AUSTRALIAN COMMISSION ON SAFETY AND QUALITY IN HEALTH CARE

AURA Antimicrobial Use and Resistance in Australia

CARAlert THE NATIONAL ALERT SYSTEM FOR CRITICAL ANTIMICROBIAL RESISTANCE

CARAlert data update 12

1 March 2019–30 April 2019

July 2019

Published by the Australian Commission on Safety and Quality in Health Care
Level 5, 255 Elizabeth Street, Sydney NSW 2000

Phone: (02) 9126 3600
Fax: (02) 9126 3613

Email: caralert@safetyandquality.gov.au
Website: www.safetyandquality.gov.au

The Commission's preference is that you attribute this publication (and any material sourced from it) using the following citation:

> Australian Commission on Safety and Quality in Health Care. CARAlert update 12: 1 March 2019–30 April 2019. Sydney: ACSQHC; 2019

Disclaimer

The content of this document is published in good faith by the Commission for information purposes. The document is not intended to provide guidance on particular healthcare choices. You should contact your healthcare provider for information or advice on particular healthcare choices.

The Commission does not accept any legal liability for any injury, loss or damage incurred by the use of, or reliance on, this document.

Contents

Data Summary

This report provides an update on data submitted to CARAlert for the reporting period: 1 March 2019 and 30 April 2019, and complements previous analyses of and updates on CARAlert data.

National overview:

- There was a 12% decrease in critical antimicrobial resistances (CARs) reported compared to the previous two-month reporting period (*n* = 275).
- Carbapenemase-producing Enterobacterales (CPE) remains the most frequently reported CAR, (*n* = 142, 52%), followed by azithromycin non-susceptible (low-level resistance, MIC ≤ 256 mg/L) *Neisseria gonorrhoeae* (*n* = 73, 27%).
- Multidrug-resistant *Shigella* species (*n* = 28, 10%) is the third most common CAR, replacing daptomycin non-susceptible *Staphylococcus aureus* this reporting period.
- The greatest increase was in food-borne CARs in this period; ceftriaxone non-susceptible *Salmonella* species and multidrug-resistant *Shigella* species increased by 80% (*n* = 9) and 87% (*n* = 28) respectively.
- *A Salmonella* species (non-typhoidal) harbouring NDM was reported for the first time since the system began; the report was from New South Wales
- There were decreases in the number of reported CPE (*n* = 142, down 9%), and daptomycin non-susceptible *S. aureus* (*n* = 18, down 22%).
- The majority of CARs were reported from public hospitals (*n* = 168); there were 14 reports from private hospitals, 47 from community settings, and seven from aged care homes (four daptomycin non-susceptible *S. aureus* and three CPE).
- The majority of CARs from aged care homes occurred in Queensland (*n* = 6, 85.7%), including two IMP-producing *Enterobacter cloacae* complex and four daptomycin non-susceptible *S. aureus;* one NDM-producing *Klebsiella pneumoniae* from an aged care home was also reported by the Northern Territory.

Carbapenemase-producing Enterobacterales:

- IMP (65.5%), NDM (19.7%), OXA-48-like (9.2%), and NDM+OXA-48-like (2.8%) types accounted for 97.2% of all CPE reported during this period; approximately 1 in 3 CPE were non-IMP types, which are often acquired overseas.
- There was a decrease in the number of NDM-types and IMP-types from screening specimens, compared to the previous two-month period (NDM: *n* = 11 versus *n* = 16; IMP: *n* =44 versus *n* = 56).
- The reductions in NDM screening isolates occurred in all states and territories except in Victoria; reductions in IMP reports from Victoria were primarily in screening isolates rather than clinical isolates (*n* = 31 versus *n* = 13 compared to *n* = 16 versus *n* = 16).
- Victoria continues to report the most CARs from screening isolates (*n* = 28); there were no CARs reported for screening isolates from Western Australia, however there were reports for clinical isolates.
- There were three reports of KPC-types in three different species. All these reports related to one patient episode in Victoria.
- Excluding confirmed CARs for which the setting was unknown, almost 16% of CPE were reported from settings other than public hospitals; private hospitals, community and aged care comprised 9.8% (*n* = 13), 3.8% (*n* = 5) and 2.3% (*n* = 3) respectively.
- Seven hospitals had more than two notifications of IMP-types; these institutions were in New South Wales (*n* = 5), Victoria (*n* = 1) and Queensland (*n* = 1).
- Two hospitals in Victoria had more than two notifications of NDM-types; one of these hospitals also had more than two notifications of IMP-types.
- Two-year trends show an increase in IMP-types in New South Wales; the recent increase in IMP types in Victoria has not continued.

- There were sporadic reports of NDM-types in South Australia, Western Australia, Northern Territory and the Australian Capital Territory; there were no recent reports of CPE in Tasmania.

Azithromycin non-susceptible (low-level resistance, MIC ≤ 256 mg/L) *N. gonorrhoeae*:

- There was a 30% decline in the number of this CAR reported (*n* = 73), compared to the previous two-month reporting period (*n* = 104).
- The majority of cases were reported from NSW (*n* = 43, 59%).
- There was a notable reduction in reports from Victoria (*n* = 23), compared to the previous two-month reporting period (*n* = 43).

***Salmonella* and *Shigella* species:**

- Increases in ceftriaxone non-susceptible *Salmonella* species occurred primarily in Queensland (*n* = 6) and New South Wales (*n* = 4); there were no reports of non-typhoidal *Salmonella* species from Victoria in contrast to other populous states.
- One ceftriaxone non-susceptible *Salmonella* species in New South Wales also contained NDM-type carbapenemase.
- Increases in multidrug-resistant *Shigella* species occurred primarily in Queensland (*n* = 16) and Victoria (*n* = 6). *S. flexneri* has accounted for the majority of the increase in Queensland (*n* = 11, 69%), which included a local cluster detected in Far North Queensland.
- These increases were investigated by the relevant state and territory health authorities and appropriate public health action was implemented to prevent and control further transmission of these infections.

National summary

Table 1: Number of critical antimicrobial resistances, by state and territory, 1 March 2019–30 April 2019, and 2018

Species	Critical resistance	State or territory								Bi-monthly			Year to date		
										2019	2019				
		NSW	Vic	Qld	SA	WA	Tas	NT	ACT	Mar-Apr	Jan-Feb	Relative change	2019	2018	Relative change
Enterobacterales	**Carbapenemase-producing Enterobacterales**	**45**	**48**	**29**	**2**	**4**	**0**	**1**	**4**	**133**	**148**	**▼ 10.1%**	**281**	**193**	**▲ 45.6**
	Carbapenemase and ribosomal methyltransferase-producing	2	7	0	0	0	0	0	0	9	8	▲ 12.5%	17	3	▲ 467%
	Ribosomal methyltransferase-producing	0	1	0	0	0	0	0	0	1	2	▼ 50.0%	3	2	▲ 50.0%
Enterococcus species	Linezolid non-susceptible	0	0	0	0	0	1	0	0	1	2	▼ 50.0%	3	6	▼ 50.0%
Mycobacterium tuberculosis	Multidrug-resistant – at least rifampicin- and isoniazid-resistant strains	1	1	0	0	0	0	0	0	2	3	▼ 33.3%	5	10	▼ 50.0%
Neisseria gonorrhoeae	Azithromycin non-susceptible (LLR < 256 mg/L)	43	23	3	0	1	0	0	3	73	104	▼ 29.8%	177	143	▲ 23.8%
	Azithromycin non-susceptible (HLR > 256 mg/L	0	0	0	0	0	0	0	0	0	0	–	0	5	▼ 100%
	Ceftriaxone non-susceptible	1	0	0	0	0	0	0	0	1	1	0.0%	2	0	–
	Ceftriaxone non-susceptible and azithromycin non-susceptible (LLR < 256 mg/L)	0	0	0	0	0	0	0	0	0	0	–	0	0	–
	Ceftriaxone non-susceptible and azithromycin non-susceptible (HLR > 256 mg/L)	0	0	0	0	0	0	0	0	0	0	–	0	2	▼ 100.0%
Salmonella species	Ceftriaxone non-susceptible	3	1	2	1	1	0	1	0	9	5	▲ 80.0%	14	17	▼ 17.6%
Shigella species	Multidrug-resistant	3	6	16	2	0	0	0	1	28	15	▲ 86.7%	43	27	▲ 59.3%

HLR = high-level resistance; LLR = low-level resistance; – = not applicable

* Relative change = absolute change between period in 2018 and same period in 2019, for each CAR, expressed as a percentage of 2018 base

Table 1 (continued)

Species	Critical resistance	State or territory								Bi monthly			Year to date		
										2019	2019				
		NSW	Vic	Qld	SA	WA	Tas	NT	ACT	Mar-Apr	Jan-Feb	Relative change	2019	2018	Relative change
Staphylococcus aureus	Daptomycin non-susceptible	2	9	5	0	2	0	0	0	18	23	▼ 21.7%	41	46	▼ 10.9%
	Daptomycin and vancomycin non-susceptible	0	0	0	0	0	0	0	0	0	0	–	0	0	–
	Linezolid non-susceptible	0	0	0	0	0	0	0	0	0	0	–	0	1	▼ 100.0%
	Vancomycin non-susceptible	0	0	0	0	0	0	0	0	0	0	–	0	0	–
Streptococcus pyogenes	Penicillin reduced susceptibility	0	0	0	0	0	0	0	0	0	0	–	0	0	–
	Total (reported by 31 May 2019)	**101**	**75**	**54**	**5**	**8**	**1**	**2**	**8**	**275**	**311**	**▼ 11.6%**	**586**	**455**	**▲ 28.8%**

* Relative change = absolute change between period in 2018 and same period in 2019, for each CAR, expressed as a percentage of 2018 base

Table 2: Number of critical antimicrobial resistance isolates, by setting, national, 1 March 2019–30 April 2019

Species	Critical resistance	Setting					Total
		Public hospital	Private hospital	Aged care home	Community	Unknown	
Enterobacterales	Carbapenemase-producing Enterobacterales	105	12	3	5	8	133
	Carbapenemase and ribosomal methyltransferase-producing	7	1	0	0	1	9
	Ribosomal methyltransferase-producing	1	0	0	0	0	1
Enterococcus species	Linezolid non-susceptible	1	0	0	0	0	1
Mycobacterium tuberculosis	Multidrug-resistant – at least rifampicin- and isoniazid-resistant strains	2	0	0	0	0	2
Neisseria gonorrhoeae	Azithromycin non-susceptible (LLR < 256 mg/L)	27*	0	0	31	15	73
	Azithromycin non-susceptible (HLR > 256 mg/L	0	0	0	0	0	0
	Ceftriaxone non-susceptible	0	0	0	1	0	1
	Ceftriaxone non-susceptible and azithromycin non-susceptible (LLR < 256 mg/L)	0	0	0	0	0	0
	Ceftriaxone non-susceptible and azithromycin non-susceptible (HLR > 256 mg/L)	0	0	0	0	0	0
Salmonella species	Ceftriaxone non-susceptible	7	0	0	1	1	9
Shigella species	Multidrug-resistant	10	0	0	16	2	28
Staphylococcus aureus	Daptomycin non-susceptible	8	1	4	5	0	18
	Daptomycin and vancomycin non-susceptible	0	0	0	0	0	0
	Linezolid non-susceptible	0	0	0	0	0	0
	Vancomycin non-susceptible	0	0	0	0	0	0
Streptococcus pyogenes	Penicillin reduced susceptibility	0	0	0	0	0	0
	Total (reported by 31 May 2019)	**168**	**14**	**7**	**59**	**17**	**275**

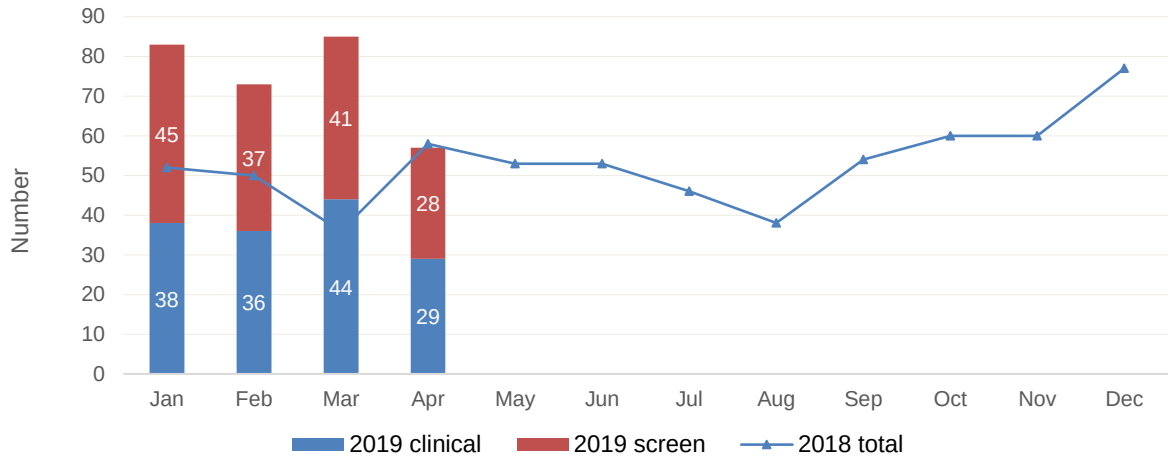
* Mostly sexual health clinics located within a hospital

Summary by CAR

Enterobacterales

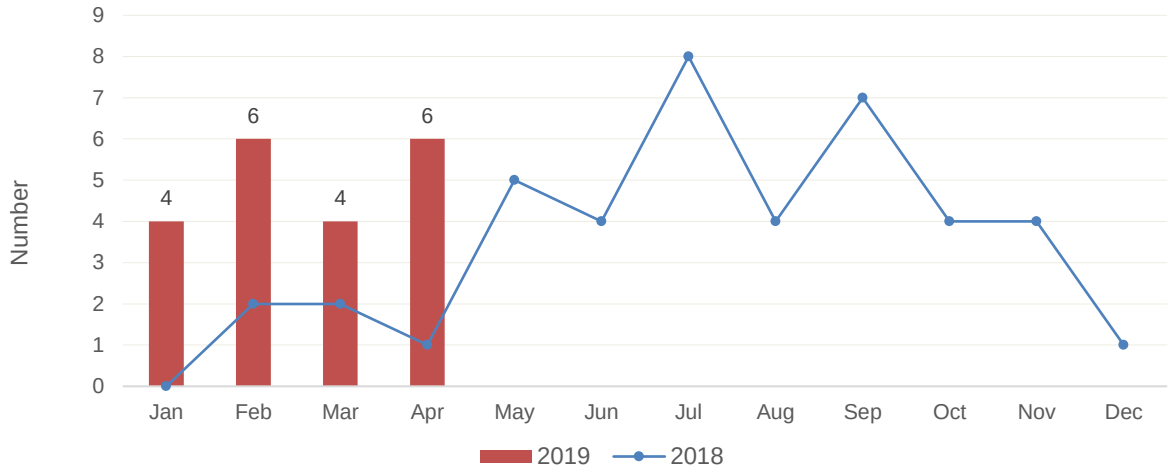
National data

Figure 1: Carbapenemase-producing Enterobacterales*, number reported by specimen type for 2019, compared with the total for previous year, national



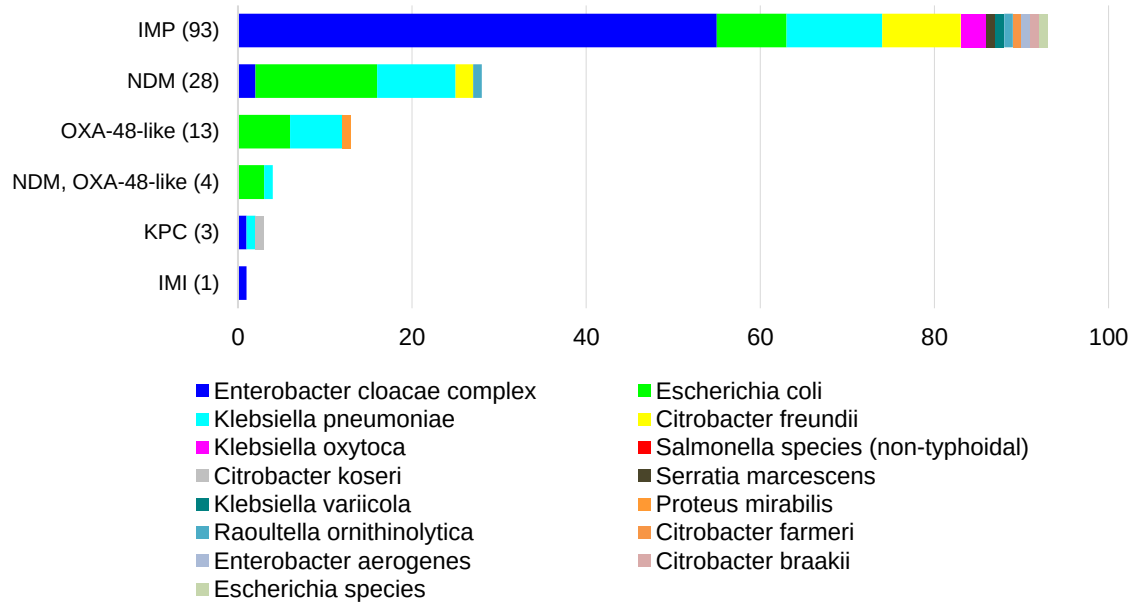
* Carbapenemase-producing alone or in combination with ribosomal methyltransferases

Figure 2: Ribosomal methyltransferase-producing Enterobacterales*, number reported for 2019 by month, compared with the previous year, national



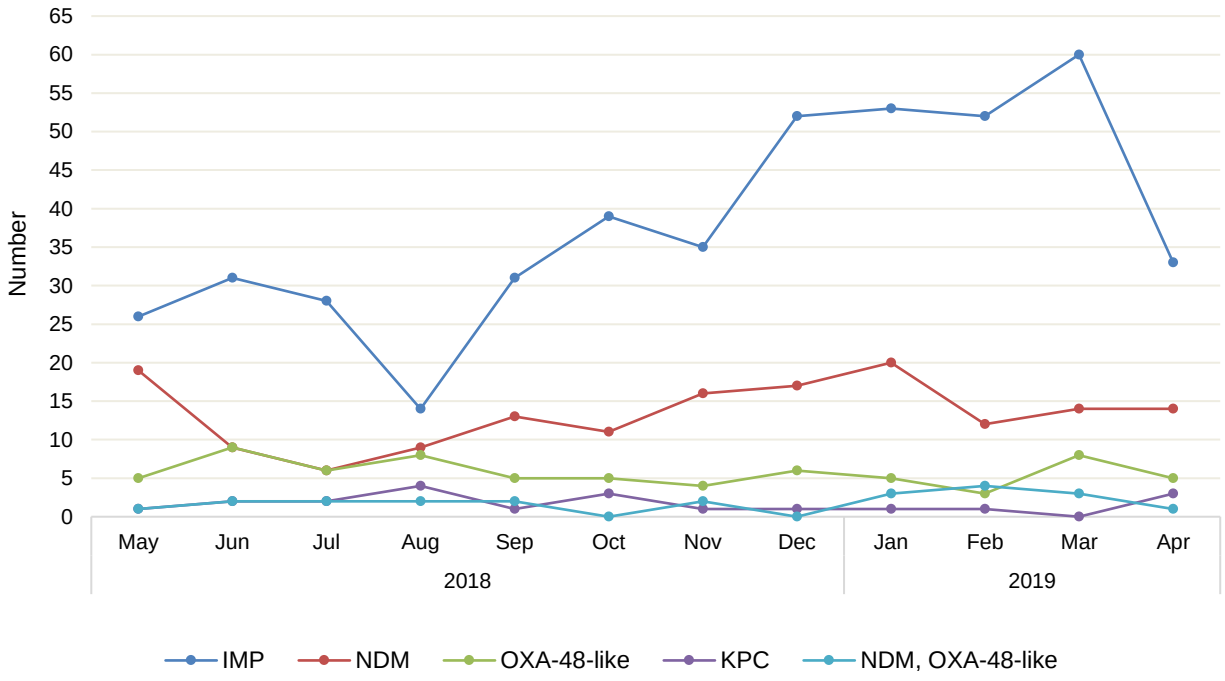
* Ribosomal methyltransferases alone, or in combination with carbapenemases

Figure 3: Carbapenemase-producing Enterobacterales*, number reported by carbapenemase type and species, national, 1 March 2019–30 April 2019



* Carbapenemase-producing Enterobacterales (*n* = 133), carbapenemase- and ribosomal methyltransferase-producing Enterobacterales (*n* = 9)

Figure 4: Twelve–month trend for the top four reported carbapenemase types, national, 1 May 2018–30 April 2019



State and territory

Figure 5: Carbapenemase-producing Enterobacterales, number reported by state and territory, 1 March 2019–30 April 2019

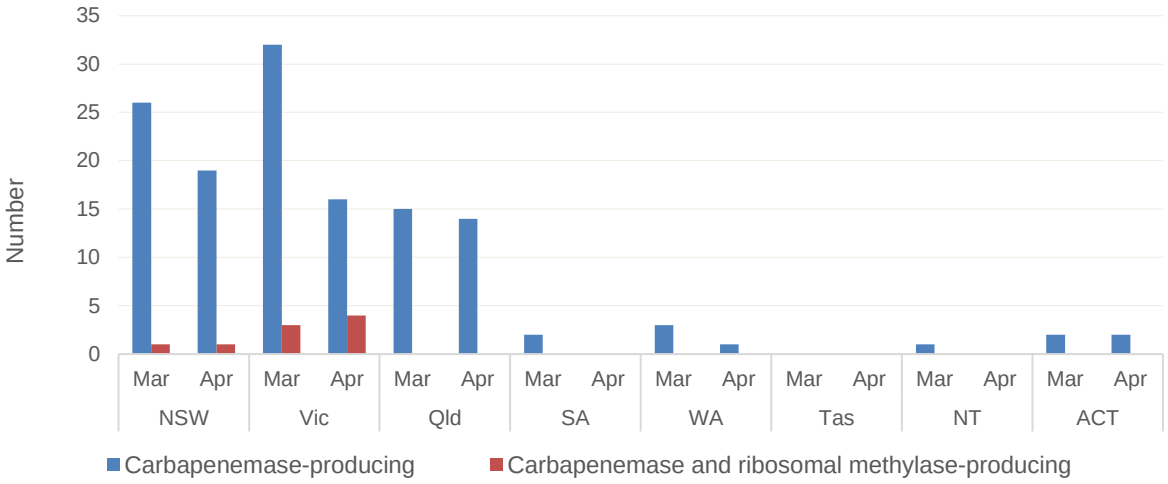


Figure 6: Two-year trend for the top four reported carbapenemase types, by state and territory and nationally, (three-month moving average), 1 May 2017–30 April 2019

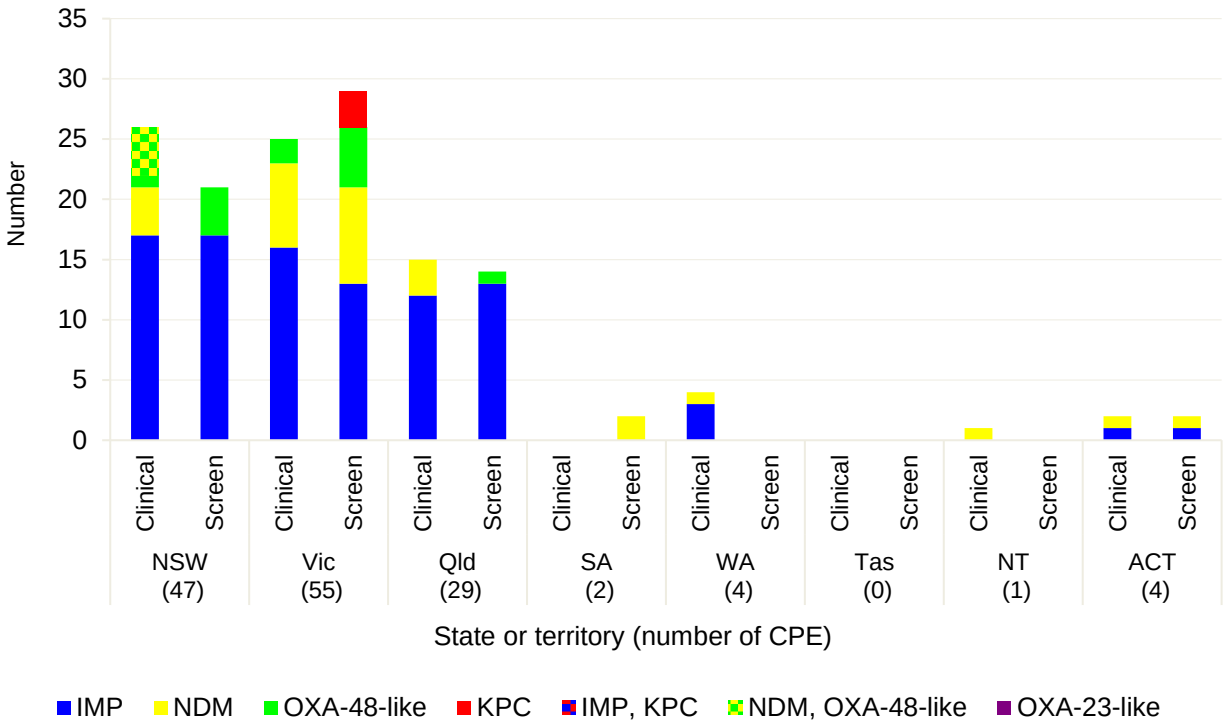
Type	NSW	Vic	Qld	SA	WA	Tas	NT	ACT	Australia
IMP	18 5	23 2	12 7	0 0	4 0	0 0	0 0	3 0	55 20
NDM	4 1	7 3	6 1	1 0	2 0	0 0	1 0	1 0	18 6
OXA-48-like	3 0	5 1	26 0	0 0	1 0	0 0	0 0	0 0	29 4
KPC	1 0	3 0	0 0	0 0	0 0	0 0	0 0	0 0	4 1
All types	26 9	35 11	38 9	2 0	6 1	1 0	1 0	3 0	80 36

Line graphs represent three-month moving average for the period 1 May 2017 to 30 April 2019, for each type, where maximum monthly average was greater than one.

Straight green line in cell = no carbapenemase type for that state or territory during the reporting period

Blank cell = maximum monthly average was one or less

Figure 7: Carbapenemase-producing Enterobacterales*, number reported by carbapenemase type and specimen type, by state and territory, 1 March 2019–30 April 2019



* Carbapenemase-producing Enterobacterales (*n* = 133), carbapenemase- and ribosomal methyltransferase-producing Enterobacterales (*n* = 9)

Notes:

1. An increase in screening isolates may be due to a change in screening practice or indicate that an outbreak is being managed
2. NDM-type is primarily associated with overseas acquisition; increases in NDM-type screening isolates may be due to increased overseas acquisition in local patients. Local transmission requires enhanced surveillance and response.

Figure 8: Top four reported carbapenemase-producing Enterobacterales type by specimen type, by state and territory, 1 March 2019–30 April 2019

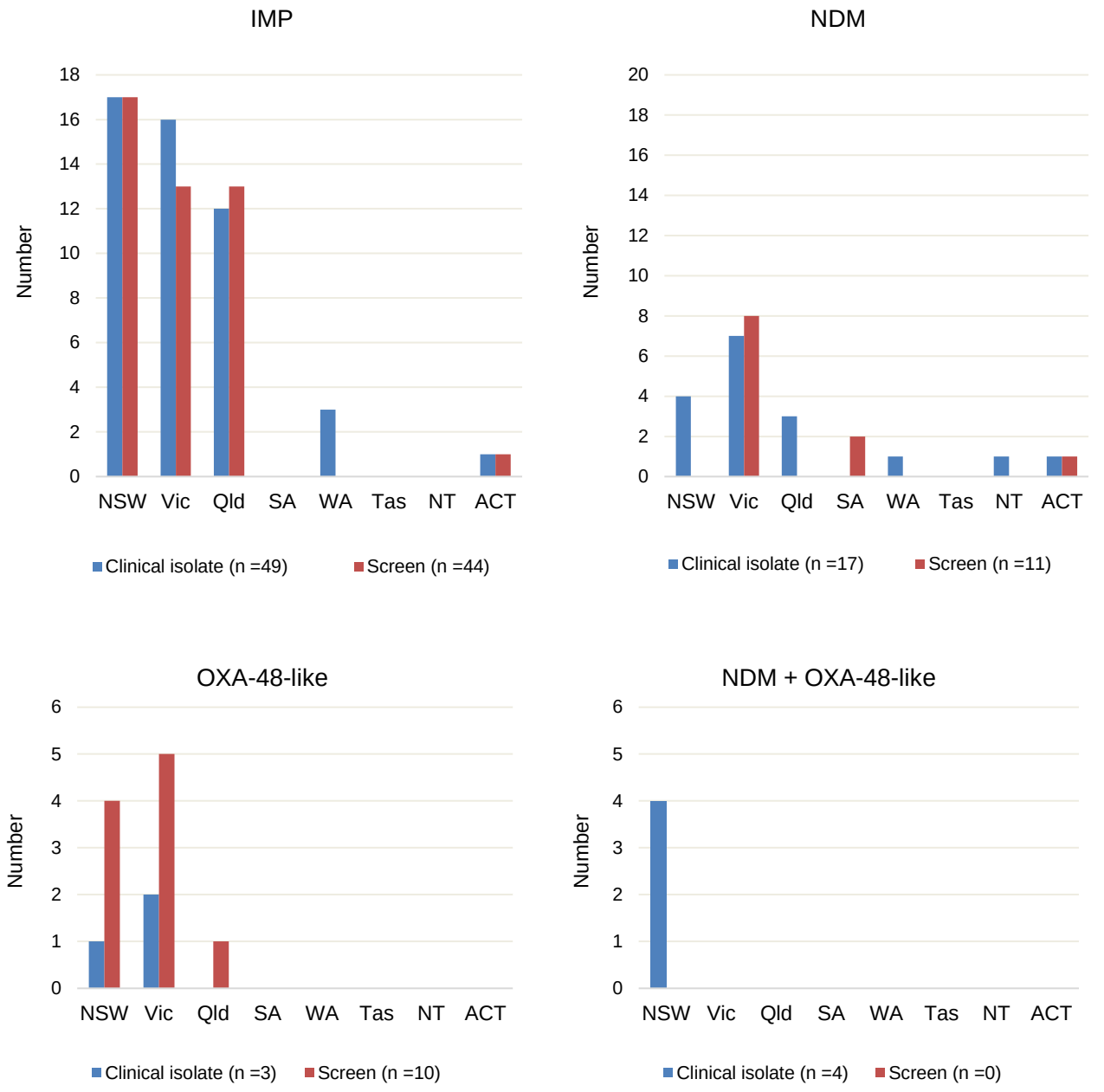
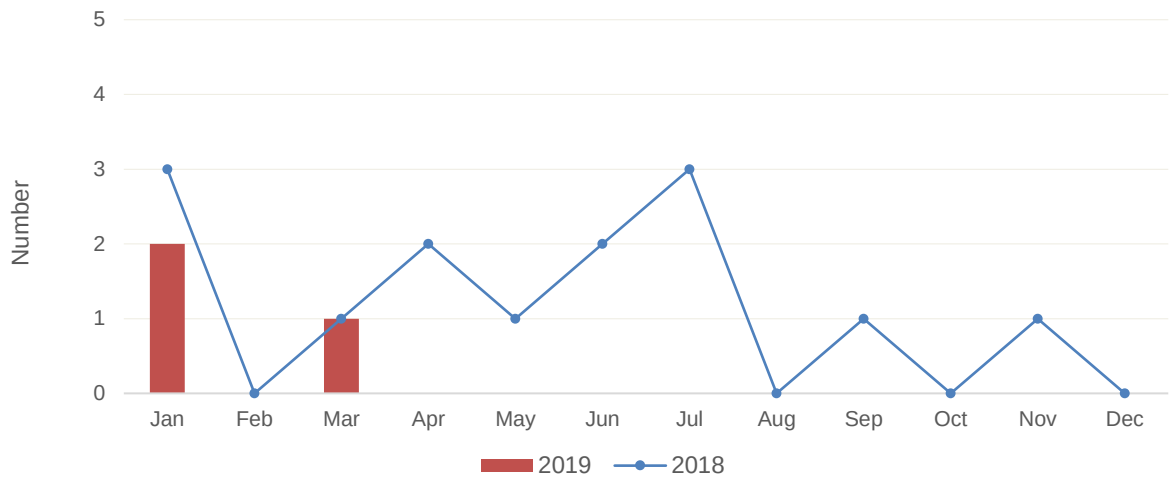


Table 3: Top four carbapenemase types, number reported by setting, by state and territory, 1 March 2019–30 April 2019

Carbapenemase type	Setting	State or territory								Total
		NSW	Vic	Qld	SA	WA	Tas	NT	ACT	
IMP	**Total**	**34**	**29**	**25**	**0**	**3**	**0**	**0**	**2**	**93**
	Public hospital	33	27	11	0	3	0	0	2	76
	Private hospital	0	1	8	0	0	0	0	0	9
	Aged care home	0	0	2	0	0	0	0	0	2
	Community	0	1	0	0	0	0	0	0	1
	Unknown	1	0	4	0	0	0	0	0	5
NDM	**Total**	**4**	**15**	**3**	**2**	**1**	**0**	**1**	**2**	**28**
	Public hospital	3	12	1	1	0	0	0	2	19
	Private hospital	0	1	0	0	0	0	0	0	1
	Aged care home	0	0	0	0	0	0	1	0	1
	Community	0	2	1	0	1	0	0	0	4
	Unknown	1	0	1	1	0	0	0	0	3
OXA-48-like	**Total**	**5**	**7**	**1**	**0**	**0**	**0**	**0**	**0**	**13**
	Public hospital	5	5	0	0	0	0	0	0	10
	Private hospital	0	2	1	0	0	0	0	0	3
	Aged care home	0	0	0	0	0	0	0	0	0
	Community	0	0	0	0	0	0	0	0	0
	Unknown	0	0	0	0	0	0	0	0	0
NDM, OXA-48-like	**Total**	**4**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**4**
	Public hospital	3	0	0	0	0	0	0	0	3
	Private hospital	0	0	0	0	0	0	0	0	0
	Aged care home	0	0	0	0	0	0	0	0	0
	Community	0	0	0	0	0	0	0	0	0
	Unknown	1	0	0	0	0	0	0	0	1

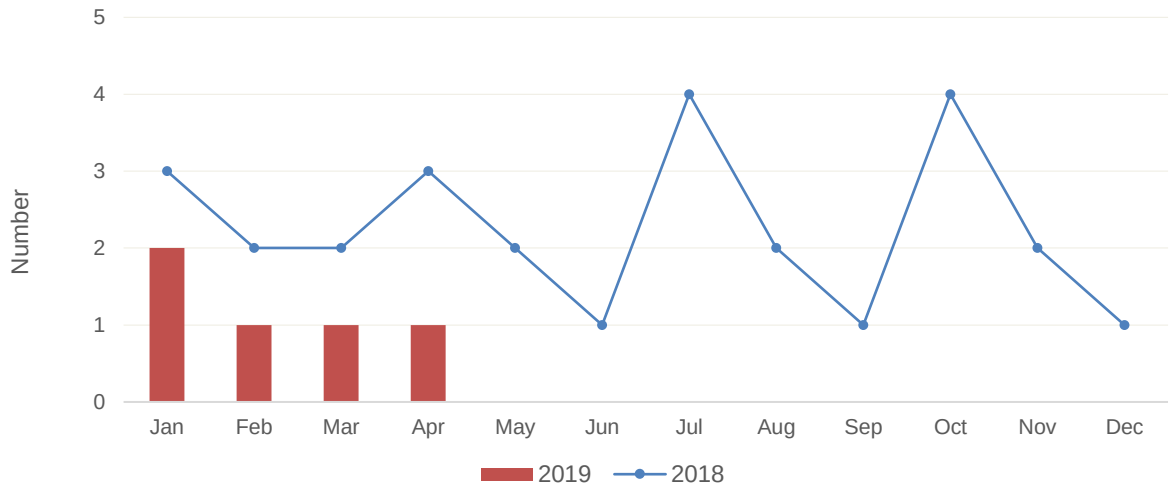
Enterococcus species

Figure 9: Linezolid non-susceptible *Enterococcus* species, number reported for 2019, by month, compared with the previous year, national



Mycobacterium tuberculosis

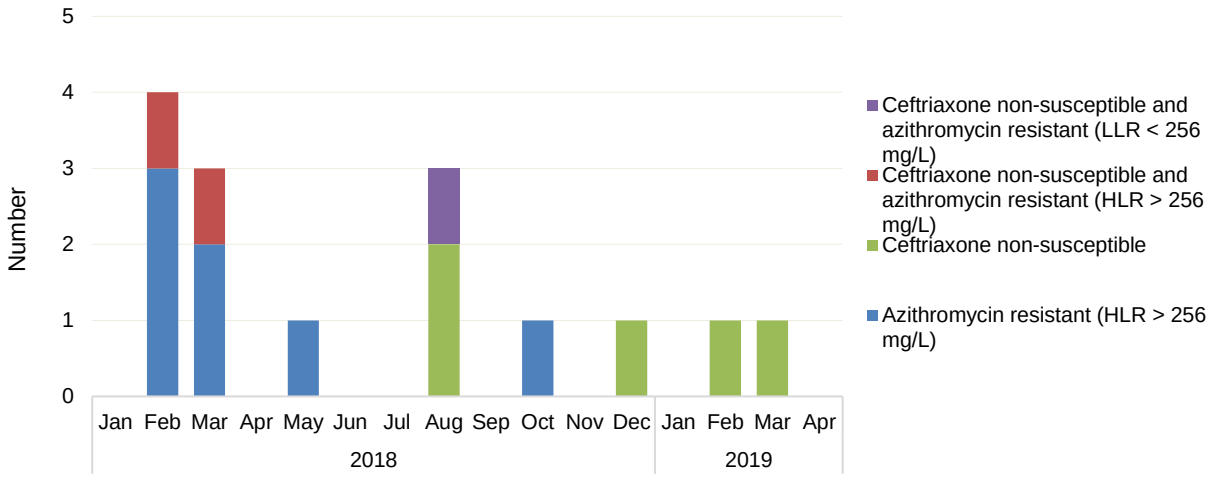
Figure 10: Multidrug-resistant *Mycobacterium tuberculosis,* number reported for 2019 by month, compared with the previous year, national



Neisseria gonorrhoeae

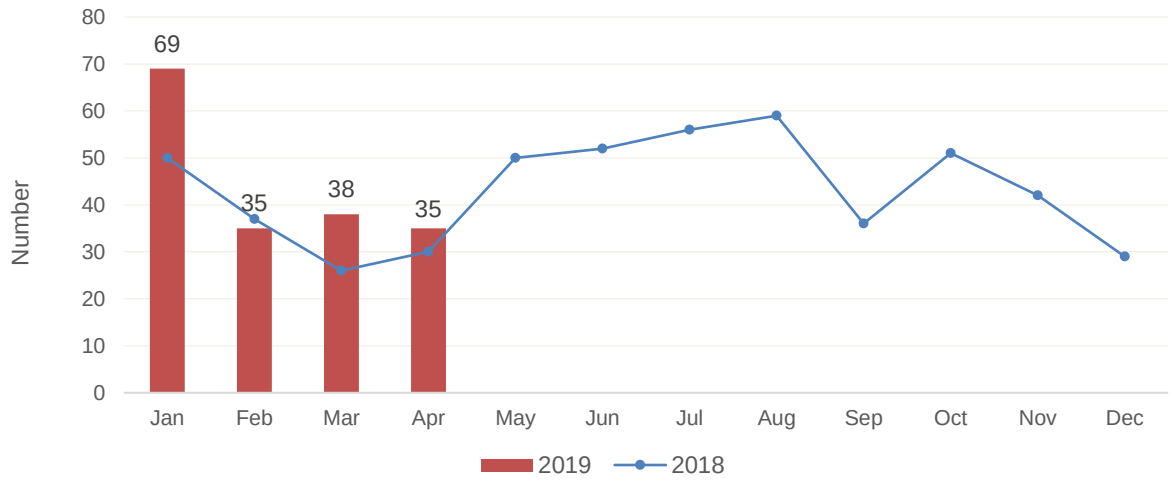
National data

Figure 11: Ceftriaxone non-susceptible and/or azithromycin non-susceptible (HLR > 256 mg/L) *Neisseria gonorrhoeae,* number reported by month, 1 January 2018–30 April 2019



LLR: Low level resistance; HLR: High level resistance

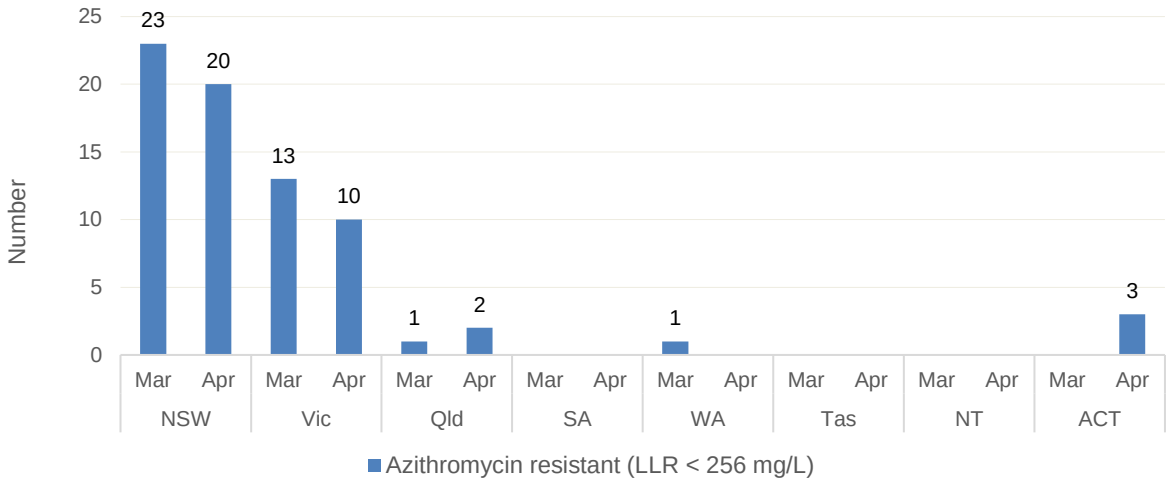
Figure 12: Azithromycin non-susceptible (LLR < 256 mg/L) *Neisseria gonorrhoeae,* number reported for 2019 by month, compared with the previous year, national



LLR: Low level resistance

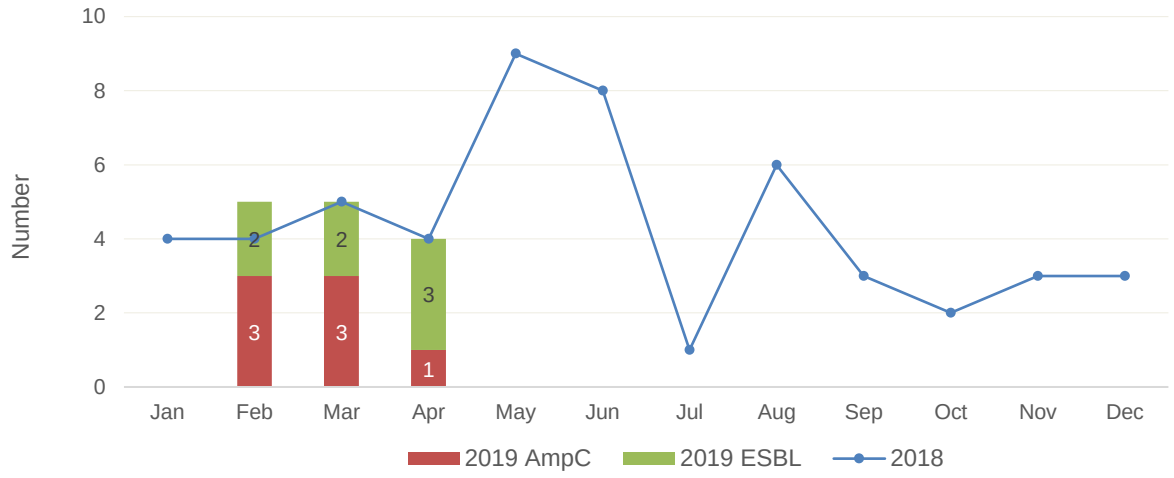
State and territory

Figure 13: Azithromycin non-susceptible (LLR < 256 mg/L) *Neisseria gonorrhoeae,* number reported by state and territory, 1 March 2019–30 April 2019



Salmonella species

Figure 14: Ceftriaxone non susceptible *Salmonella* species, number reported for 2019 by month, compared with the previous year, national

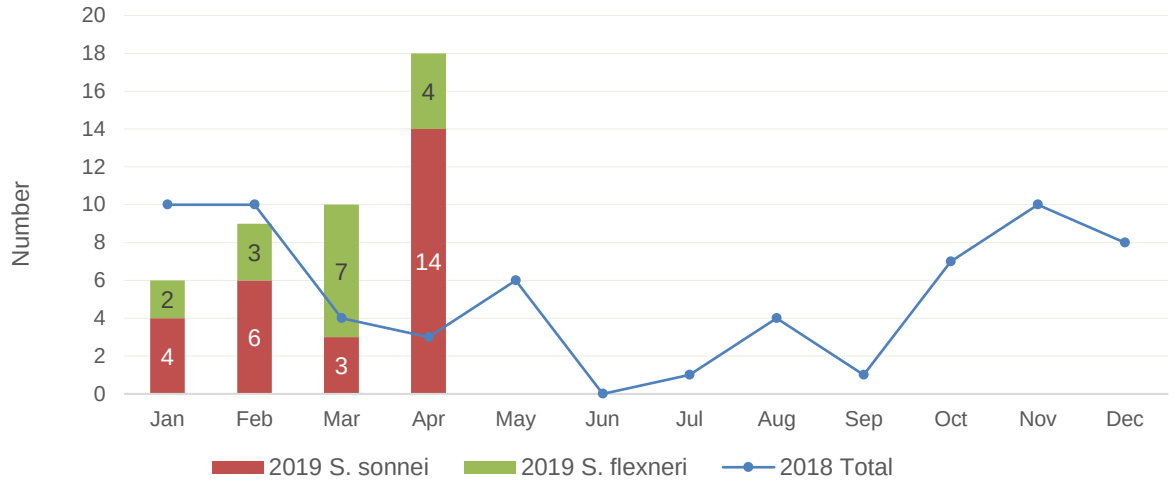


Notes (1 March 2019—30 April 2019)

1. Non-typhoidal Salmonella species (n = 8) and typhoidal Salmonella species (ESBL) (n = 1)
2. Includes one non-typhoidal species with AmpC (CMY2) and NDM-type carbapenemase

Shigella species

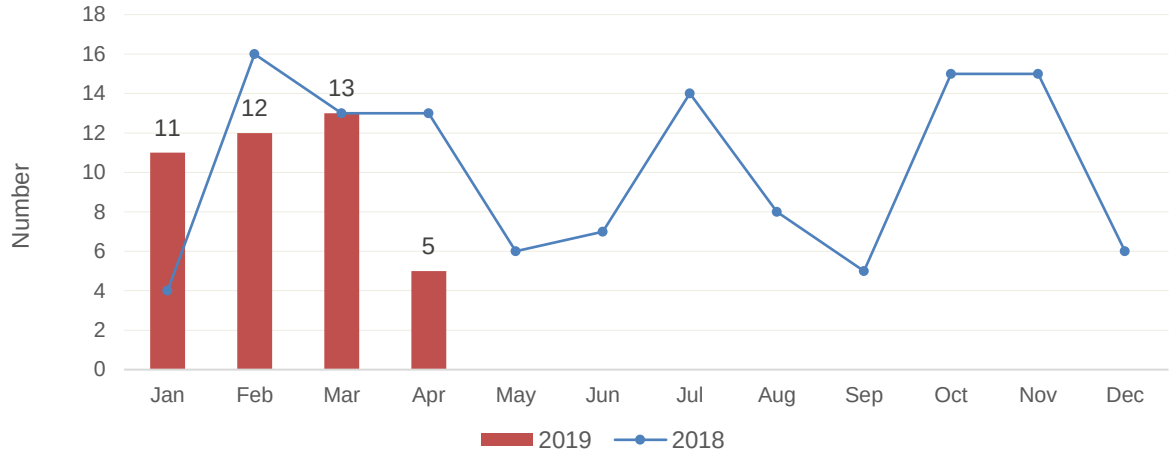
Figure 15: Multidrug-resistant *Shigella* species, number reported for 2019 by month, compared with the previous year, national



Staphylococcus aureus

National data

Figure 16: Daptomycin non-susceptible *Staphylococcus aureus,* number reported for 2019 by month, compared with the previous year, national



Note: No linezolid non-susceptible *S. aureus* or vancomycin non-susceptible *S. aureus* were reported in the two-month period (March–April 2019).

State and territory

Table 4. Daptomycin non-susceptible *Staphylococcus aureus,* number reported by setting and state and territory, 1 March 2019–30 April 2019

Setting	State or territory								Total
	NSW	Vic	Qld	SA	WA	Tas	NT	ACT	
Total	**2**	**9**	**5**	**0**	**2**	**0**	**0**	**0**	**18**
Public hospital	2	3	1	0	2	0	0	0	8
Private hospital	0	1	0	0	0	0	0	0	1
Aged care home	0	0	4	0	0	0	0	0	4
Community	0	5	0	0	0	0	0	0	5
Unknown	0	0	0	0	0	0	0	0	0

Appendix

Data Notes

The following are important considerations for interpreting CARAlert data:

1. The data are based on the date that the isolate with the confirmed CAR was collected.
2. States and territories refer to the state or territory where the CAR was detected. If place of residence is unknown or overseas, the state or territory of the originating laboratory is reported.
3. Comparison between reports may be influenced by delayed detection or late submissions of CARs.
4. Number of CARs reported does not always equal the number of patients, as patients may have more than one CAR, or species, detected in a specimen.
5. Cut-off date for data that are included in updates and reports is four weeks after the end of each reporting period.
6. National summary data is provided; comparison across states and territories is provided for organisms where there are large numbers reported and a comparison is meaningful.
7. Authorised offers in each states and territory health department can access the CARAlert web portal directly for further information about their jurisdiction, including the name of the public hospital where a patient with a confirmed CAR was cared for, and to extract reports on their data.

About CARAlert

CARAlert is a 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 in March 2016.

The AURA Surveillance System provides essential information to develop and implement strategies to prevent and contain antimicrobial resistance 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.[1]

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:

1. Collection and routine testing – the isolate is collected from the patient and sent to the originating laboratory for routine testing
2. 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
3. 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.

[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.

AUSTRALIAN COMMISSION
ON SAFETY AND QUALITY IN HEALTH CARE

Level 5, 255 Elizabeth Street, Sydney NSW 2000
GPO Box 5480, Sydney NSW 2001

Phone: (02) 9126 3600
Fax: (02) 9126 3613

Email: mail@safetyandquality.gov.au
Website: www.safetyandquality.gov.au