AUSTRALIAN COMMISSION ON SAFETY AND QUALITY IN HEALTH CARE

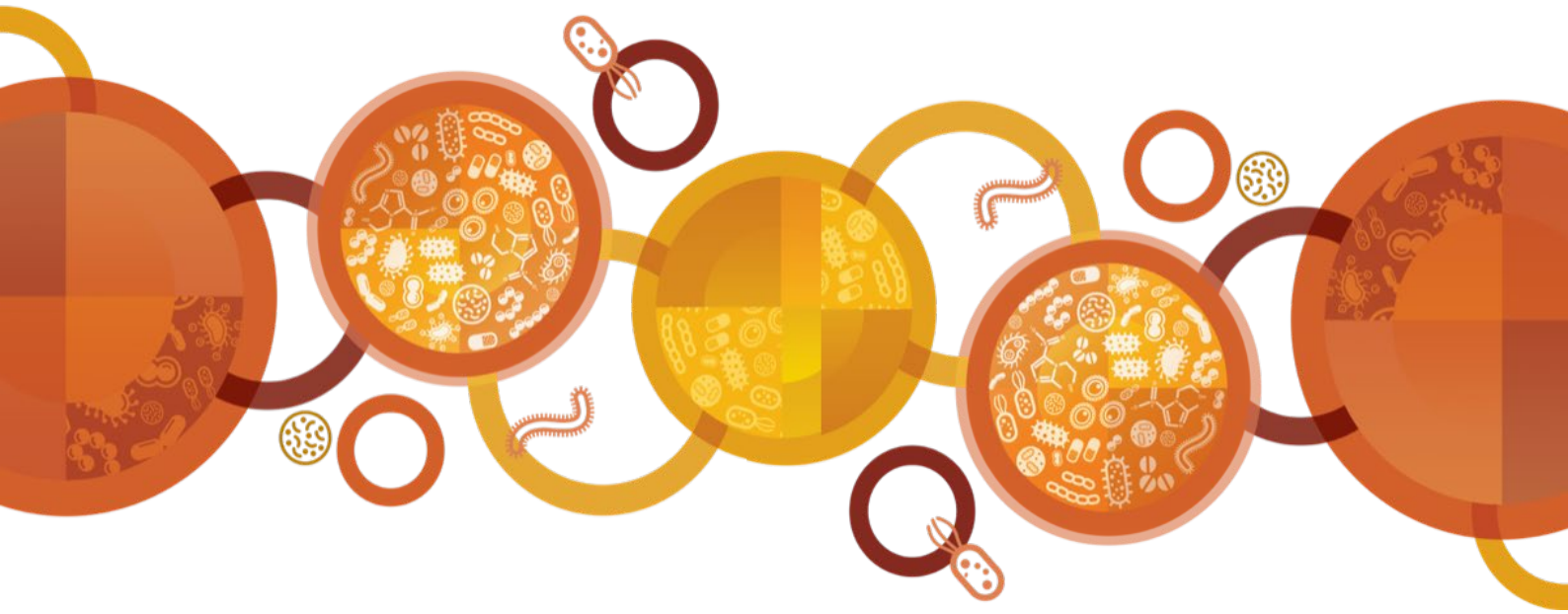
AURA Antimicrobial Use and Resistance in Australia

CARAlert THE NATIONAL ALERT SYSTEM FOR CRITICAL ANTIMICROBIAL RESISTANCE

CARAlert data update 30

1 September 2022–31 October 2022

December 2022



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Contents

Data Summary

This report provides an update on data submitted to the National Alert System for Critical Antimicrobial Resistances (CARAlert) for the reporting period: 1 September 2022 to 31 October 2022, and complements previous analyses of and updates on CARAlert data.

National overview

- The total number of critical antimicrobial resistances (CARs) reported was up 16.1% compared to the previous two-month reporting period (*n* = 259 versus *n* = 223)
- A little under two-thirds of the CARs reported were carbapenemase-producing *Enterobacterales* (CPE) (including those with ribosomal methyltransferase) (158/259, 61.0%)
- The total number of CPE (either alone or in combination with other CARs) reported to date this year, compared with the same period last year, increased by 35.6% (*n* = 697 versus *n* = 514)
- Azithromycin-nonsusceptible (low-level resistance) *Neisseria gonorrhoeae* was the second most reported CAR (33/259, 12.7%)
- The number of ceftriaxone- or azithromycin-nonsusceptible *N. gonorrhoeae* increased by 260% (*n* = 36) compared with the previous two-month reporting period (*n* = 10)
- Excluding *N. gonorrhoeae*, where the setting was known, the majority of CARs were reported from public hospitals (162/211, 76.8%). There were 39 (18.5%) reports from community settings, 10 (4.7%) from private hospitals, and no reports from aged care homes.

Carbapenemase-producing *Enterobacterales*

- IMP (80/158, 50.6%), NDM (54/158, 34.2%), OXA-48-like (13/158, 8.2%), and NDM+OXA-48-like (7/158, 4.4%) types accounted for 97.4% of all CPE reported during this period
- The total number of CPE (either alone or in combination with other CARs) increased (*n* = 158, up 13.7%) compared to the previous two-month period (*n* = 139). The total number of IMP-types reported increased (*n* = 80) during this reporting period compared to the previous reporting period (*n* = 64). IMP-types reported increased from New South Wales (*n* = 43 versus *n* = 29), and decreased from Victoria (*n* = 7 versus *n* = 11)
- There was an increase in the total number of NDM-types (either alone or with OXA-48-like) (*n* = 61, up 15.1%) compared to the previous two-month period (*n* = 53). There was an increase in reports from Queensland (*n* = 15 versus *n* = 8, up 87.5%)
- Two KPC-producing *Enterobacterales* were reported from Victoria, one *Escherichia coli*, and one *Klebsiella pneumoniae*
- Excluding CARs for which the setting was unknown, 20.0% (31/155) of CPE were reported from settings other than public hospitals; 14.8% (23/155) and 5.2% (8/155) were from community settings and private hospitals respectively
- Eight hospitals (*n* = 7 in New South Wales; *n* = 1 in Queensland) had more than two reports of IMP-types. A further five hospitals had two notifications of IMP-types: Queensland (*n* = 3), New South Wales (*n* = 2). Five hospitals from New South Wales had four or more reports
- Seven hospitals had more than one report of NDM-types; in New South Wales (*n* = 3), Victoria (*n* = 2), Queensland (*n* = 1), and South Australia (*n* = 1). One hospital in Queensland had nine notifications of NDM-types: *K. pneumoniae* (*n* = 5), *E. coli* (*n* = 3) and *Enterobacter hormaechei* (*n* = 1).

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

- There were 14 ceftriaxone-nonsusceptible *Salmonella* species reported during this period: 12 non-typhoidal species from Victoria (*n* = 6, ESBL [5], AmpC [1]), South Australia (*n* = 2, ESBL), Western Australia (*n* = 2, ESBL [1], AmpC [1]), Queensland (*n* = 1, ESBL), and the Northern Territory (*n* = 1, ESBL); and two *S.* Typhi (ESBL) from New South Wales
- There were 12 multidrug-resistant (MDR) *Shigella* species reported in this period: six *S. sonnei* and six *S. flexneri*. All *S. sonnei* isolates were ceftriaxone/cefotaxime-resistant and produced an ESBL. A substantial majority (5/6, 83.3%) of MDR *S. flexneri* were susceptible to ceftriaxone/cefotaxime.

Azithromycin-nonsusceptible (low-level resistance, MIC < 256 mg/L) *N. gonorrhoeae*

- The total number of reports of this CAR more than tripled compared with the previous two-month reporting period (*n* = 33 versus *n* = 10, up 230%). Reports were from Victoria (*n* = 18 versus *n* = 4, up 350%), Queensland (*n* = 13 versus *n* = 1, up 333%), New South Wales (*n* = 1) and Tasmania (*n* = 1).

Ceftriaxone- and/or azithromycin-nonsusceptible *N. gonorrhoeae*

- There were three reports of *N. gonorrhoeae* with high-level resistance to azithromycin from Queensland
- No ceftriaxone-nonsusceptible *N. gonorrhoeae* were reported in this period.

Daptomycin-, linezolid-, or vancomycin-nonsusceptible *Staphylococcus aureus* complex

- The number of reports of daptomycin-nonsusceptible *S. aureus* (DNSA) decreased compared with the previous two-month reporting period (*n* = 18 versus *n* = 31)
- One DNSA from New South Wales was also vancomycin-nonsusceptible
- DNSA reports were from New South Wales (*n* = 5), Western Australia (*n* = 5), Queensland (*n* = 4), and Victoria (*n* = 4)
- There were no reports of linezolid-nonsusceptible *S. aureus* in this period.

Carbapenemase-producing *Acinetobacter baumannii* complex and *Pseudomonas aeruginosa*

- Four carbapenemase-producing *A. baumannii* complex were reported during this period. The reports were from New South Wales ($bla_{\text{OXA-23}}$, *n* = 3) and Victoria ($bla_{\text{OXA-23}}$ + $bla_{\text{NDM-5}}$, *n* = 1)
- The number of carbapenemase-producing *P. aeruginosa* reports increased compared to the previous two-month reporting period (*n* = 11 versus *n* = 4). Reports were from New South Wales ($bla_{\text{GES-5}}$, *n* = 7; bla_{NDM}, *n* = 1), Victoria ($bla_{\text{VIM-2}}$, *n* = 2), and Queensland ($bla_{\text{GES-5}}$, *n* = 1).

Linezolid-resistant *Enterococcus*

- Two linezolid-resistant *Enterococcus faecalis* were reported during this period: one from South Australia and one from Western Australia.

Candida auris

- No *Candida auris* were reported during this period.

Transmissible colistin resistance (other than that seen in combination with CPE)

- No *Enterobacterales* with transmissible (*mcr* genes other than *mcr-9*) colistin resistance were reported during this period.

***Streptococcus pyogenes* with reduced susceptibility to penicillin**

- No cases of *S. pyogenes* with reduced susceptibility to penicillin were reported during this period.

National summary

Table 1: Number of critical antimicrobial resistances, by state and territory, 1 September 2022–31 October 2022, and year to date 2021 and 2022

Species	Critical resistance	State or Territory (July–August 2022)								Bi-monthly			Year to date		
										2022	2022				
		NSW	Vic	Qld	SA	WA	Tas	NT	ACT	Jul-Aug	Sep-Oct	Relative change*	2021	2022	Relative change*
Acinetobacter baumannii complex	Carbapenemase-producing	3	0	0	0	0	0	0	0	5	3	▼ 40.0%	12	17	▲ 41.7%
	Carbapenemase and ribosomal methyltransferase-producing	0	1	0	0	0	0	0	0	3	1	▼ 66.7%	2	4	▲ 100%
Candida auris	–	0	0	0	0	0	0	0	0	2	0	▼ 100%	1	5	▲ 400%
Enterobacterales	Carbapenemase-producing	59	31	42	7	10	1	0	2	126	152	▲ 20.6%	505	666	▲ 31.9%
	Carbapenemase and ribosomal methyltransferase-producing	2	2	0	0	2	0	0	0	13	6	▼ 53.8%	9	31	▲ 244%
	Ribosomal methyltransferase-producing	1	1	0	1	1	0	0	0	2	4	▲ 100%	8	8	0.0%
	Transmissible resistance to colistin	0	0	0	0	0	0	0	0	0	0	–	0	0	–
Enterococcus species	Linezolid resistant	0	0	0	1	1	0	0	0	2	2	0.0%	9	14	▲ 55.6%
Mycobacterium tuberculosis	Multidrug-resistant – at least rifampicin- and isoniazid-resistant strains	0	0	0	0	0	0	0	0	1	0	▼ 100%	12	6	▼ 50.0%
Neisseria gonorrhoeae	Azithromycin-nonsusceptible (low-level)†	1	18	13	0	0	1	0	0	10	33	▲ 230%	213	85	▼ 60.1%
	Azithromycin-nonsusceptible (high-level)§	0	0	3	0	0	0	0	0	0	3	–	0	6	–
	Ceftriaxone-nonsusceptible	0	0	0	0	0	0	0	0	0	0	–	0	6	–
	Ceftriaxone-nonsusceptible and azithromycin-nonsusceptible	0	0	0	0	0	0	0	0	0	0	–	1	3	▲ 200%

– = not applicable

Note: For this report, transmissible resistance to colistin refers to the presence of *mcr* genes other than *mcr-9*. This variant is not associated with a colistin resistant phenotype, but is typically found on H12 plasmids which may carry bla_{IMP-4}.

Table 1 (continued)

Species	Critical resistance	State or territory (July–August 2022)								Bi-monthly			Year to date		
										2022	2022				
		NSW	Vic	Qld	SA	WA	Tas	NT	ACT	Jul-Aug	Sep-Oct	Relative change*	2021	2022	Relative change*
Pseudomonas aeruginosa	Carbapenemase-producing	8	2	1	0	0	0	0	0	4	11	▲ 175%	54	47	▼ 13.0%
	Carbapenemase and ribosomal methyltransferase-producing	0	0	0	0	0	0	0	0	0	0	–	2	2	0.0%
Salmonella species	Ceftriaxone-nonsusceptible	2	6	1	2	2	0	1	0	8	14	▲ 75.0%	21	40	▲ 90.5%
Shigella species	Multidrug-resistant	1	5	3	1	1	0	1	0	15	12	▼ 20.0%	33	57	▲ 72.7%
Staphylococcus aureus complex	Daptomycin-nonsusceptible	4	4	4	0	5	0	0	0	31	17	▼ 45.2%	221	122	▼ 44.8%
	Daptomycin- and vancomycin-nonsusceptible	1	0	0	0	0	0	0	0	0	1	–	0	2	–
	Linezolid-nonsusceptible	0	0	0	0	0	0	0	0	1	0	▼ 100%	1	2	▲ 100%
	Vancomycin-nonsusceptible	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 05 December 2022)	**82**	**70**	**67**	**12**	**22**	**2**	**2**	**2**	**223**	**259**	**▲ 16.1**	**1,104**	**1,123**	**▲ 1.7%**

MIC = minimum inhibitory concentration; – = not applicable

* Relative change = absolute change between period in 2021 and same period in 2022, for each CAR, expressed as a percentage of 2021 base
† Azithromycin MIC < 256 mg/L
§ Azithromycin MIC ≥ 256 mg/L

Note: The number of CARs for 2021 have been updated to include additional submissions received after the previous publication date.

Table 2: Number of critical antimicrobial resistance isolates, by setting, national, 1 September 2022–31 October 2022

Species	Critical resistance	Setting					Total
		Public hospital	Private hospital	Aged care home	Community	Unknown	
Acinetobacter baumannii complex	Carbapenemase-producing	3	0	0	0	0	3
	Carbapenemase and ribosomal methyltransferase-producing	1	0	0	0	0	1
Candida auris	–	0	0	0	0	0	0
Enterobacterales	Carbapenemase-producing	121	8	0	21	2	152
	Carbapenemase and ribosomal methyltransferase-producing	3	0	0	2	1	6
	Ribosomal methyltransferase-producing	3	0	0	1	0	4
	Transmissible resistance to colistin	0	0	0	0	0	0
Enterococcus species	Linezolid-resistant	2	0	0	0	0	2
Mycobacterium tuberculosis	Multidrug-resistant – at least rifampicin- and isoniazid-resistant strains	0	0	0	0	0	0
Neisseria gonorrhoeae	Azithromycin-nonsusceptible (low-level)*	2	0	0	21	10	33
	Azithromycin-nonsusceptible (high-level)†	0	0	0	3	0	3
	Ceftriaxone-nonsusceptible	0	0	0	0	0	0
	Ceftriaxone-nonsusceptible and azithromycin-nonsusceptible	0	0	0	0	0	0
Pseudomonas aeruginosa	Carbapenemase-producing	9	0	0	2	0	11
	Carbapenemase and ribosomal methyltransferase-producing	0	0	0	0	0	0
Salmonella species	Ceftriaxone-nonsusceptible	6	0	0	4	4	14
Shigella species	Multidrug-resistant	2	1	0	6	3	12
Staphylococcus aureus complex	Daptomycin-nonsusceptible	11	1	0	3	2	17
	Daptomycin- and vancomycin-nonsusceptible	1	0	0	0	0	1
	Linezolid-nonsusceptible	0	0	0	0	0	0
	Vancomycin-nonsusceptible	0	0	0	0	0	0
Streptococcus pyogenes	Penicillin reduced susceptibility	0	0	0	0	0	0
	Total (reported by 05 December 2022)	**164**	**10**	**0**	**63**	**22**	**259**

* Azithromycin MIC < 256 mg/L
† Azithromycin MIC ≥ 256 mg/L

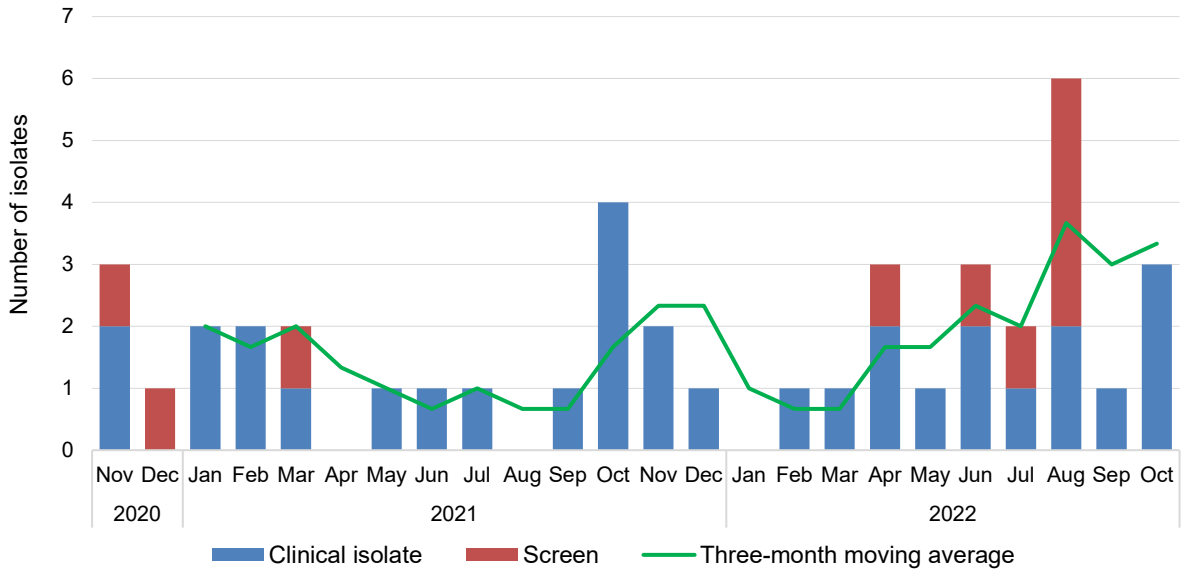
Note: Information on setting for *Neisseria gonorrhoeae* is often not available.

Summary by CAR

Acinetobacter baumannii complex

National data

Figure 1: Carbapenemase-producing *Acinetobacter baumannii* complex, 24-month trend by specimen type, national, 1 November 2020–31 October 2022



State and territory data

Figure 2: Carbapenemase-producing *Acinetobacter baumannii* complex, number reported by carbapenemase type and specimen type, by state and territory, 1 September 2022–31 October 2022

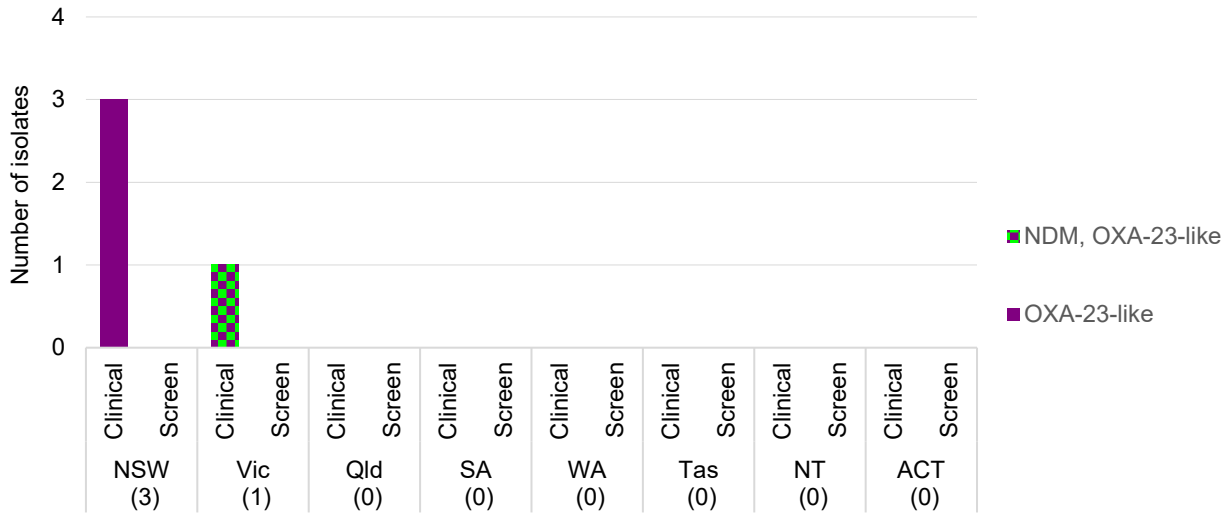


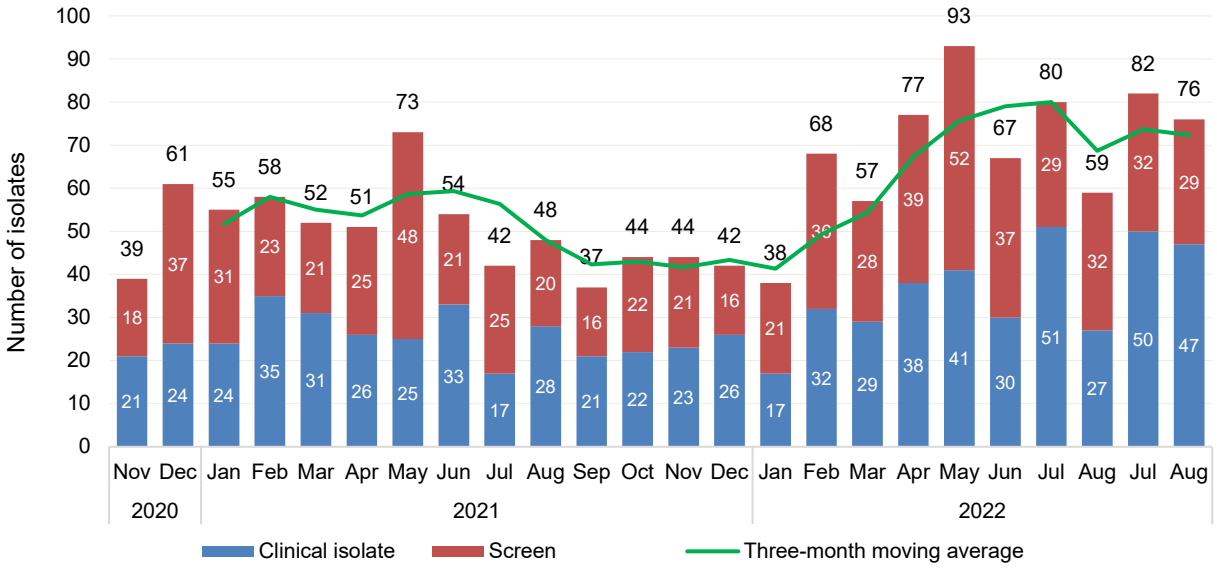
Table 3: Carbapenemase-producing *Acinetobacter baumannii* complex, number reported by setting, by state and territory, 1 September 2022–31 October 2022

Setting	State or territory								Total
	NSW	Vic	Qld	SA	WA	Tas	NT	ACT	
Total	3	1	0	0	0	0	0	0	4
Public hospital	3	1	0	0	0	0	0	0	4
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	0	0	0	0	0	0	0	0	0

Enterobacterales

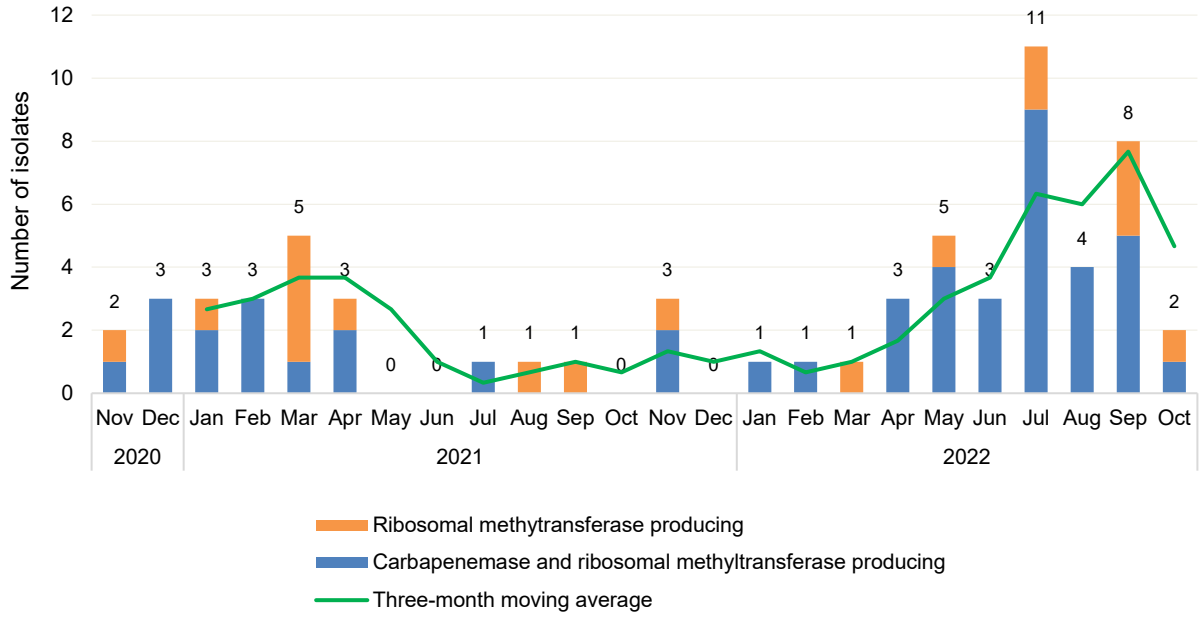
National data

Figure 3: Carbapenemase-producing *Enterobacterales**, 24-month trend by specimen type, national, 1 November 2020–31 October 2022



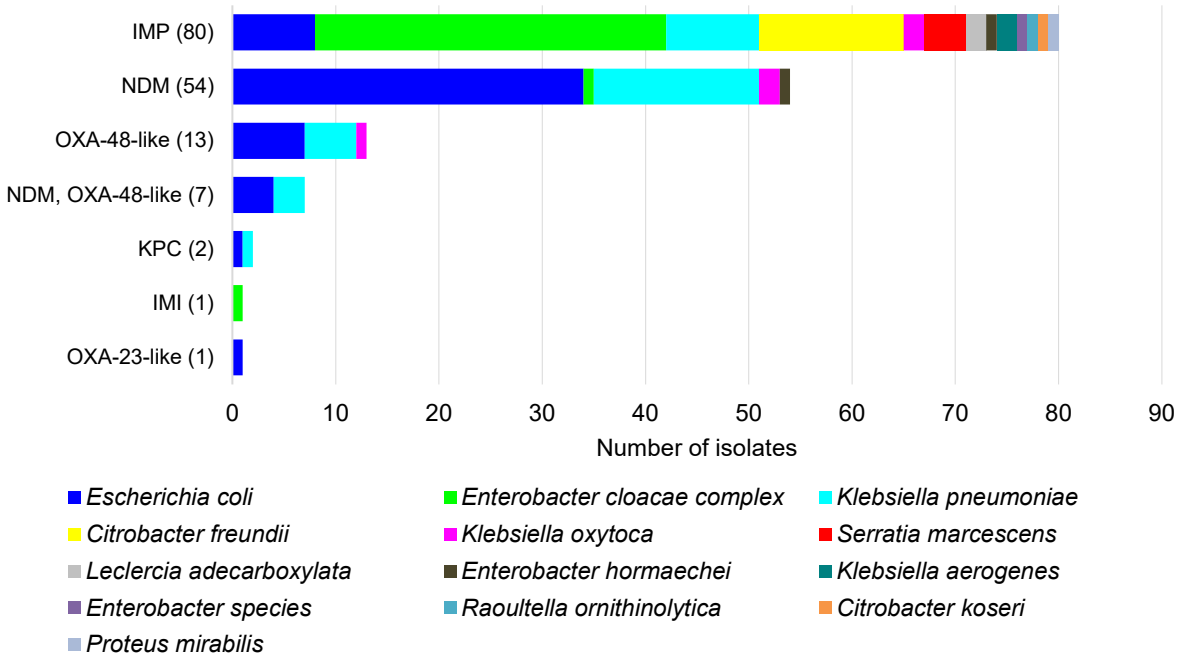
* Carbapenemase-producing alone or in combination with ribosomal methyltransferases

Figure 4: Ribosomal methyltransferase-producing *Enterobacterales**, 24-month trend, national, 1 November 2020–31 October 2022



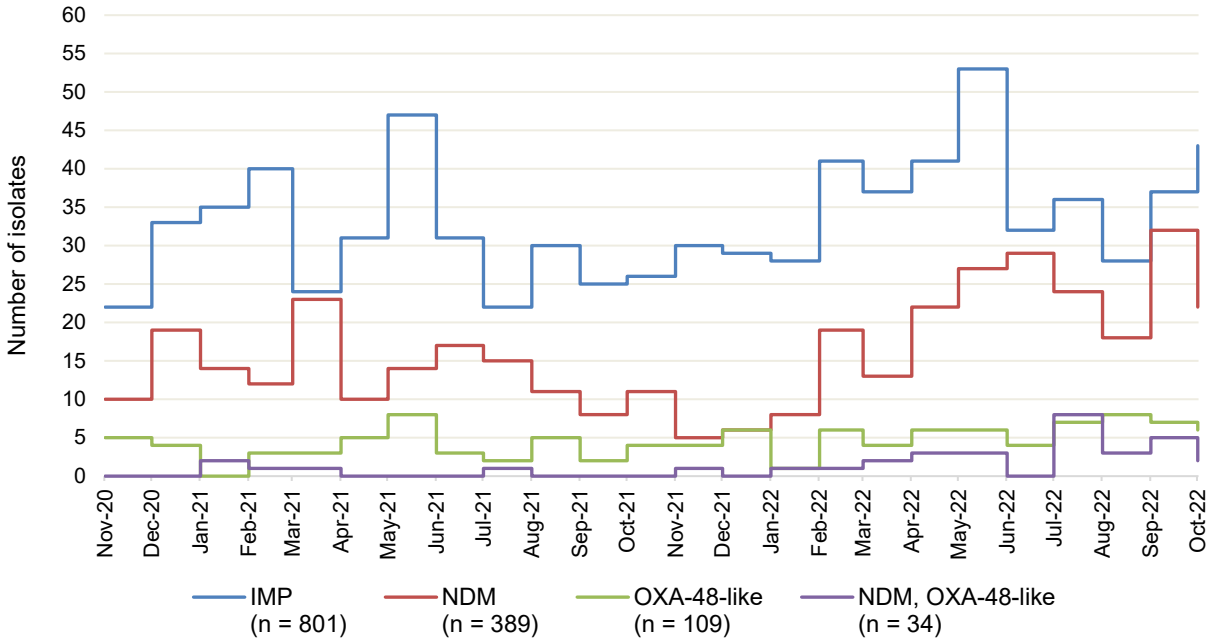
* Ribosomal methyltransferases alone, or in combination with carbapenemase(s)

Figure 5: Carbapenemase-producing *Enterobacterales**, number reported by carbapenemase type and species, national, 1 September 2022–31 October 2022



* Carbapenemase-producing (*n* = 152), carbapenemase and ribosomal methyltransferase-producing (*n* = 6)

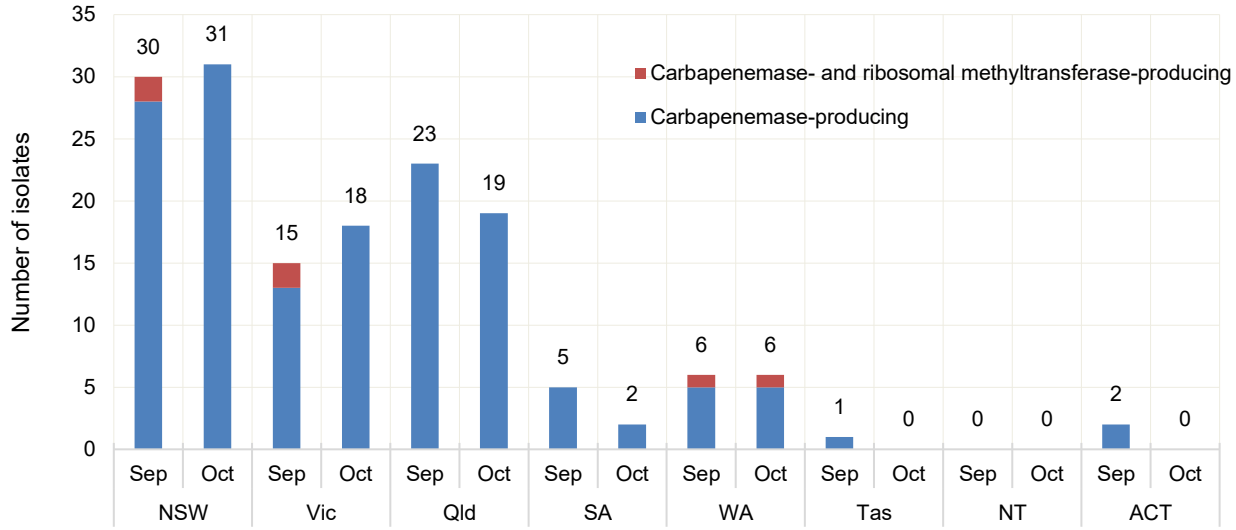
Figure 6: Top four reported carbapenemase types*, 24-month trend, national, 1 November 2020–31 October 2022



* Alone or in combination with another type for the reporting period indicated

State and territory data

Figure 7: Carbapenemase-producing *Enterobacterales**, number reported by month, state and territory, 1 September 2022–31 October 2022



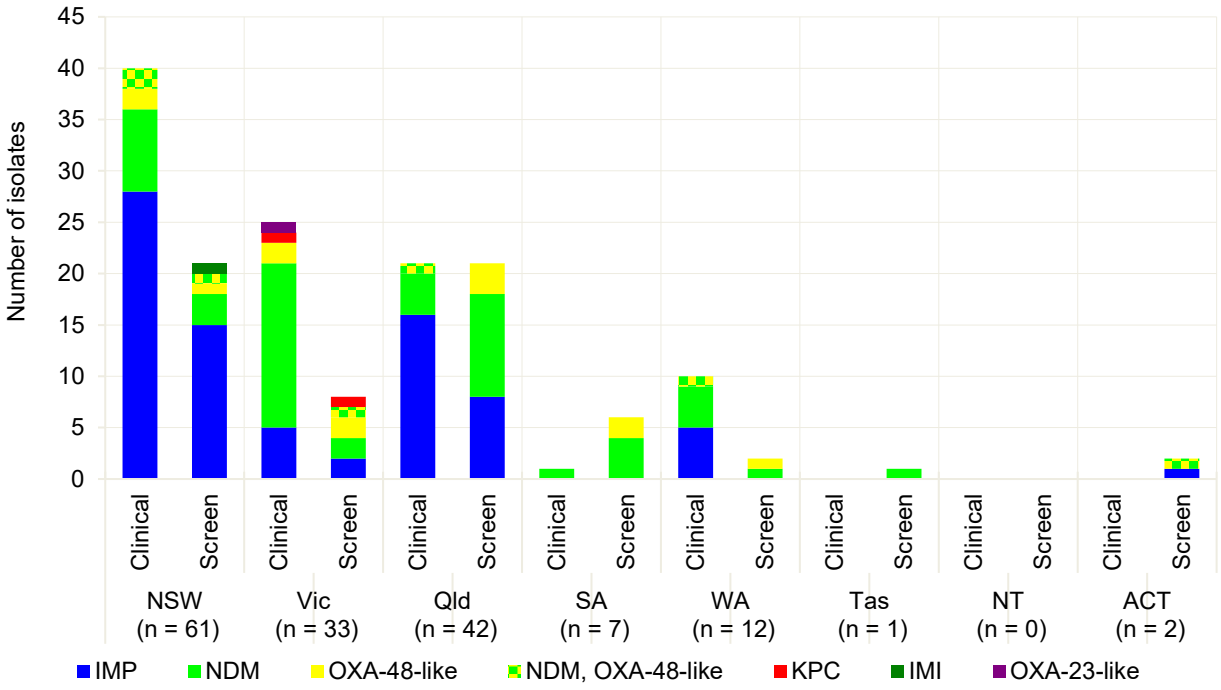
* Carbapenemase-producing (*n* = 152), carbapenemase and ribosomal methyltransferase-producing (*n* = 6)

Figure 8: Two-year trend for the top four reported carbapenemase types from *Enterobacterales*, by state and territory and nationally, (three-month moving average), 1 November 2020–31 October 2022

Type	NSW	Vic	Qld	SA	WA	Tas	NT	ACT	Australia
IMP	20 10	5 2	19 8	0 0	2 0	0 0	0 0	1 0	44 26
NDM	6 1	11 3	5 1	5 0	3 0	1 0	1 0	1 0	27 6
OXA-48-like	3 0	2 0	2 0	1 0	1 0	0 0	0 0	1 0	7 2
KPC	0 0	1 0	0 0	0 0	0 0	0 0	0 0	0 0	1 0
All types	30 14	19 8	26 10	6 1	6 1	1 0	1 0	2 0	80 41

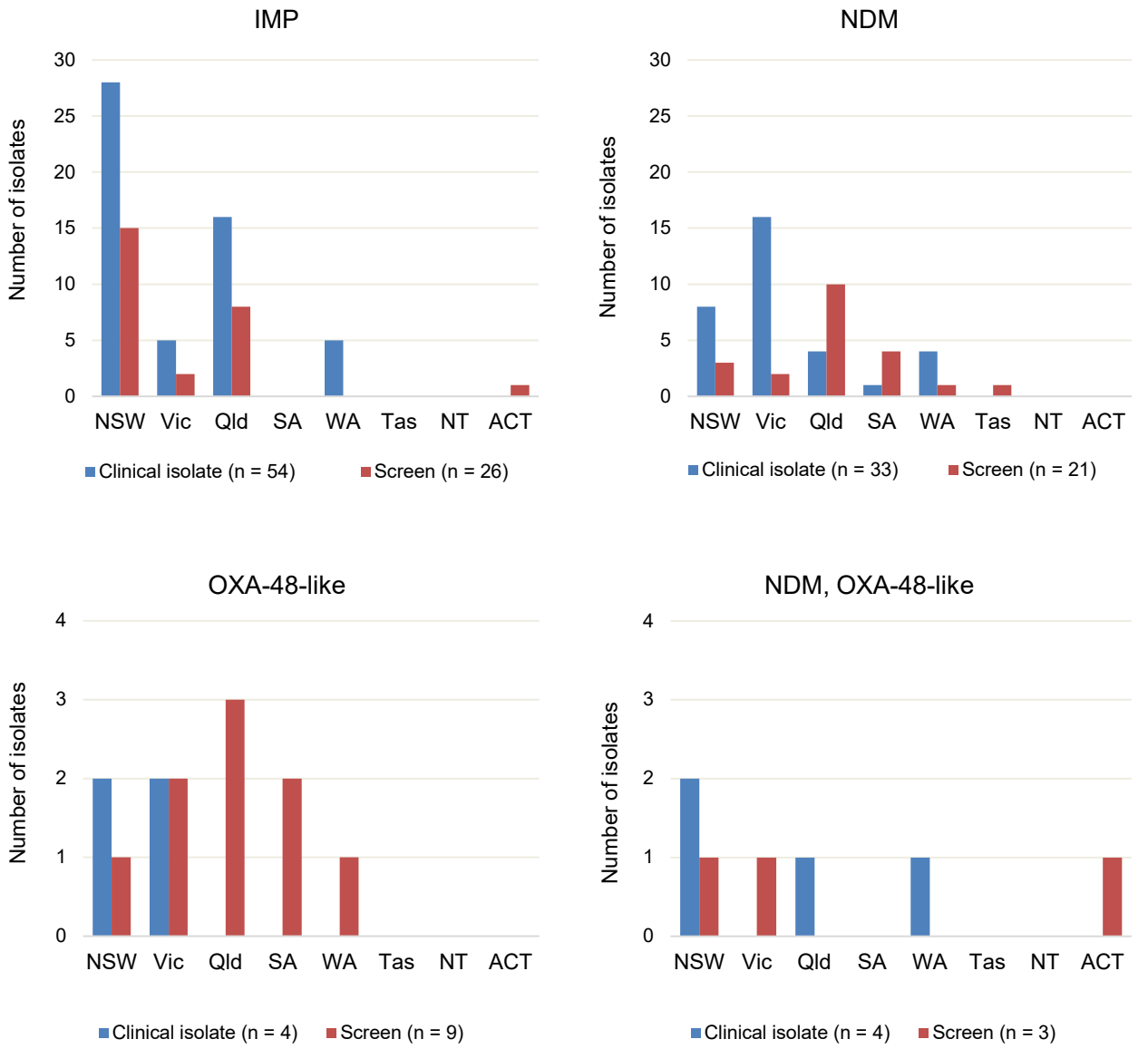
Straight green line in cell = no carbapenemase type for that state or territory during the reporting period
Blank cell = maximum monthly average was one or less
Note: Line graphs represent three-month moving average for the period 1 November 2020 to 31 October 2022, for each type, where maximum monthly average was greater than one.

Figure 9: Carbapenemase-producing *Enterobacterales**, number reported by carbapenemase type and specimen type, by state and territory, 1 September 2022–31 October 2022



* Carbapenemase-producing (*n* = 152), carbapenemase and ribosomal methyltransferase-producing (*n* = 6)

Figure 10: Top four reported carbapenemase-producing *Enterobacterales* types by specimen type, by state and territory, 1 September 2022–31 October 2022



Note: Other types include KPC (*n* = 2, Vic [clinical, 1; screen, 1]); IMI (*n* = 1, NSW [screen]); OXA-23-like (*n* = 1, Vic [clinical]).

Table 4: Top four carbapenemase types from *Enterobacterales*, number reported by setting, by state and territory, 1 September 2022–31 October 2022

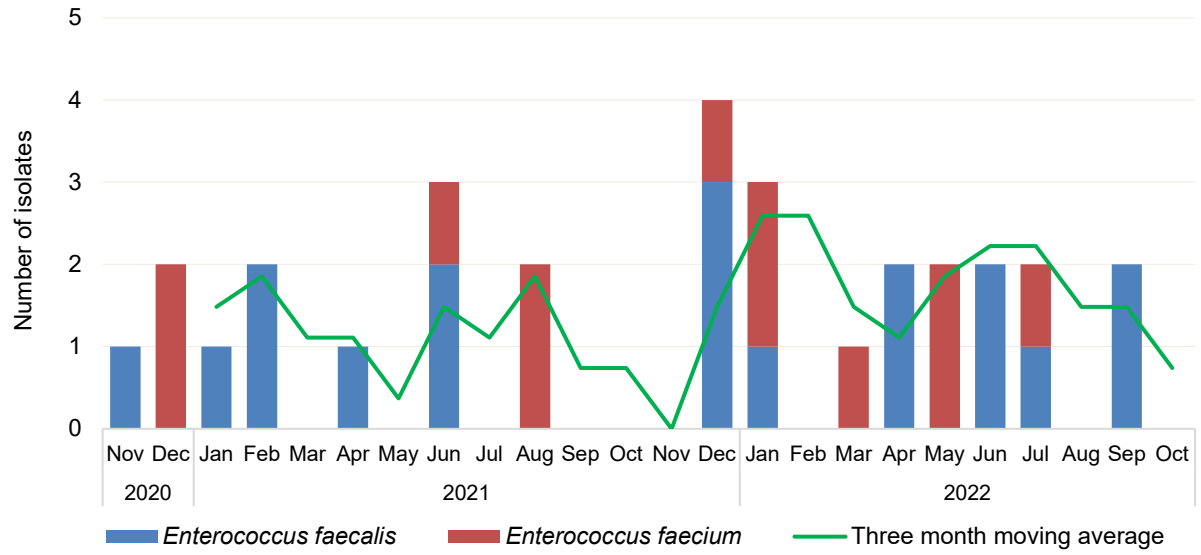
Carbapenemase type	Setting	State or territory								Total
		NSW	Vic	Qld	SA	WA	Tas	NT	ACT	
IMP	Total	43	7	24	0	5	0	0	1	80
	Public hospitals	40	5	16	0	1	0	0	0	62
	Private hospitals	2	0	3	0	2	0	0	1	8
	Aged care homes	0	0	0	0	0	0	0	0	0
	Community	1	2	5	0	1	0	0	0	9
	Unknown	0	0	0	0	1	0	0	0	1
NDM	Total	11	18	14	5	5	1	0	0	54
	Public hospitals	10	12	12	4	2	1	0	0	41
	Private hospitals	0	0	0	0	0	0	0	0	0
	Aged care homes	0	0	0	0	0	0	0	0	0
	Community	1	4	2	1	3	0	0	0	11
	Unknown	0	2	0	0	0	0	0	0	2
OXA-48-like	Total	3	4	3	2	1	0	0	0	13
	Public hospitals	3	3	3	2	1	0	0	0	12
	Private hospitals	0	0	0	0	0	0	0	0	0
	Aged care homes	0	0	0	0	0	0	0	0	0
	Community	0	1	0	0	0	0	0	0	1
	Unknown	0	0	0	0	0	0	0	0	0
NDM, OXA-48-like	Total	3	1	1	0	1	0	0	1	7
	Public hospitals	3	1	0	0	0	0	0	1	5
	Private hospitals	0	0	0	0	0	0	0	0	0
	Aged care homes	0	0	0	0	0	0	0	0	0
	Community	0	0	1	0	1	0	0	0	2
	Unknown	0	0	0	0	0	0	0	0	0

Note: Top four carbapenemase types account for 97.5% (154/158) of all carbapenemase-producing *Enterobacterales* reported for this period. Other types were and KPC (*n* = 2, Vic), IMI (n = 1, NSW); OXA-23-like (n = 1, Vic).

Enterococcus species

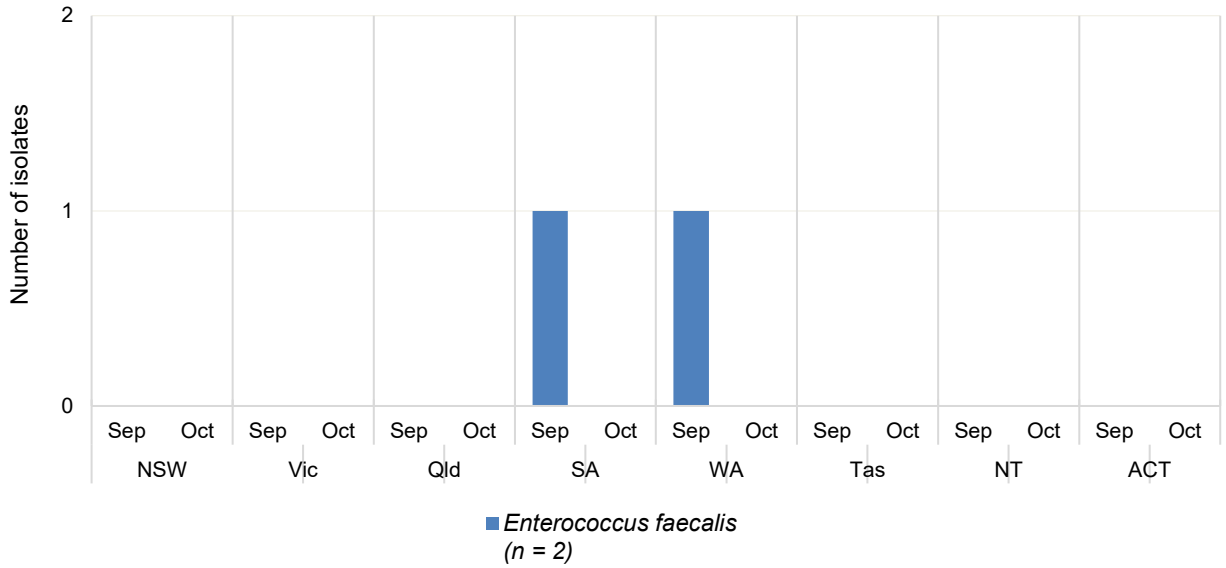
National data

Figure 11: Linezolid-nonsusceptible *Enterococcus* species, 24-month trend, national, 1 November 2020–31 October 2022



State and territory data

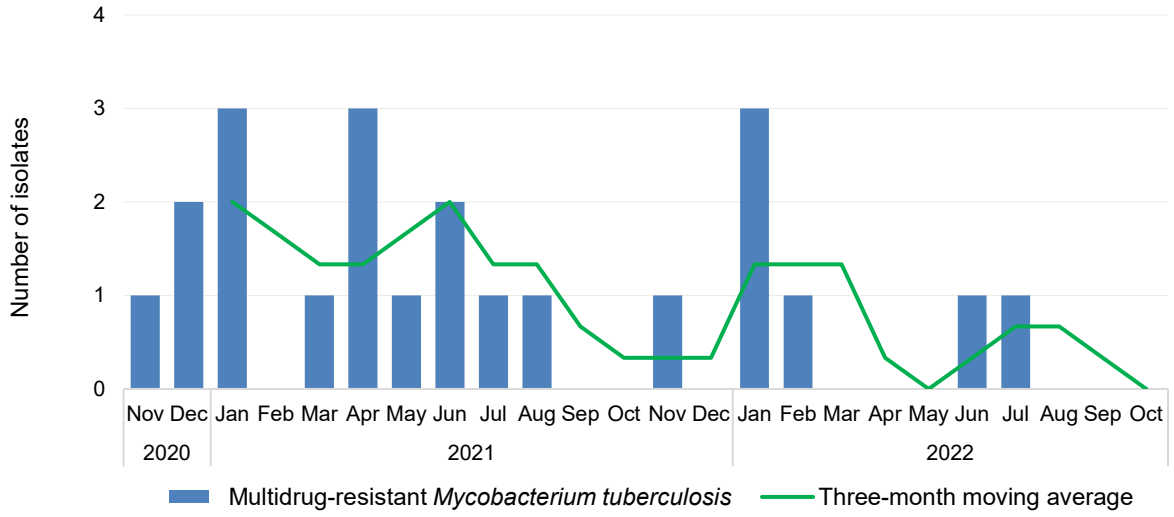
Figure 12: Linezolid-nonsusceptible *Enterococcus* species, number reported by state and territory, 1 September 2022–31 October 2022



Mycobacterium tuberculosis

National data

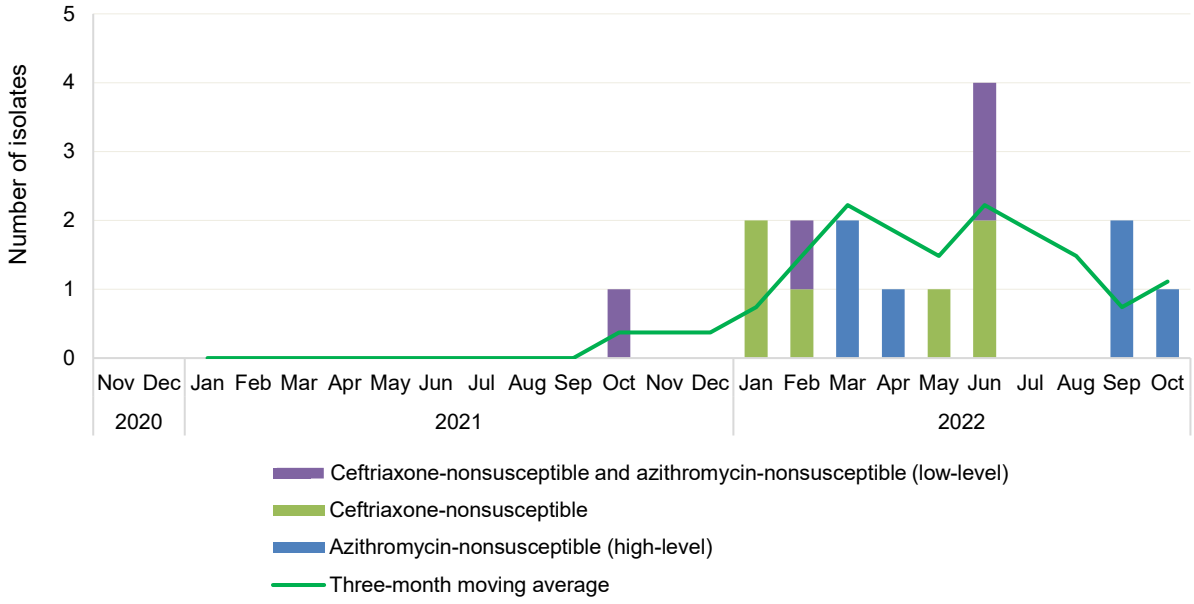
Figure 13: Multidrug-resistant *Mycobacterium tuberculosis,* 24-month trend, national, 1 November 2020–31 October 2022



Neisseria gonorrhoeae

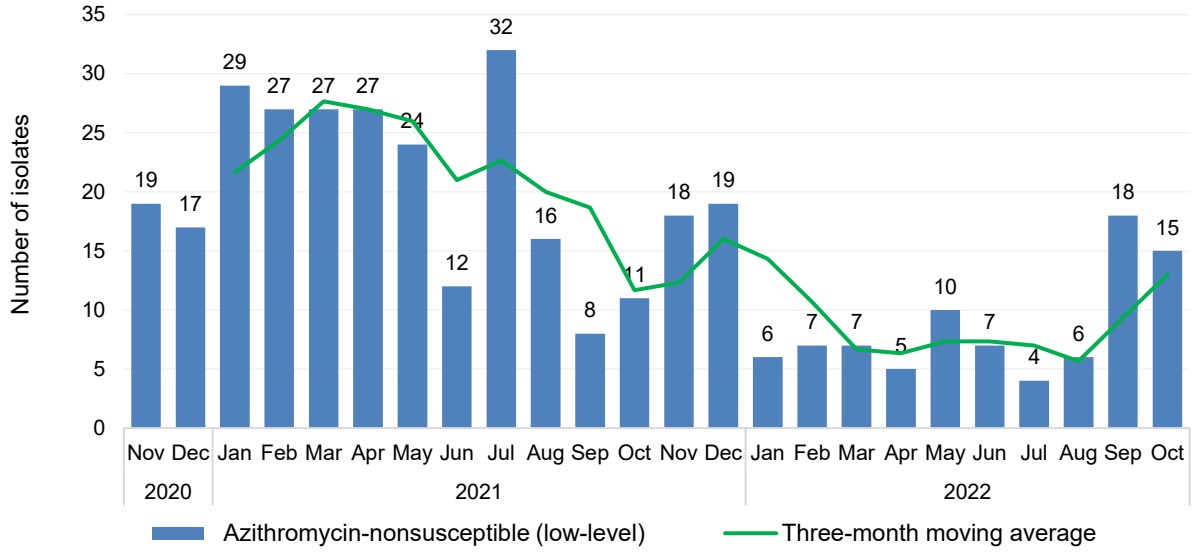
National data

Figure 14: Ceftriaxone-nonsusceptible and/or azithromycin-nonsusceptible *Neisseria gonorrhoeae,* number reported by month, national, 1 November 2020–31 October 2022



Note: Low-level = azithromycin MIC < 256 mg/L; High-level = azithromycin MIC ≥ 256 mg/L.

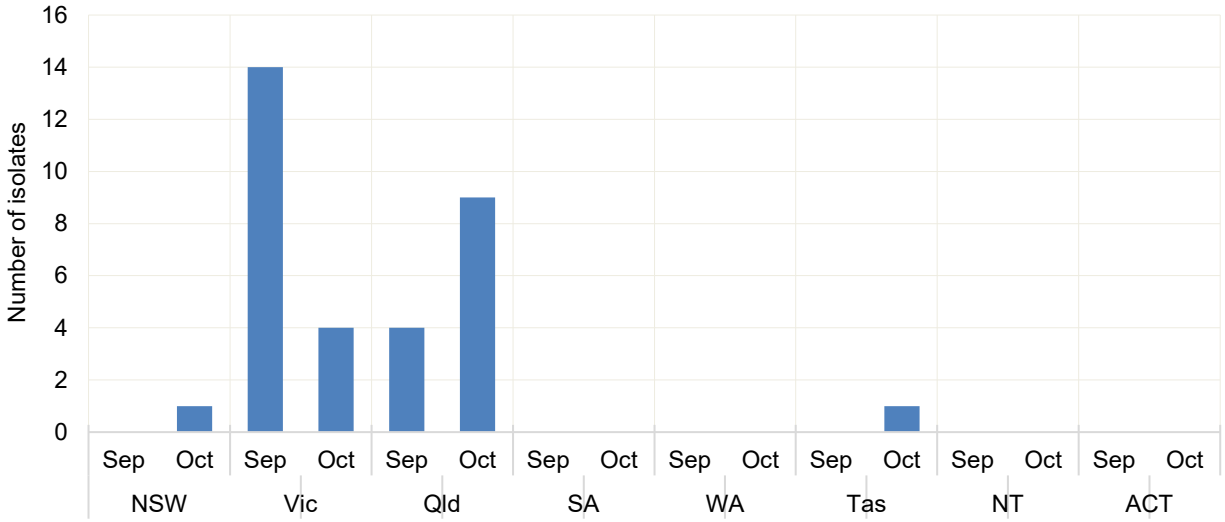
Figure 15: Azithromycin-nonsusceptible (low-level) *Neisseria gonorrhoeae*, 24-month trend, national, 1 November 2020–31 October 2022



Note: Low-level = azithromycin MIC < 256 mg/L.

State and territory data

Figure 16: Azithromycin-nonsusceptible (low-level) *Neisseria gonorrhoeae,* number reported by month, state and territory, 1 September 2022–31 October 2022

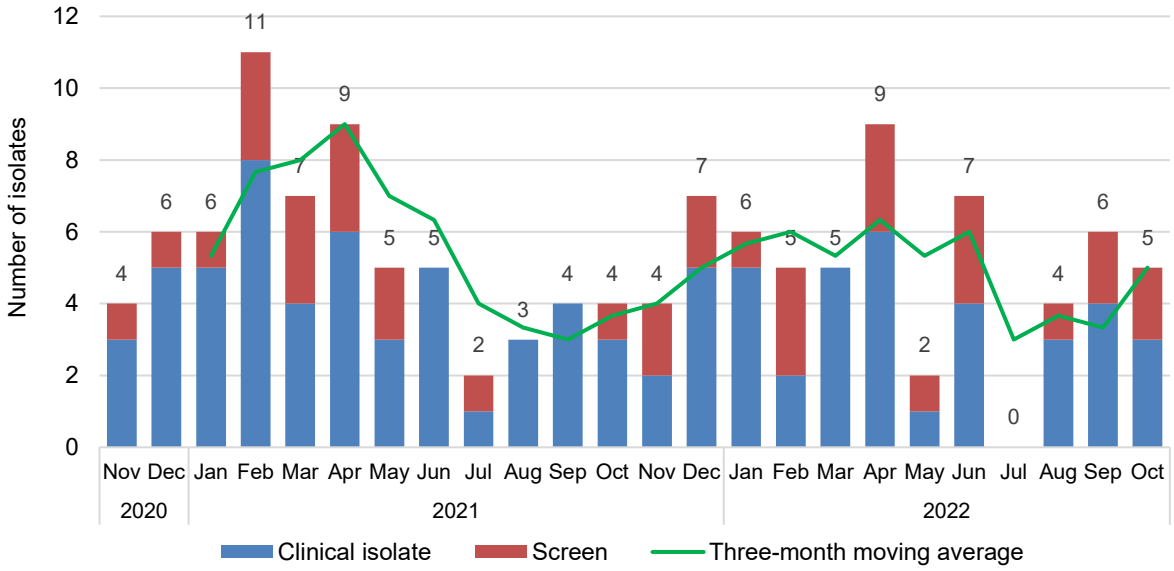


Note: Low-level = azithromycin MIC < 256 mg/L

Pseudomonas aeruginosa

National data

Figure 17: Carbapenemase-producing *Pseudomonas aeruginosa*, 24-month trend by specimen type, national, 1 November 2020–31 October 2022



State and territory data

Figure 18: Carbapenemase-producing *Pseudomonas aeruginosa*, number reported by carbapenemase type and specimen type, by state and territory, 1 September 2022–31 October 2022

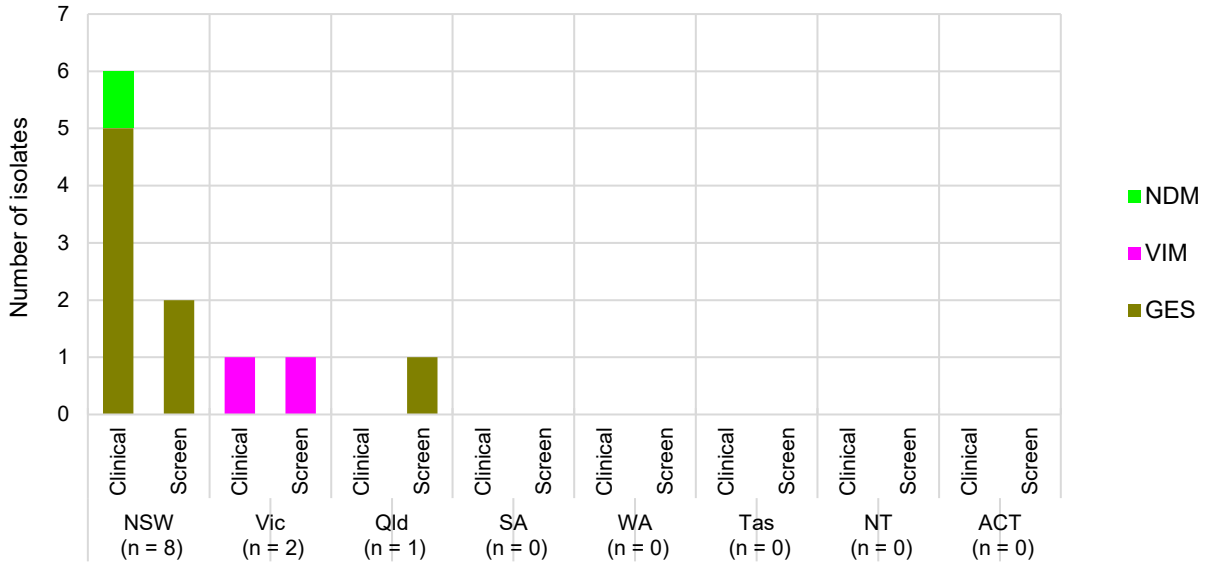


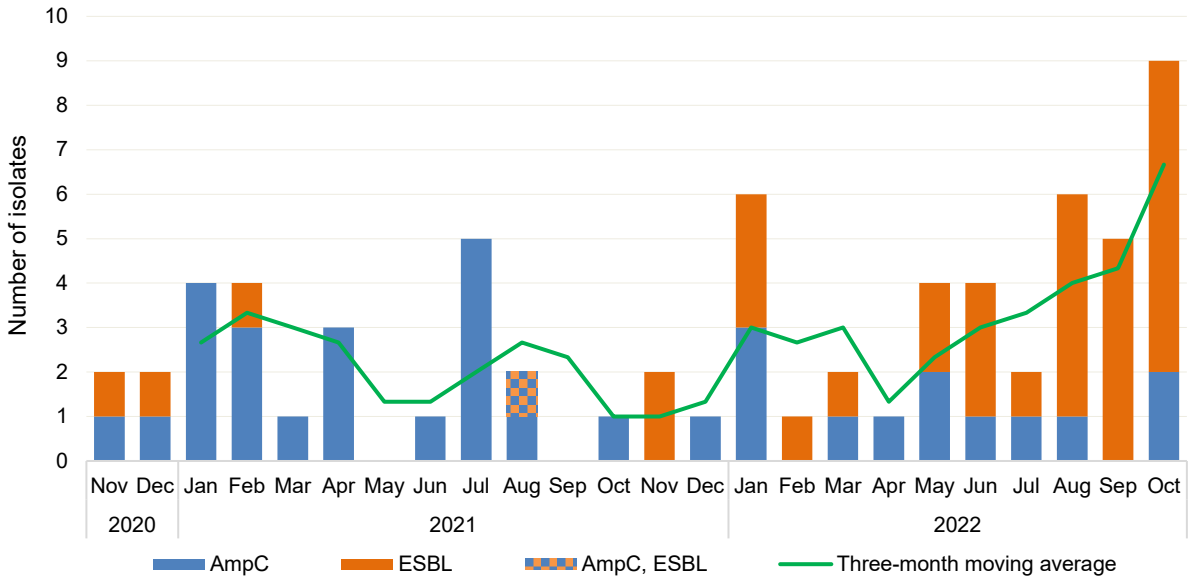
Table 5: Carbapenemase-producing *Pseudomonas aeruginosa*, number reported by setting, by state and territory, 1 September 2022–31 October 2022

	State or territory								
Setting	**NSW**	**Vic**	**Qld**	**SA**	**WA**	**Tas**	**NT**	**ACT**	**Total**
Total	8	2	1	0	0	0	0	0	11
Public hospital	7	2	0	0	0	0	0	0	9
Private hospital	0	0	0	0	0	0	0	0	0
Aged care home	0	0	0	0	0	0	0	0	0
Community	1	0	1	0	0	0	0	0	2
Unknown	0	0	0	0	0	0	0	0	0

Salmonella species

National data

Figure 19: Ceftriaxone-nonsusceptible *Salmonella* species, 24-month trend, national, 1 November 2020–31 October 2022



Note: (1 September 2022–31 October 2022) non-typhoidal *Salmonella* species (*n* = 12) and typhoidal *Salmonella* species (*n* = 2).

Shigella species

National data

Figure 20: Multidrug-resistant *Shigella* species, 24-month trend, national, 1 November 2020–31 October 2022

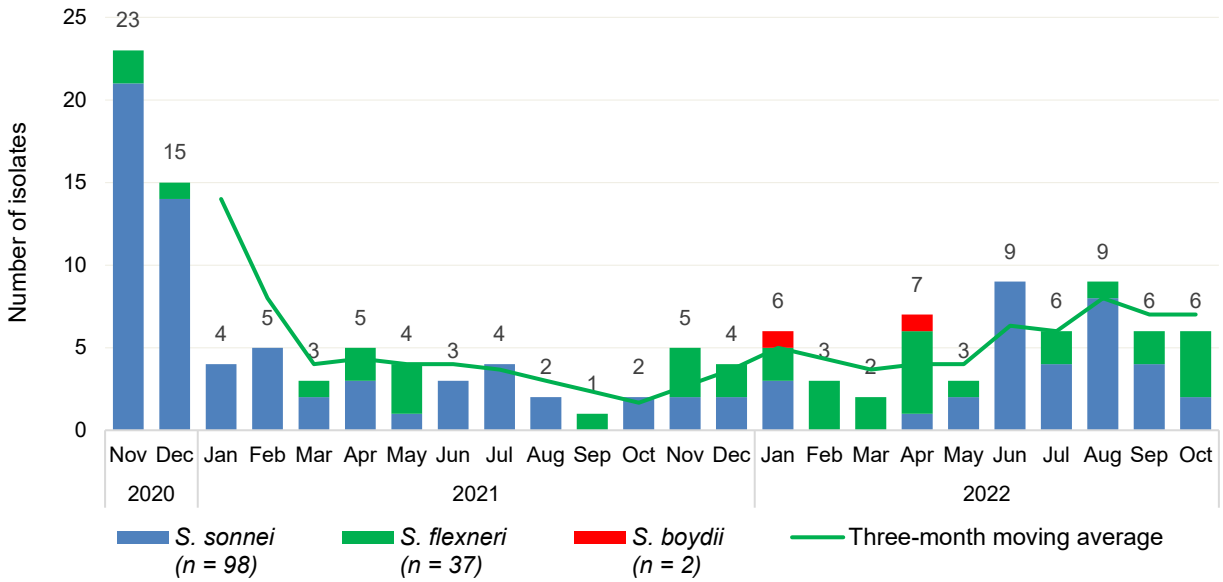
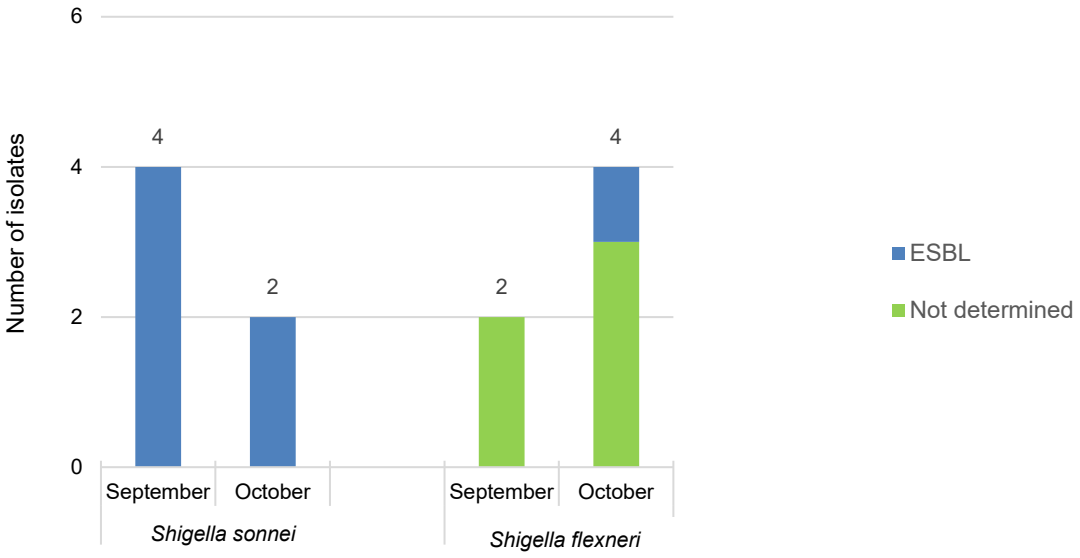


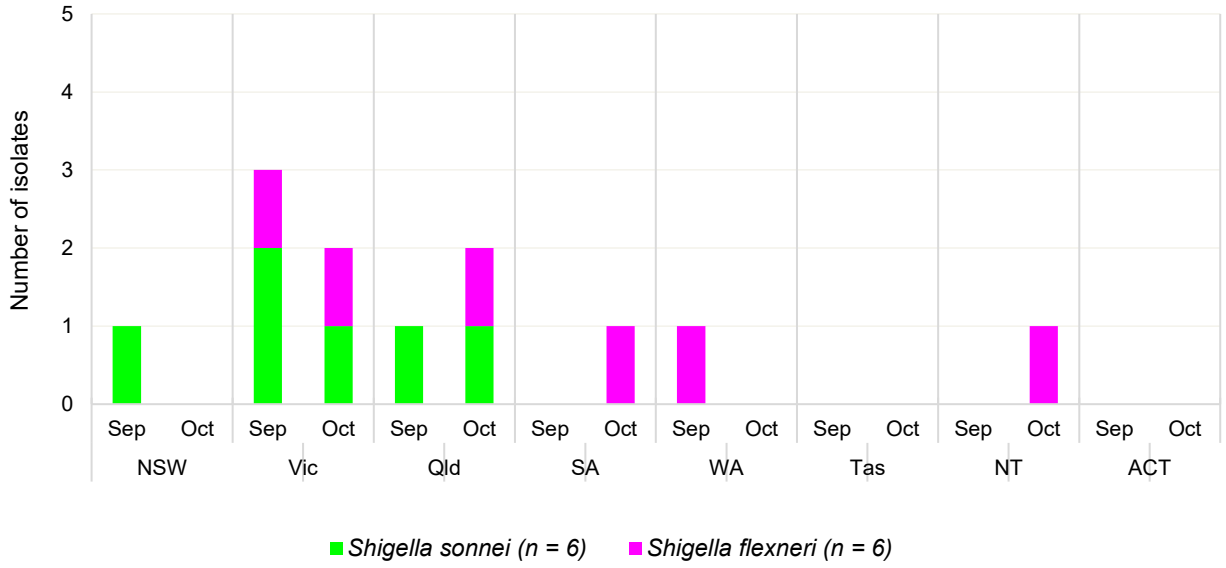
Figure 21: Multidrug-resistant *Shigella* species, number reported by month, national, 1 September 2022–31 October 2022



Note: Not determined = multidrug-resistant, ceftriaxone-susceptible.

State and territory data

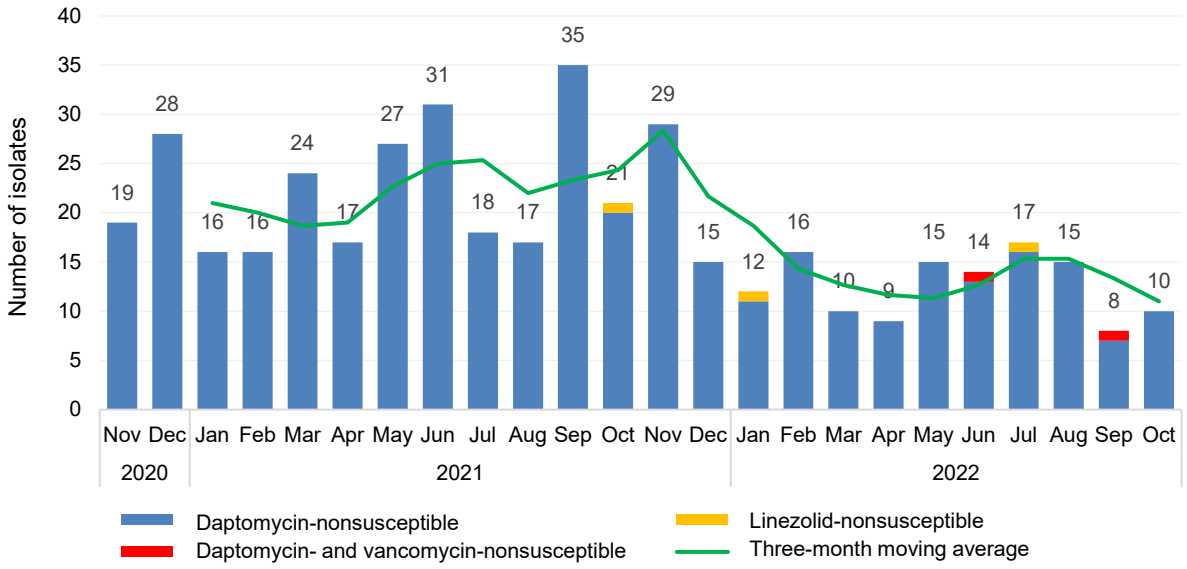
Figure 22: Multidrug-resistant *Shigella* species, number reported by state and territory, 1 September 2022–31 October 2022



Staphylococcus aureus

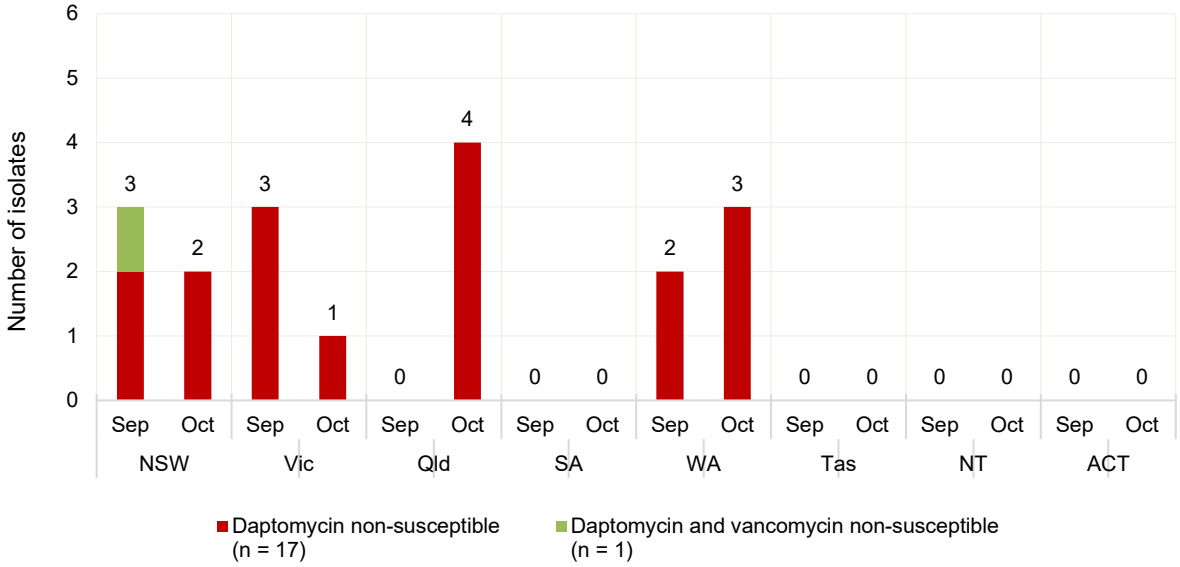
National data

Figure 23: Daptomycin-, linezolid- or vancomycin-nonsusceptible *Staphylococcus aureus,* 24-month trend, national, 1 November 2020–31 October 2022



State and territory data

Figure 24: Daptomycin-, linezolid- or vancomycin-nonsusceptible *Staphylococcus aureus*, number reported by month, state and territory, 1 September 2022–31 October 2022



Note: No linezolid-nonsusceptible *S. aureus* were reported during this period.

Table 6: Daptomycin-nonsusceptible *Staphylococcus aureus,* number reported by setting and state and territory, 1 September 2022–31 October 2022

	State or territory								
Setting	**NSW**	**Vic**	**Qld**	**SA**	**WA**	**Tas**	**NT**	**ACT**	**Total**
Total	5	4	4	0	5	0	0	0	18
Public hospital	4	2	1	0	5	0	0	0	12
Private hospital	0	0	1	0	0	0	0	0	1
Aged care home	0	0	0	0	0	0	0	0	0
Community	1	0	2	0	0	0	0	0	3
Unknown	0	2	0	0	0	0	0	0	2

Note: One daptomycin- and vancomycin-nonsusceptible *Staphylococcus aureus* isolate was reported from a public hospital in NSW during this period.

Appendix

Data Notes

The following are important considerations for interpreting CARAlert data:

- The data are based on the date that the isolate with the confirmed CAR was collected
- States and territories refer to the state or territory within which the hospital is located, or within which the patient resides for isolates from the community. If place of residence is unknown or overseas, the state or territory of the originating laboratory is reported
- Comparison between reports may be influenced by delayed detection or late submissions of CARs
- The same CAR/type/species is not submitted where the sample originated from the same patient who had the previous CAR, and the isolate was collected on the same day, or collected in the same admission or within three months
- 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
- Cut-off date for data that are included in updates and reports is four weeks after the end of each reporting period
- 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
- Authorised officers in each state and territory health department can access the CARAlert web portal directly for further information about their jurisdiction, including the name of the public hospital in which a patient with a confirmed CAR was cared for, and to extract reports on their data.

About CARAlert

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 a component of the Antimicrobial Use and Resistance in Australia (AURA) Surveillance System.

Participating confirming laboratories submit data to CARAlert on priority organisms with critical resistance to last-line antimicrobial agents (CARs) which can result in significant morbidity and mortality. Isolates collected from patients are reported to CARAlert as either a clinical isolate, that is a specimen (e.g., from blood, urine, wound) taken to guide clinical diagnosis, or as a screen for infection prevention and control purposes. No patient-level data are held in the CARAlert system. Funding for CARAlert is provided by the Australian Government Department of Health and Aged Care, with contributions from the states and territories as part of the analysis and data submission processes.

The CARs reported to CARAlert are listed in Table A1. The CARs were drawn from the list of high-priority organisms and antimicrobials which are the focus of the AURA Surveillance System.[1]

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) Preventing and Controlling Infections Standard and Australia's National Antimicrobial Resistance Strategy – 2020 and beyond.

[1] Australian Commission on Safety and Quality in Health Care. AURA 2021: fourth Australian report on antimicrobial use and resistance in human health. Sydney: ACSQHC; 2021.

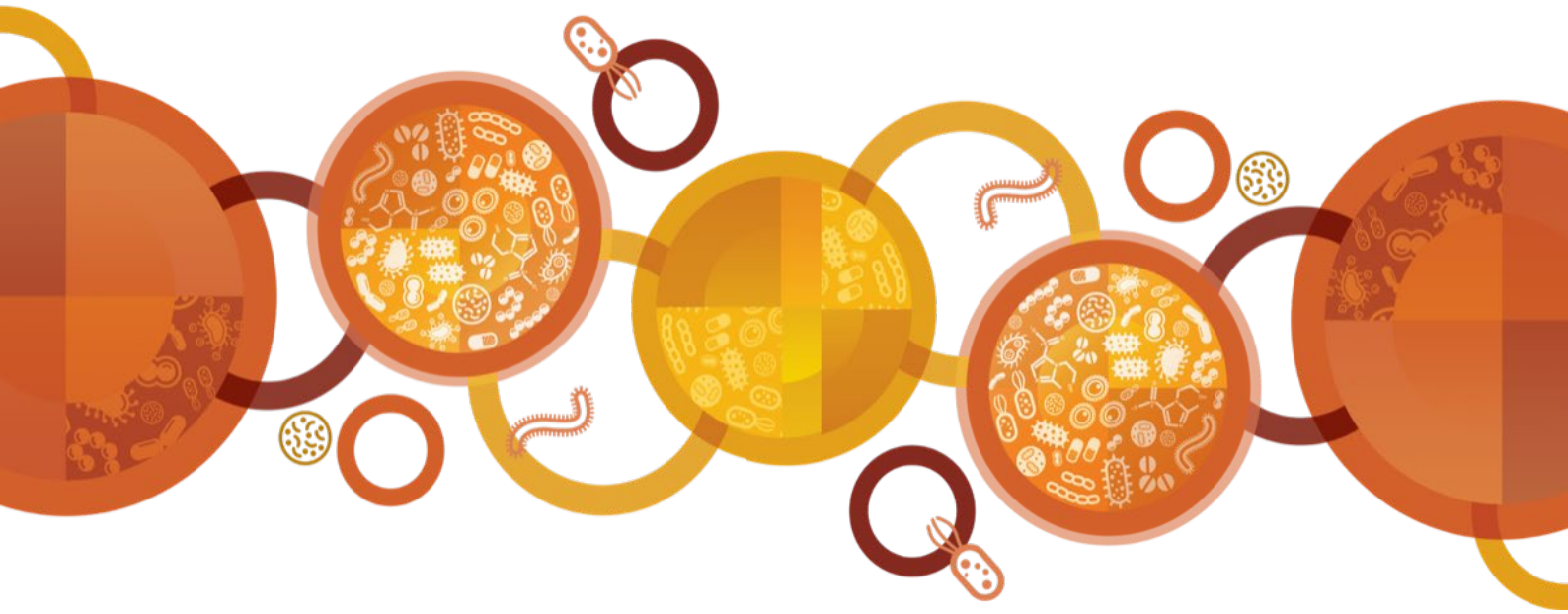
Table A1: List of critical antimicrobial resistances reported to CARAlert

Species	Critical resistance
Acinetobacter baumannii complex	Carbapenemase-producing*
*Candida auris**	–
Enterobacterales	Carbapenemase-producing, and/or ribosomal methyltransferase-producing
Enterobacterales	Transmissible colistin resistance*
Enterococcus species	Linezolid-resistant
Mycobacterium tuberculosis	Multidrug-resistant – resistant to at least rifampicin and isoniazid
Neisseria gonorrhoeae	Ceftriaxone- or azithromycin§-nonsusceptible
Salmonella species	Ceftriaxone-nonsusceptible
Shigella species	Multidrug-resistant
Staphylococcus aureus complex†	Vancomycin-, linezolid- or daptomycin-nonsusceptible
Streptococcus pyogenes	Penicillin reduced susceptibility
Pseudomonas aeruginosa	Carbapenemase-producing*

* Reported from July 2019
† For CARAlert, *S. aureus* includes *S. argenteus* and *S. schweitzeri*
§ Low level-azithromycin-nonsusceptible *N. gonorrhoeae* excluded from the weekly digest following review in 2018

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, the isolate is sent to a confirming laboratory that has the capacity to confirm the CAR
3. Reporting to clinicians in accordance with usual laboratory processes – the confirming laboratory reports back to the originating laboratory, which in turn reports to the clinician who initially requested the microbiological testing
4. 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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