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CARAlert data update 8

1 July 2018–31 August 2018

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## Summary

This data update is one of a [series](https://www.safetyandquality.gov.au/antimicrobial-use-and-resistance-in-australia/what-is-aura/national-alert-system-for-critical-antimicrobial-resistances-caralert/) to provide regular data updates and six-monthly detailed analyses of data submitted to the National Alert System for Critical Antimicrobial Resistances (CARAlert). The format of this update has been changed, compared with previous updates, to make the data more accessible.

See [Appendix 1](#_Appendix_1) for information about CARAlert and its contribution to the Antimicrobial Use and Resistance in Australia (AURA) Surveillance System.

Analyses presented in this update relate to 175 isolates collected from 1 July 2018 to 31 August 2018, where the results were reported to CARAlert by 30 September 2018. From the commencement of CARAlert (17 March 2016) to 31 August 2018, 3,154 results from 92 originating laboratories across Australia were entered into the CARAlert system.

### Data highlights

[Figure 1](#_Figure_1:_Critical) and [Table 1](#_Table_2:_Number) show the number and distribution of critical antimicrobial resistance (CAR) isolates, by state and territory.

There were 75 carbapenemase-producing Enterobacterales [[1]](#footnote-1) (CPE) and 54 azithromycin non-susceptible (low-level resistance, MIC ≤ 256 mg/L) *Neisseria gonorrhoeae* reported during this two-month period. These two resistances were the most commonly reported (74%). The great majority (88%) of reported cases were from New South Wales, Victoria and Queensland.

[Figure 2](#_Figure_2:_Critical) shows the CARs reported by species and month, 1 July 2018 to 31 August 2018.

[Figures 3](#_Figure_3:_Carbapenemase-producing) to 5 show details of carbapenemase type and the species of CPE, by state and territory, 1 July 2018 to 31 August 2018. IMP (51.2%), NDM (17.1%) and OXA-48-like (17.1%) types accounted for 85.4% of all CPE reported during this period, with 90.2% from New South Wales, Victoria and Queensland. Fifty–five percent of CPE were from clinical specimens, although differences were seen between states and territories.

The distribution of azithromycin non-susceptible *N. gonorrhoeae*, by state and territory, is shown in [Figure 6](#_Figure_6:_Neisseria). There was one ceftriaxone non-susceptible *N. gonorrhoeae* confirmed in August 2018 from a patient residing in Victoria.

One report of a GES-5-producing *Klebsiella pneumoniae* was submitted during this reporting period. This is the first time the GES type has been reported in CARAlert. The isolate was collected in May 2018 from a patient residing in Victoria.

### Implications of key findings and response

The findings regarding CPE highlight the importance of implementation of the Commission’s [2017 CPE control guidelines](https://www.safetyandquality.gov.au/our-work/healthcare-associated-infection/cpe-guide/).

The findings regarding azithromycin non-susceptible *N. gonorrhoeae* highlight the importance of state and territory sexually transmitted infection control and prevention programs.

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, including the name of the public hospital where a patient with a confirmed CAR was cared for. This information 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 has recently been completed. The review assessed the resistances and species that are currently reported to CARAlert to determine that they continue to be priorities, and identified additional CARs that should be captured by CARAlert.

System changes to accommodate reporting of four new CARs – transferrable resistance to colistin in Enterobacterales, carbapenemase-producing *Acinetobacter baumannii* complex, carbapenemase-producing *Pseudomonas aeruginosa* and *Candida auris* – are expected to be completed so that reporting can commence in 2019.

### Data

#### Table 1: Number of critical antimicrobial resistance isolates, by state and territory, 1 July 2018 to 31 August 2018.

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Critical antimicrobial resistance | NSW | Vic | Qld | SA | WA | Tas | NT | ACT | OS | Unk | 2018 Jul–Aug | 2018 YTD | 2017 Jul–Aug | 2017 | Trend† Sep-17 Aug-18 |
| Carbapenemase-producing Enterobacterales | 26 | 15 | 26 | 1 | 3 | 1 | 0 | 2 | 1 | 0 | 75 | 369 | 84 | 528 |  |
| Azithromycin non-susceptible (LLR < 256 mg/L) *Neisseria gonorrhoeae* | 9 | 33 | 11 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 54 | 294 | 91 | 730 |  |
| Daptomycin non-susceptible *Staphylococcus aureus* | 3 | 8 | 3 | 0 | 6 | 0 | 0 | 1 | 0 | 1 | 22 | 81 | 14 | 121 |  |
| Carbapenemase and ribosomal methyltransferase-producing Enterobacterales | 3 | 4 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 7 | 15 | 6 | 33 |  |
| Ceftriaxone non-susceptible *Salmonella* species | 1 | 1 | 4 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 6 | 40 | 9 | 37 |  |
| Ribosomal methyltransferase-producing Enterobacterales | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 3 | 6 | 4 | 22 |  |
| Multidrug-resistant *Shigella* species | 2 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 35 | 3 | 31 |  |
| Linezolid non-susceptible *Enterococcus* species | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 2 | 11 | 1 | 5 |  |
| Multidrug-resistant *Mycobacterium tuberculosis* | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 2 | 6 | 1 | 11 |  |
| Ceftriaxone non-susceptible *Neisseria gonorrhoeae* | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 |  |
| Azithromycin non-susceptible (HLR > 256 mg/L) *Neisseria gonorrhoeae* | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 6 | 1 | 4 |  |
| 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 | 1 | 0 | 1 |  |
| Vancomycin non-susceptible *Staphylococcus aureus* | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |  |
| **Total (reported by 30 September 2018)** | **45** | **63** | **46** | **2** | **10** | **1** | **0** | **3** | **3** | **2** | **175** | **867** | **214** | **1,523** |  |

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

† Trend Sep-17 Aug-18 = 12-month trend, 1 September 2017 to 31 August 2018

#### Figure 1: Critical antimicrobial resistances (CARs), number and distribution reported nationally, and by state and territory, 1 September 2017 to 31 August 2018



Figure 1 (continued): Critical antimicrobial resistances (CARs), number and distribution reported nationally, and by state and territory, 1 September 2017 to 31 August 2018

#### Figure 2: Critical antimicrobial resistances, number reported by species and month, year on year, 1 January 2017 to 31 August 2018

**D.** *Neisseria gonorrhoeae* – azithromycin non-susceptible (high level resistance) or ceftriaxone non-susceptible

**A.** Enterobacterales – carbapenemase-producing

**B.** Enterobacterales – ribosomal methyltransferase-producing

**C.** *Neisseria gonorrhoeae* – azithromycin non-susceptible (low level resistance)

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

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 31 August 2018

**H.** *Enterococcus* species – linezolid non-susceptible

**G.** *Shigella* – multidrug-resistant

**E.** *Staphylococcus aureus*

**F.** *Salmonella* – ceftriaxone non-susceptible

**I.** *Mycobacterium tuberculosis* – multidrug resistant

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

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; VAN = vancomycin 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 July 2018 to 31 August 2018.

\* Carbapenemase-producing Enterobacterales (n = 75), carbapenemase- and ribosomal methyltransferase-producing Enterobacterales (n = 7)

#### Figure 4: Two–year trend data for the top four carbapenemase types, by state and territory andnationally, 1 July 2016 to 31 August 2018

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Type** | **NSW** | **Vic** | **Qld** | **SA** | **WA** | **Tas** | **NT** | **ACT** | **Australia** |
| IMP |  |  |  |  |  |  |  |  |  |
| NDM |  |  |  |  |  |  |  |  |  |
| OXA-48-like |  |  |  |  |  |  |  |  |  |
| KPC |  |  |  |  |  |  |  |  |  |
| All types |  |  |  |  |  |  |  |  |  |

Line graphs represent three-month moving average for the period 1 July 2016 to 31 August 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 July 2018 and 31 August 2018.

**A.** **Species (*n*) by carbapenemase type**

**B.** **Carbapenemase type (*n*) by species**

\* Carbapenemase-producing Enterobacterales (n = 75), carbapenemase- and ribosomal methyltransferase-producing Enterobacterales (n = 7)

## *Neisseria gonorrhoeae* by state and territory

#### Figure 6: **Neisseria gonorrhoeae, number reported by state and territory, and month of collection\*,** 1 July 2018 and 31 August 2018.

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

### Appendix 1

## About CARAlert

CARAlert is a key component of the Antimicrobial Use and Resistance in Australia (AURA) Surveillance System. CARAlert was established by the Australian Commission on Safety and Quality in Health Care (the Commission) in March 2016.

The AURA Surveillance System, coordinated by the Commission, provides essential information to develop and implement strategies to prevent and contain antimicrobial resistance (AMR) in human health and improve antimicrobial use across the acute and community healthcare settings. AURA also supports the National Safety and Quality Health Service (NSQHS) Standard Preventing and Controlling Healthcare-Associated Infection and Australia’s National Antimicrobial Resistance Strategy (2015–2019). Funding for AURA is provided by the Australian Government Department of Health and state and territory health departments.

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

The CARs reported under CARAlert are listed in Table 2. The CARs were drawn from the list of high-priority organisms and antimicrobials which are the focus of the AURA Surveillance System.[[2]](#footnote-2)

**Table 2: List of critical antimicrobial resistances reported to CARAlert**

|  |  |
| --- | --- |
| 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)

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.



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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. [↑](#footnote-ref-1)
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. [↑](#footnote-ref-2)