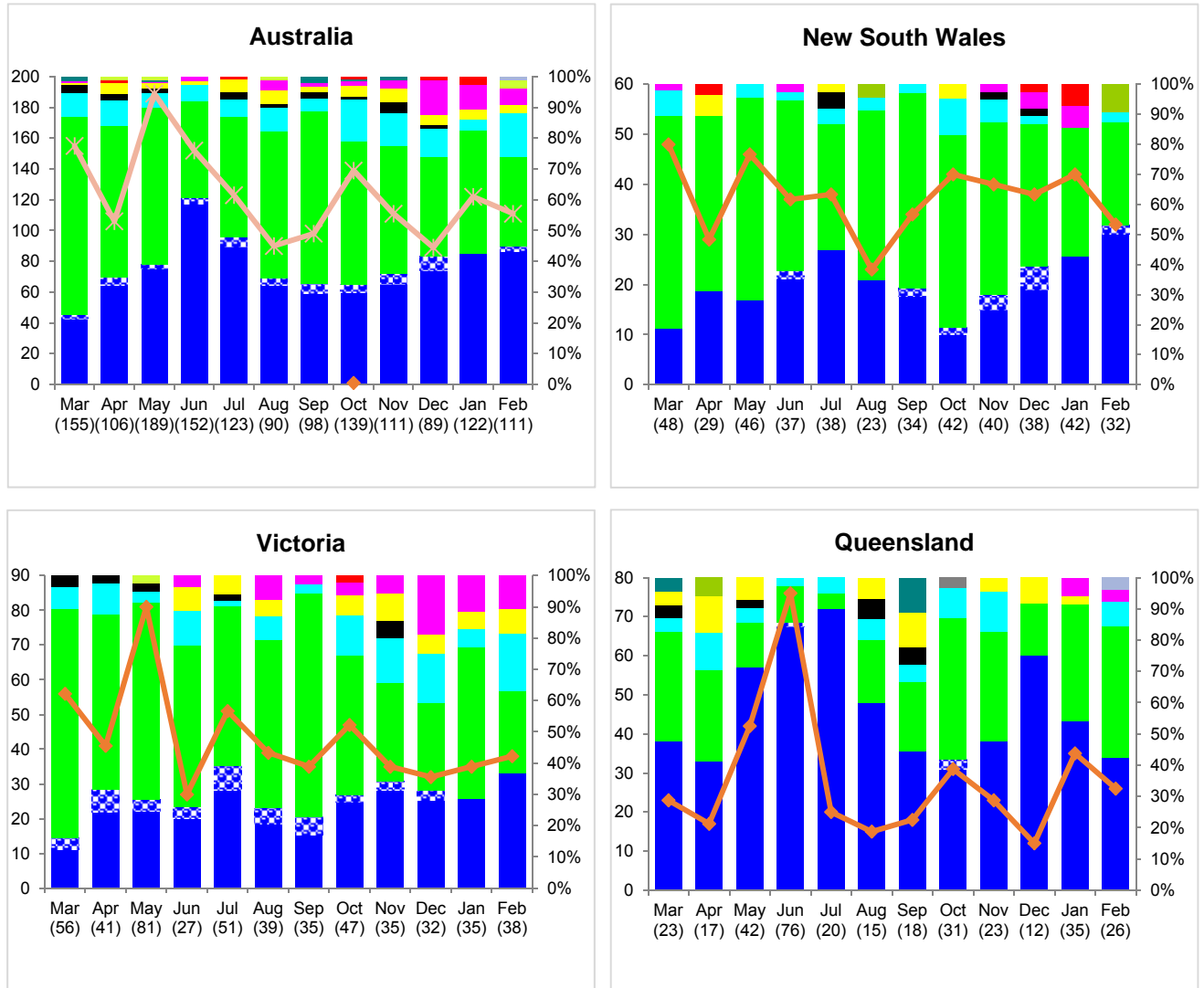
Table 2: Number of critical antimicrobial resistance isolates, by state and territory, 1 January 2018 to 28 February 2018

| Critical antimicrobial resistance | NSW | Vic | Qld | SA | WA | Tas | NT | ACT | OS | Unk | 2018 Jan–Feb | 2018 YTD | 2017 Jan–Feb | 2017 | Trend† Mar-17 Feb-18 |
|--|-----------|-----------|-----------|----------|-----------|----------|----------|----------|----------|----------|--------------|------------|--------------|--------------|----------------------|
| Carbapenemase-producing Enterobacteriaceae | 34 | 24 | 30 | 0 | 10 | 0 | 0 | 2 | 0 | 0 | 100 | 100 | 78 | 528 | |
| Azithromycin non-susceptible (LLR < 256 mg/L) <i>Neisseria gonorrhoeae</i> | 29 | 27 | 24 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 81 | 81 | 149 | 730 | |
| Daptomycin non-susceptible <i>Staphylococcus aureus</i> | 1 | 9 | 2 | 0 | 8 | 0 | 0 | 0 | 0 | 0 | 20 | 20 | 24 | 119 | |
| Multidrug-resistant <i>Shigella</i> species | 3 | 8 | 3 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 16 | 16 | 4 | 27 | |
| Ceftriaxone non-susceptible <i>Salmonella</i> species | 0 | 5 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 7 | 7 | 3 | 37 | |
| Azithromycin non-susceptible (HLR > 256 mg/L) <i>Neisseria gonorrhoeae</i> | 3 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 3 | 0 | 4 | |
| Linezolid non-susceptible <i>Enterococcus</i> species | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 3 | 1 | 5 | |
| Carbapenemase and ribosomal methyltransferase-producing Enterobacteriaceae | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 2 | 2 | 1 | 33 | |
| Ceftriaxone non-susceptible and azithromycin resistant (HLR > 256 mg/L) <i>Neisseria gonorrhoeae</i> | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | |
| Ribosomal methyltransferase-producing Enterobacteriaceae | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 22 | |
| Multidrug-resistant <i>Mycobacterium tuberculosis</i> | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 9 | |
| Ceftriaxone non-susceptible <i>Neisseria gonorrhoeae</i> | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| Vancomycin non-susceptible <i>Staphylococcus aureus</i> | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| Linezolid non-susceptible <i>Staphylococcus aureus</i> | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | |
| Total (as at 31 March 2018) | 74 | 73 | 61 | 1 | 20 | 1 | 0 | 2 | 0 | 1 | 233 | 233 | 263 | 1,515 | |

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

† Trend Mar-17 Feb-18 = 12-month trend, 1 March 2017 to 28 February 2018

Figure 1: Critical antimicrobial resistances (CARs), number and distribution reported nationally, and by state and territory, 1 March 2017 to 28 February 2018



- Carbapenemase-producing Enterobacteriaceae
- Carbapenemase and ribosomal methyltransferase-producing Enterobacteriaceae
- Azithromycin non-susceptible (LLR < 256 mg/L) *Neisseria gonorrhoeae*
- Daptomycin non-susceptible *Staphylococcus aureus*
- Ribosomal methyltransferase-producing Enterobacteriaceae
- Ceftriaxone non-susceptible *Salmonella* species
- Multidrug-resistant *Shigella* species
- Multidrug-resistant *Mycobacterium tuberculosis*
- Linezolid non-susceptible *Enterococcus* species
- Azithromycin non-susceptible (HLR > 256 mg/L) *Neisseria gonorrhoeae*
- Linezolid non-susceptible *Staphylococcus aureus*
- Ceftriaxone non-susceptible and azithromycin non-susceptible (HLR > 256 mg/L) *Neisseria gonorrhoeae*

Figure 1 (continued): Critical antimicrobial resistances (CARs), number and distribution reported nationally, and by state and territory, 1 March 2017 to 28 February 2018

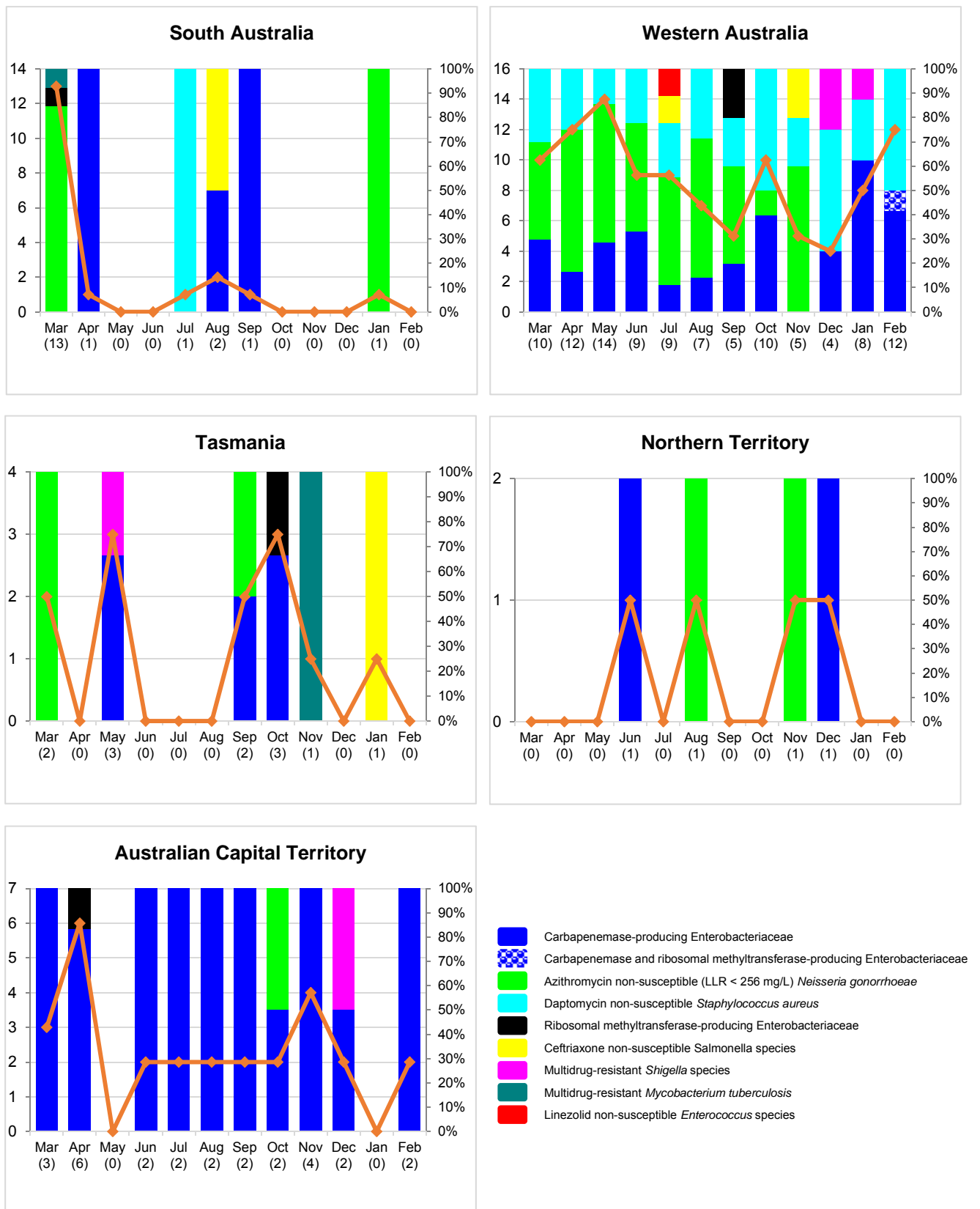
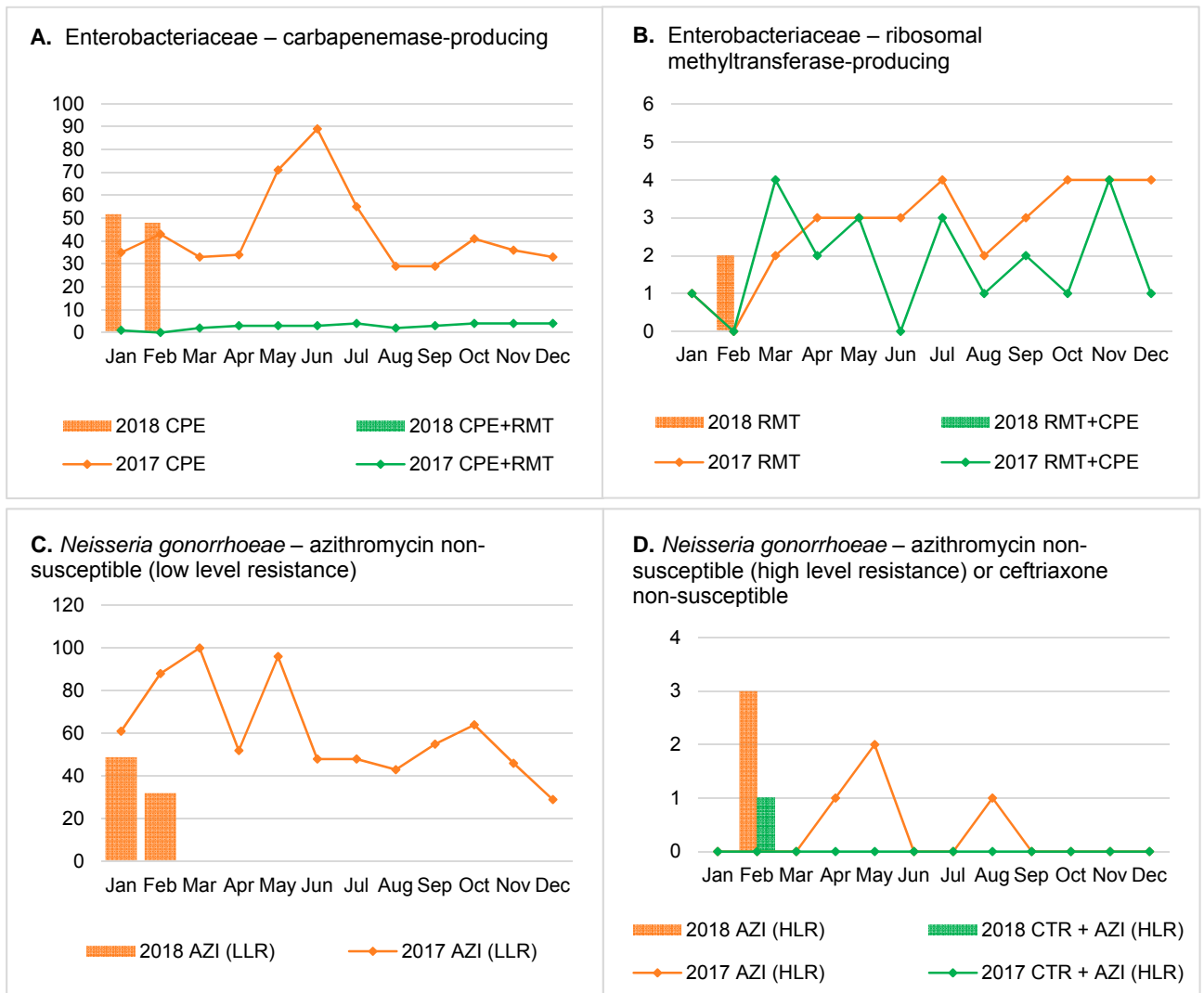


Figure 2: Critical antimicrobial resistances, number reported by species and month, year on year, 1 January 2017 to 28 February 2018

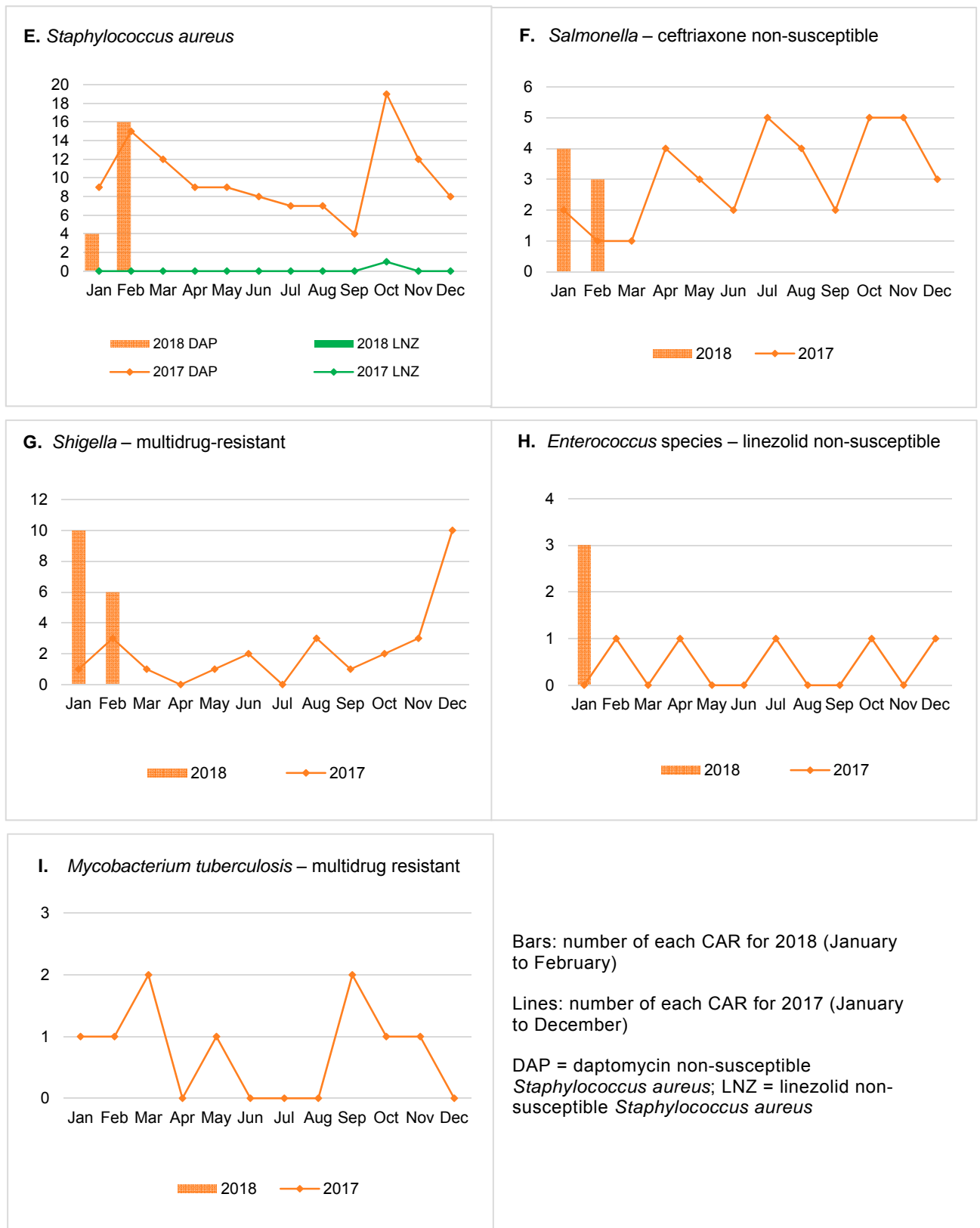


Bars: number of each CAR for 2018 (January to February)

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

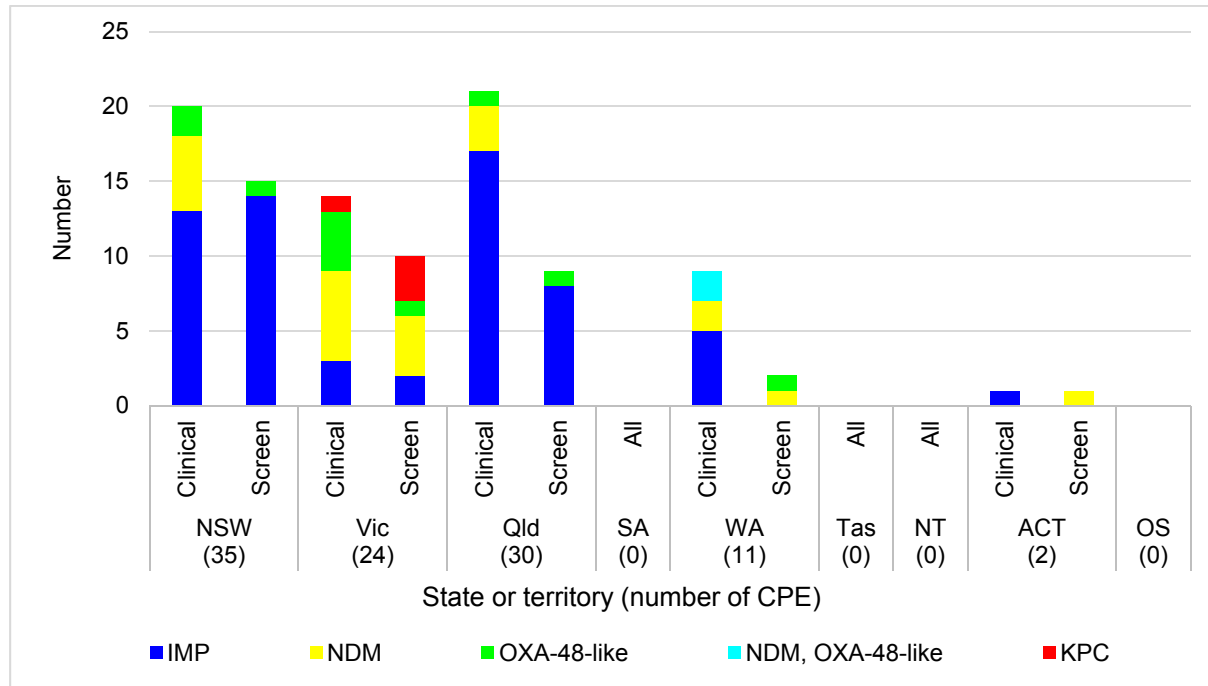
AZI (LLR) = azithromycin non-susceptible, low level resistance (LLR, MIC < 256 mg/L) *Neisseria gonorrhoeae*; AZI (HLR) = azithromycin non-susceptible, high level resistance (HLR, MIC > 256 mg/L) *Neisseria gonorrhoeae*; CPE = carbapenemase-producing Enterobacteriaceae; CPE+RMT = carbapenemase- and ribosomal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

Figure 2 (continued): Critical antimicrobial resistances, number reported by species and month, year on year, 1 January 2017 to 28 February 2018



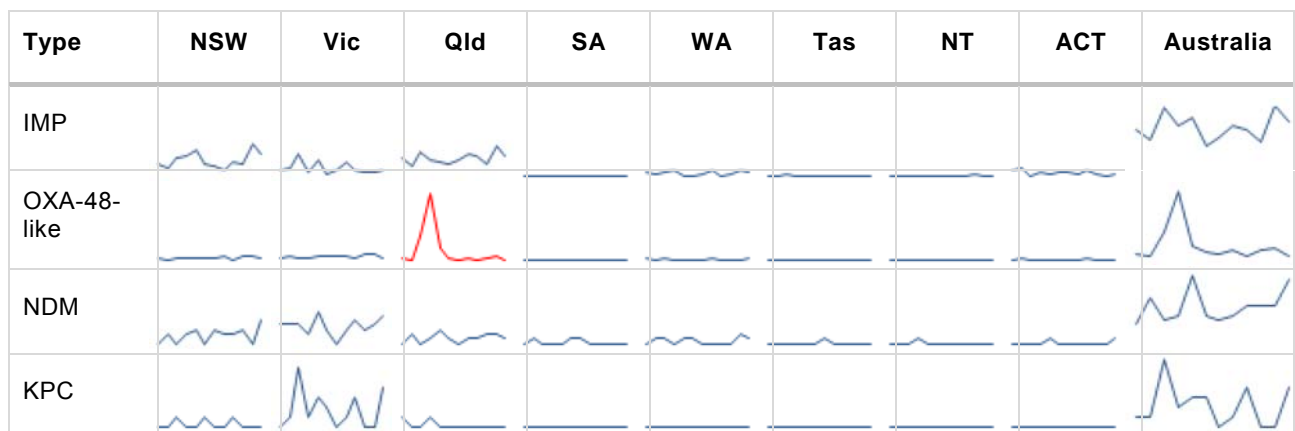
Carbapenemase-producing Enterobacteriaceae type, by state and territory

Figure 3: Carbapenemase-producing Enterobacteriaceae*, by carbapenemase type and specimen type, number reported by state and territory, 1 January 2018 to 28 February 2018



* Carbapenemase-producing Enterobacteriaceae (n = 100), carbapenemase- and ribosomal methyltransferase-producing Enterobacteriaceae (n = 2)

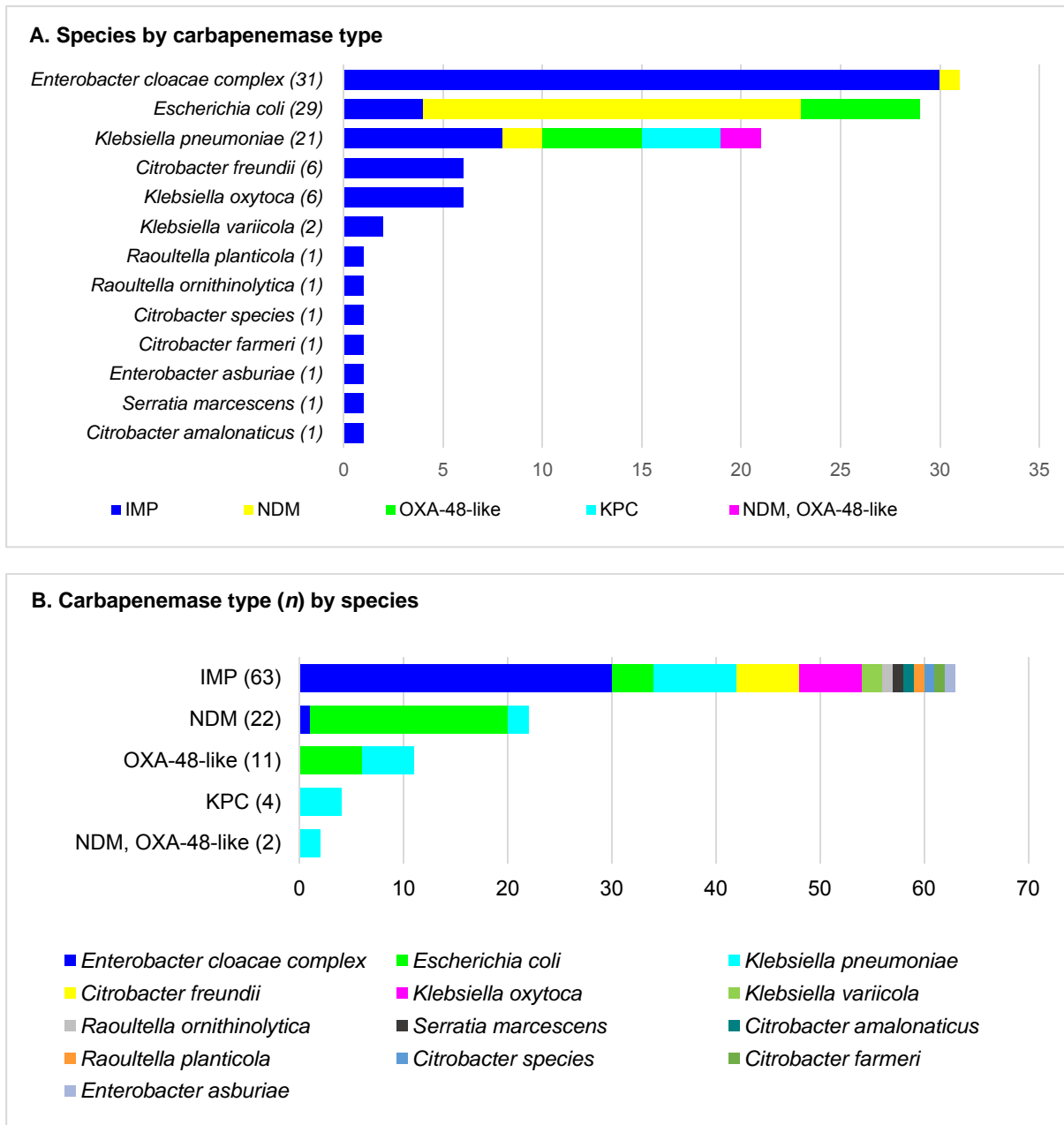
Figure 4: Trend data for the top four carbapenemase types, by state and territory and nationally, 1 March 2017 to 28 February 2018



Line graphs for the period 1 March 2017 to 28 February 2018, for each type

Carbapenemase-producing Enterobacteriaceae by species and carbapenemase type

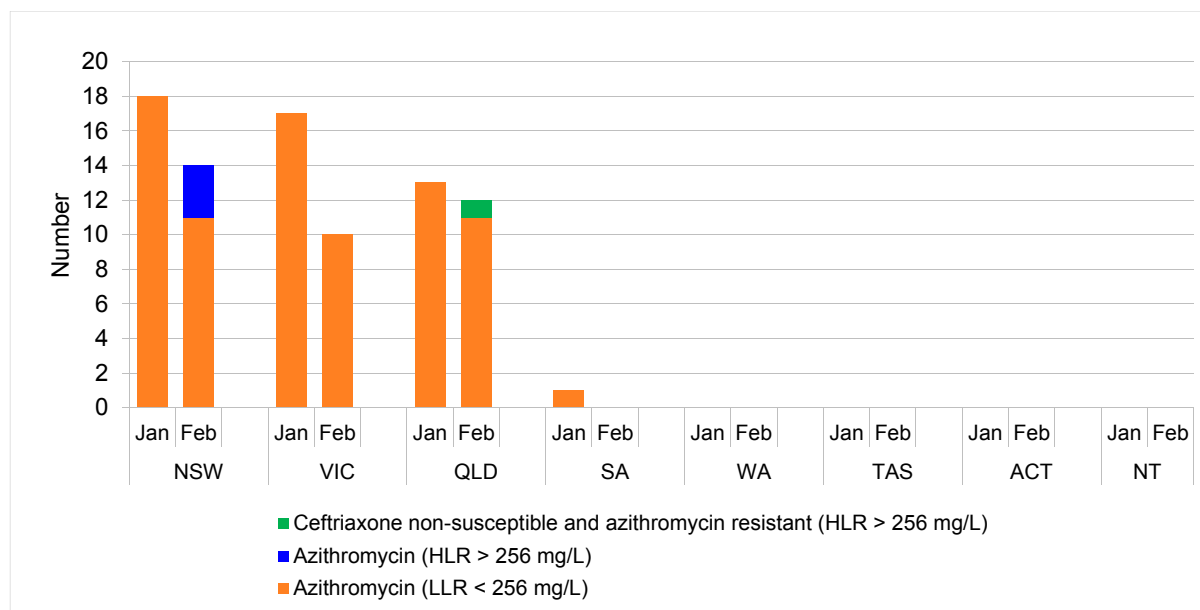
Figure 5: Carbapenemase-producing Enterobacteriaceae, number reported by (A) species and (B) carbapenemase type, 1 January 2018 to 28 February 2018



* Carbapenemase-producing Enterobacteriaceae (n = 100), carbapenemase- and ribosomal methyltransferase-producing Enterobacteriaceae (n = 2)

Neisseria gonorrhoeae by state and territory

Figure 6: *Neisseria gonorrhoeae*, number reported by state and territory, and month of collection*, 1 January 2018 to 28 February 2018



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

Acknowledgement

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