The Australian Group on Antimicrobial Resistance

Australian Enterococcal Sepsis Outcome Program (AESOP) 2020

Final Report

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Prof. Geoffrey Coombs and Ms. Denise Daley on behalf of the Australian Group on Antimicrobial Resistance
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Contents

List of Tables

List of Figures

Summary

- In the 2020 survey, 1,230 episodes of enterococcal bacteraemia were reported.
- The majority (93.9%) of enterococcal bacteraemic episodes were caused by *E. faecalis* (54.2%) or *E. faecium* (39.7%).
- Onset
    - *E. faecalis* 71.4% community-onset.
    - *E. faecium* 33.2% community-onset.
- Mortality
    - The overall 30-day mortality was 18.1%
    - There was no significant difference in the 30 day all-cause mortality between *E. faecium* and *E. faecalis*: 19.6% and 17.3% respectively (p=0.4).
    - There was no significant difference in the 30 day all-cause mortality between community onset vs hospital onset enterococcal bacteraemia 15.9% and 20.7% respectively (p=0.06).
    - There was **no** significant difference in mortality between vancomycin non-susceptible (VRE) and vancomycin susceptible *E. faecium* (VSE) 19.8% v 19.4% respectively (p=0.9)
- Age and Gender
    - The majority of episodes were in males (65.1%).
    - Only 14.1% of episodes occurred in patients <40 years of age.
- Clinical Manifestations
    - For *E. faecalis* urinary tract infection was the most frequent principle clinical manifestation.
    - For *E. faecium* biliary tract infection was the most frequent principle clinical manifestation.
- Length of Stay (LOS)
    - 22.8% of patients had a LOS post enterococcal bacteraemia greater than 30 days
    - There was a significant difference in mean LOS between *E. faecium* and *E. faecalis* episodes (p<0.0001).

- There was a significant difference in mean LOS between vancomycin susceptible and non-susceptible *E. faecium* (p=0.02)

- Vancomycin resistance and *van* genes
  - By CLSI and EUCAST guidelines 32.0% and 32.6% (respectively) of blood stream infections caused by *E. faecium* in Australia were phenotypically vancomycin resistant.
  - *van* gene PCR results were available for 483 (99.0%) of the 488 *E. faecium* isolates.
    - 35.2% of *E. faecium* harboured *van*A and or *vanB* genes.
      - 13.7% *vanA*
      - 21.3% *vanB*
      - 0.2% both *vanA* and *vanB*
    - Nine vancomycin susceptible *E. faecium* harboured *vanA* genes and three harboured *vanB* genes
  - One *E. faecalis* isolate harboured *vanA* genes

- Multi-Locus Sequence Types (MLST)
  - 470 of the 488 (96.3%) *E. faecium* isolates were available for whole genome sequencing (WGS).
    - There were 71 *E. faecium* MLSTs of which ST17, ST1424, ST80, ST796, ST78, ST1421, ST555 and ST117 were the eight most common sequence types (STs) identified (ten or more isolates).
    - *vanA* genes were detected in seven STs.
    - *vanB* genes were detected in eleven STs.
    - *van*A and *van*B genes were detected in one ST

Background and Objectives

Globally, enterococci are thought to account for approximately 10% of all bacteraemias, and in North America and Europe are the fourth and fifth leading causes of sepsis respectively.[1, 2] Although in the 1970s healthcare-associated enterococcal infections were primarily due to *Enterococcus faecalis*, there has been a steady increase in prevalence of *E. faecium* nosocomial infections.[3-5] Worldwide, the increase in nosocomial *E. faecium* infections has primarily been due to the expansion of polyclonal hospital-adapted clonal complex (CC) 17 isolates. While innately resistant to many classes of antimicrobials, *E. faecium* CC17 has demonstrated a remarkable capacity to evolve new antimicrobial resistances. In 2009, the Infectious Diseases Society of America highlighted *E. faecium* as one of the key problem bacteria or ESKAPE (*Enterococcus faecium, Staphylococcus aureus, Klebsiella pneumoniae, Acinetobacter baumannii, P. aeruginosa, and Enterobacter* species) pathogens requiring new therapies.[6]

AGAR began surveillance of antimicrobial resistance in *Enterococcus* species in 1995.[7] In 2011, AGAR commenced the Australian Enterococcal Sepsis Outcome Program (AESOP).[8-9]

In order to provide data to support improved antimicrobial prescribing and patient care, the objective of AESOP 2020 was to determine the proportion of *E. faecalis* and *E. faecium* bacteraemia isolates demonstrating antimicrobial resistance with particular emphasis on:

- Assessing susceptibility to ampicillin
- Assessing susceptibility to glycopeptides, and the associated resistance genes
- Monitoring the molecular epidemiology of *E. faecium*.

Summary of methods

Thirty-nine institutions, in each state and mainland territory of Australia, were enrolled in the 2020 AGAR programs. Each laboratory collected isolates from all unique patient episodes of bacteraemia from 1 January to 31 December 2020. Approval to conduct the prospective data collection, including de-identified demographic data, was given by the research ethics committees associated with each participating hospital.

Enterococcus sp with the same antimicrobial susceptibility profiles isolated from a patient's blood culture within 14 days of the first positive culture were excluded. A new enterococcal sepsis episode in the same patient was recorded if it was identified by a culture of blood collected more than 14 days after the last positive culture

Data fields

Laboratory data collected for each episode included an accession number, the date of blood culture collection, the organism isolated (genus and species), and the antimicrobial susceptibility test results (minimum inhibitory concentrations) for each species. The patient's date of birth, sex and postcode of residence were also provided. If the patient was admitted to hospital, the dates of admission and discharge were recorded. Depending on the level of participation, limited clinical and outcome data were also provided. These included the principal clinical manifestation, the outcome at seven and 30 days (including whether the patient died within 30 days), and, if applicable, the date of death. To avoid interpretive bias, no attempt was made to assign attributable mortality. Each episode of bacteraemia was designated healthcare onset if the first positive blood culture(s) in an episode were collected >48 hours after admission.

Laboratory testing

Enterococcal isolates were identified to the species level by the participating laboratories using matrix-assisted laser desorption ionization,MALDI (MALDI Biotyper [Bruker Daltonics, Germany] or Vitek-MS® [bioMérieux, France]), or by the Vitek2® (bioMérieux).

Susceptibility testing

Antimicrobial susceptibility testing was performed using the Vitek2® (bioMérieux) or the Phoenix™ (Becton Dickinson, USA) automated microbiology systems according to the manufacturer's instructions. Minimum inhibitory concentration (MIC) data and isolates were referred to the Antimicrobial Resistance and Infectious Diseases (AMRID) Research Laboratory at Murdoch University. Breakpoints as identified by the Clinical and Laboratory Standards Institute (CLSI)[10] and European Committee on Antimicrobial Susceptibility Testing (EUCAST)[11] were utilised for interpretation. Linezolid- and daptomycin-non-susceptible isolates and vancomycin-susceptible isolates which harboured *vanA* or *vanB* genes were retested by Etest® (bioMérieux) using the Mueller-Hinton agar recommended by the manufacturer. *E. faecalis* ATCC® 29212 was used as the control strain.

PCR screening and whole genome sequencing

Molecular testing was performed by whole genome sequencing (WGS) using the NextSeq platform (Illumina, San Diego, USA). Sequencing results were analysed using the Nullarbor pipeline.[12]

Statistical analysis

Confidence intervals of proportions, Fisher's exact test for categorical variables, and chi-square test for trend were calculated, if appropriate, using MedCalc for Windows, version 12.7 (MedCalc Software, Ostend Belgium).

Results

From the 1st January 2020 to the 31st December 2020, 1,230 episodes of enterococcal bacteraemia from 39 laboratories were included in AESOP 2020. Isolates were collected from all states and mainland territories. A new *Enterococcus* sepsis episode in the same patient was recorded if it was confirmed by a further culture of blood taken more than 14 days after the initial positive culture. Each episode of bacteraemia was designated hospital onset (HO) if the first positive blood culture(s) in an episode was collected >48 hours after admission.

Almost all enterococcal bacteraemic patients were admitted to hospital: 1,219/1,230 (99.1%).

Enterococcal Episodes by Region

E. faecalis and *E. faecium* accounted for 93.9% of the isolates identified to species level (Table 1).

Table 1: Enterococcal Episodes by region

Region	*E. faecalis*	*E. faecium*	*Enterococcus sp**	Total
NSW	224	180	24	428
Vic	134	124	16	274
Qld	97	35	10	142
SA	59	39	3	101
WA	89	63	12	164
Tas	27	10	7	44
NT	6	6	2	14
ACT	31	31	1	63
Australia	667	488	75	1,230

**E. gallinarum (n=20), E. casseliflavus (19), E. avium (12), E. raffinosus (12), E. hirae (8), E. durans (2), E. cecorum (1)*

NSW = New South Wales ; Vic = Victoria ; Qld = Queensland ; SA = South Australia ; WA = Western Australia ; Tas = Tasmania ; ACT= Australian Capital Territory ; NT = Northern Territory

Place of Onset of Bacteraemia

Data on the place of onset was available for 1,230 (100%) episodes of enterococcal bacteraemia (Table 2).

E. faecalis and *Enterococcus sp* were predominantly community-onset (blood taken on or before admission or <48hrs after hospital admission): 476/667 (71.4%; 95%CI: 67.8-74.8) and 50/75 (66.7%; 95%CI: 54.9-77.2) respectively. *E. faecium* was predominantly hospital-onset 326/488 (66.8%; 95%CI: 62.5-71.0).

Table 2: *Enterococcus faecalis* and *Enterococcus faecium* by Place of Onset

Organism	Community-onset (CO)	% CO	Hospital-Onset (HO)	%HO	Total
E. faecalis	476	71.4%	191	28.6%	667
E. faecium	162	33.2%	326	66.8%	488
Other *Enterococcus sp*	50	66.7%	25	33.3%	75
All	688	55.9%	542	44.1%	1,230

Thirty Day All-Cause Mortality

The 30 day all-cause mortality data was available for 962 (78.2%) episodes of enterococcal bacteraemia (Table 3).

The 30 day all-cause mortality for enterococcal bacteraemia was 18.1%.

There was no significant difference in the 30 day all-cause mortality between community onset vs hospital onset enterococcal bacteraemia 85/533 (15.9%) and 89/429 (20.7%) respectively (p=0.06).

There was no significant difference in the 30 day all-cause mortality between *E. faecium* and *E. faecalis*: 77/392 (19.6%) and 89/513 (17.3%) respectively (p=0.4).

Table 3: Thirty Day All-cause Mortality: *Enterococcus* species versus Place of Onset.

Organism	Community		Hospital		Total	
	Number	Deaths, % (n)	Number	Deaths, % (n)	Number	Deaths, % (n)
E. faecalis	365	17.3 (63)	148	17.6 (26)	513	17.3 (89)
E. faecium	130	13.8 (18)	262	22.5 (59)	392	19.6 (77)
Other *Enterococcus sp*	38	10.5 (4)	18	22.2 (4)	56	14.3 (8)

E. faecium Thirty Day All-Cause Mortality

Thirty day all-cause mortality data, place of onset and vancomycin susceptibility was known for 390 (79.9%) *E.faecium* episodes (Table 4).

There was no significant difference in mortality between vancomycin non-susceptible *E. faecium* (VRE) and vancomycin susceptible *E. faecium* (VSE): 26/131 (19.8%) and 50/258 (19.4%) respectively (p=0.9). There was no significant difference in mortality between place of onset for VRE (p=1).

There were significant differences in mortality between place of onset for all *E. faecium* (p=0.03) and VSE (p=0.01)

Table 4: *E. faecium:* By Place of Onset, Thirty Day All-cause Mortality and Vancomycin Susceptibility

Organism	Community		Hospital		Total	
	Number	Deaths, % (n)	Number	Deaths, % (n)	Number	Deaths, % (n)
E. faecium (VRE)	31	19.4 (6)	100	20.0 (20)	131	19.8 (26)
E. faecium (VSE)	97	11.3 (11)	161	24.2 (39)	258	19.4 (50)
All E. faecium	128	13.3 (17)	261	22.6 (59)	389	19.5 (76)

Patient Demographics

Age and Gender

Age and gender were available for 1,230 (100%) enterococcal bacteraemic patients (Table 5 and Figures 1 - 3).

Increasing age is a risk factor for enterococcal bacteraemia with only 174/1,230 (14.1%, 95%CI=12.2-16.2) of episodes in patients aged less than 40.

The majority of episodes were in male patients: 801/1,230 (65.1% 95%CI=62.4-67.8).

Table 5: *Enterococcus* Bacteraemia by Decade of Life and Gender

Decade	Female	Male	Total	M/100F
1	28	45	73	161
2	5	17	22	340
3	13	14	27	108
4	26	26	52	100
5	32	41	73	128
6	52	89	141	171
7	92	138	230	150
8	97	230	327	237
9	60	157	217	262
10	24	43	67	179
11		1	1	
Grand Total	**429**	**801**	**1230**	**187**

M/100F = males per 100 females

Figure 1: Enterococcal Bacteraemia by Decade of Life and Gender

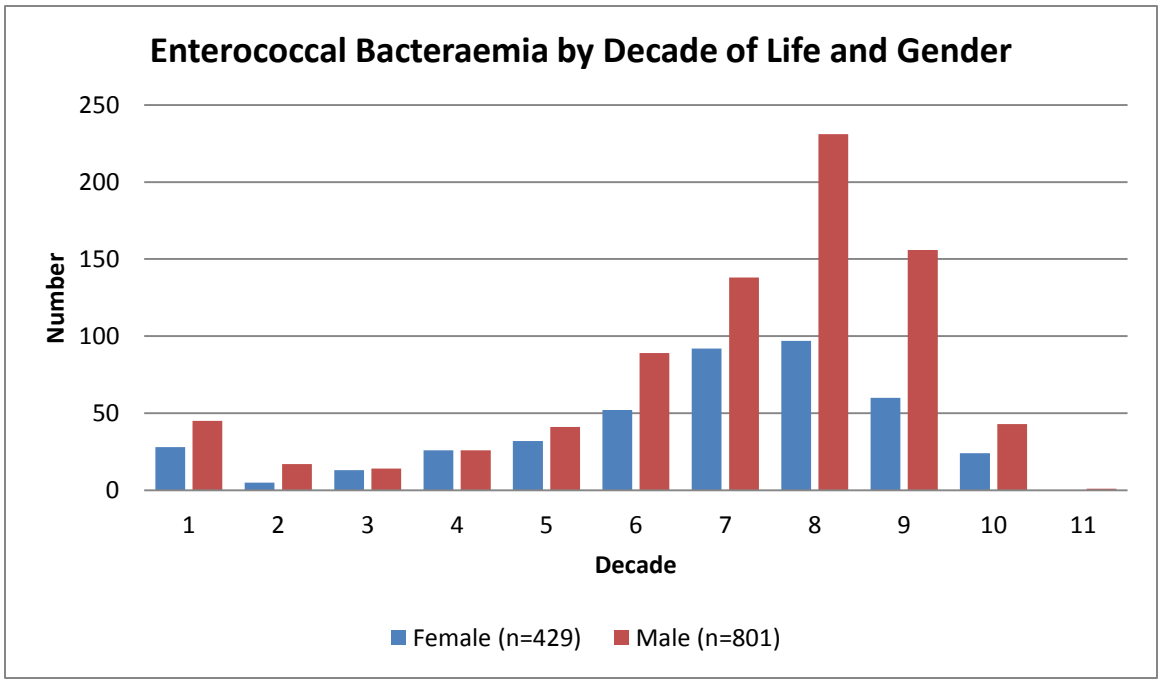


Figure 2: *E. faecalis* Bacteraemia by Decade of Life and Gender

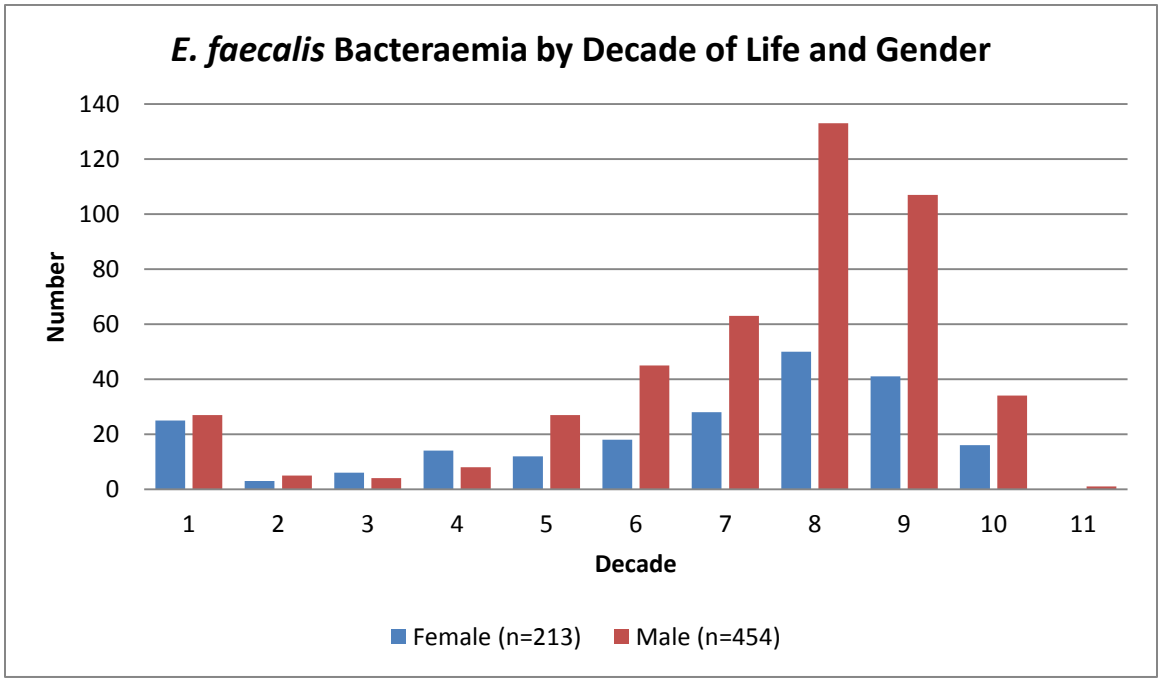
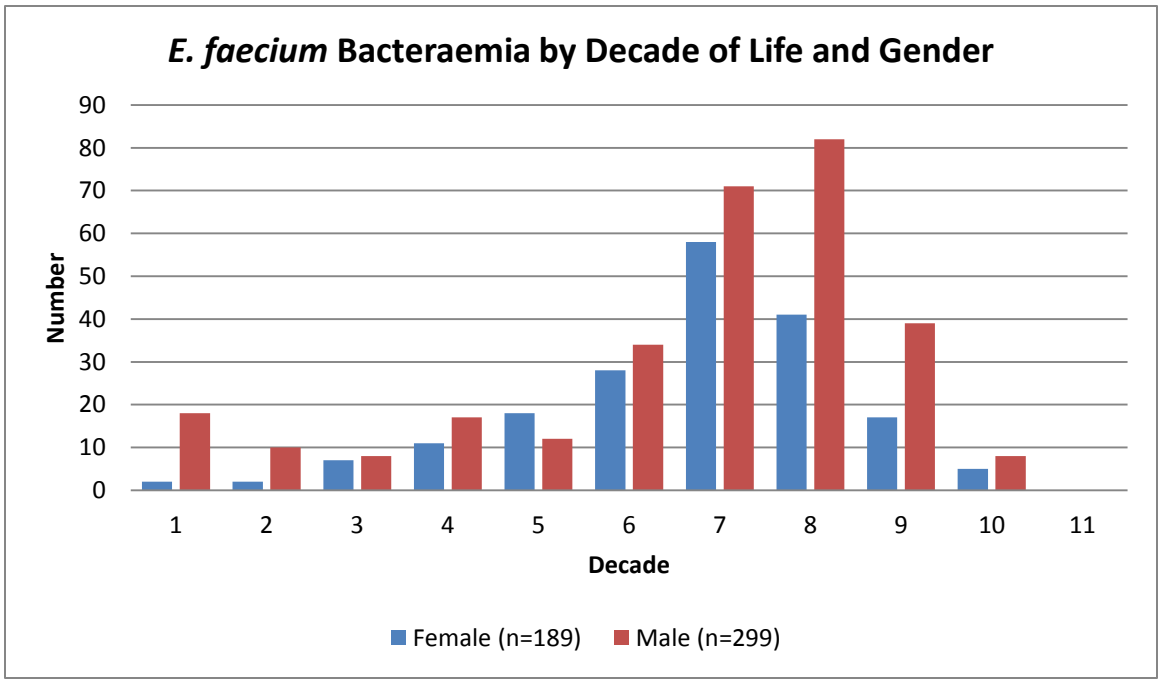


Figure 3: *E. faecium* Bacteraemia by Decade of Life and Gender



Principle Clinical Manifestation

Principle clinical manifestation was known for 1,146 (93.2%) episodes of enterococcal bacteraemia.

Overall the most common principle clinical manifestation was no focus n=191 (16.7%), followed by urinary tract infection n=187 (16.3%) (Table 6).

Of the hospital-onset episodes where data was known, the most common principle clinical manifestation was no focus (17.8%). Of the community-onset episodes where data was known, the most common principle clinical manifestation was urinary tract infection (23.8%).

Table 6: Principle Clinical Manifestation and Gender

Principle Clinical Manifestation	Female, % (n)	Male, % (n)	Total, % (n)
No focus (e.g. febrile neutropenia)	18.4 (72)	15.8 (119)	16.7 (191)
Urinary tract infection	13.0 (51)	18.0 (136)	16.3 (187)
Biliary tract infection (including cholangitis)	13.8 (54)	17.0 (128)	15.9 (182)
Intra-abdominal infection other than biliary tract	15.1 (59)	11.0 (83)	12.4 (142)
Device-related infection without metastatic focus	12.0 (47)	8.9 (67)	9.9 (114)
Febrile neutropenia (where known)	8.9 (35)	7.7 (58)	8.1 (93)
Endocarditis left-sided	3.8 (15)	8.6 (65)	7.0 (80)
Other clinical syndrome	7.9 (31)	5.2 (39)	6.1 (70)
Skin and skin structure	3.1 (12)	3.8 (29)	3.6 (41)
Osteomyelitis/septic arthritis	2.0 (8)	2.1 (16)	2.1 (24)
Endocarditis right-sided	1.3 (5)	1.1 (8)	1.1 (13)
Device-related infection with metastatic focus	0.8 (3)	0.8 (6)	0.8 (9)
Total	392	754	1,146

Principle manifestation was known for 1,077/1,155 (93.3%) of the *E. faecalis* and *E. faecium* episodes (Table 7).
The most common clinical manifestation for *E. faecalis* was urinary tract infection while for *E. faecium* it was biliary tract infection.

Table 7: Principle Clinical Manifestation: *Enterococcus faecalis* versus *Enterococcus faecium*

Principle Clinical Manifestation	E. faecalis, % (n)	E. faecium, % (n)	Total, % (n)
Urinary tract infection	25.3 (157)	6.1 (28)	17.2 (185)
No focus (e.g. febrile neutropenia)	18.5 (115)	14.4 (66)	16.8 (181)
Biliary tract infection (including cholangitis)	7.7 (48)	21.7 (99)	13.6 (147)
Intra-abdominal infection other than biliary tract	9.2 (57)	17.1 (78)	12.5 (135)
Device-related infection without metastatic focus	9.5 (59)	11.6 (53)	10.4 (112)
Febrile neutropenia (where known)	1.9 (12)	16.4 (75)	8.1 (87)
Endocarditis left-sided	11.3 (70)	1.8 (8)	7.2 (78)
Other clinical syndrome	6.9 (43)	5.5 (25)	6.3 (68)
Skin and skin structure	3.9 (24)	3.3 (15)	3.6 (39)
Osteomyelitis/septic arthritis	3.1 (19)	0.9 (4)	2.1 (23)
Endocarditis right-sided	1.9 (12)	0.2 (1)	1.2 (13)
Device-related infection with metastatic focus	0.6 (4)	1.1 (5)	0.8 (9)
Total	620	457	1,077

Length of Stay Post Bacteraemic Episode

Length of stay (LOS) data was known for 1,143/1,230 (92.9%) episodes of enterococcal bacteraemia.

22.8% of patients had a LOS post enterococcal bacteraemia > 30 days (Table 8).

There was a significant difference in mean LOS between *E. faecalis* and *E. faecium* episodes (p<0.0001).

Table 8: Enterococcal Bacteraemia Episodes by Length of Stay

Species	<7 D % (n)	7-14 D % (n)	15-30 D % (n)	>30 D % (n)	Total	Mean LOS (days)
E. faecalis	26.0 (161)	34.1 (211)	18.4 (114)	21.5 (133)	619	22.2
E. faecium	17.6 (80)	27.5 (125)	29.3 (133)	25.6 (116)	454	34.3
Other Enterococcus sp	28.6 (20)	27.1 (19)	27.1 (19)	17.1 (12)	70	16.5

There was a significant differences in mean LOS between vancomycin susceptible and non-susceptible *E. faecium* (p=0.02) (Table 9).

Table 9: *E. faecium* Bacteraemia Episodes by Length of Stay and Vancomycin susceptibility

Species	<7 D % (n)	7-14 D % (n)	15-30 D % (n)	>30 D % (n)	Total	Mean LOS (days)
E. faecium (VRE)	17.7 (26)	23.8 (35)	30.6 (45)	27.9 (41)	147	39
E. faecium (VSE)	17.7 (54)	29.5 (90)	28.2 (86)	24.6 (75)	305	31

Length of Stay Post Bacteraemic Episode versus Place of Onset

There was a significant difference in mean LOS between patients with community onset vs hospital onset *E. faecalis* bacteraemia (p<0.0001) (Table 10).

Table 10: *E. faecalis* Episodes: Length of Stay and Place of Onset

Onset	<7 D % (n)	7-14 D % (n)	15-30 D % (n)	>30 D % (n)	Total	Mean LOS (days)
Community	29.1 (128)	35.9 (158)	18.4 (81)	16.6 (73)	440	15.6
Hospital	18.4 (33)	29.6 (53)	18.4 (33)	33.5 (60)	179	40.0

There was a significant difference in mean LOS between patients with community onset vs hospital onset *E. faecium* bacteraemia (p<0.0001) (Table 11).

Table 11: *E. faecium* Episodes: Length of Stay and Place of Onset

Onset	<7 D % (n)	7-14 D % (n)	15-30 D % (n)	>30 D % (n)	Total	Mean LOS (days)
Community	14.2 (43)	22.5 (68)	31.5 (95)	31.8 (96)	302	14.6
Hospital	24.3 (37)	37.5 (57)	25.0 (38)	13.2 (20)	152	45.0

There was a significant difference in mean LOS between patients with community onset vs hospital onset *E. faecium* vancomycin non-susceptible (VRE) bacteraemia (p=<0.0001).

There was a significant difference in mean LOS between patients with community onset vs hospital onset *E. faecium* vancomycin susceptible (VSE) bacteraemia (p<0.0001) (Table 12).

Table 12: *E. faecium* Episodes (VRE and VSE): By Length of Stay and Place of Onset

	<7 days	7-14 days	15-30 days	>30 days	Total	Mean LOS (days)
***E. faecium* VRE**						
Community-onset	25.8 (8)	32.3 (10)	29.0 (9)	12.9 (4)	31	14.4
Hospital-onset	15.5 (18)	21.6 (25)	31.0 (36)	31.9 (37)	116	46.3
***E. faecium* VSE**						
Community-onset	24.4 (29)	39.5 (47)	22.7 (27)	13.4 (16)	119	14.6
Hospital-onset	13.4 (25)	23.1 (43)	31.7 (59)	31.7 (59)	186	44.1

Antimicrobial Susceptibility Data

The susceptibility results for the *E. faecalis* and *E. faecium* isolates are shown in Table 13.

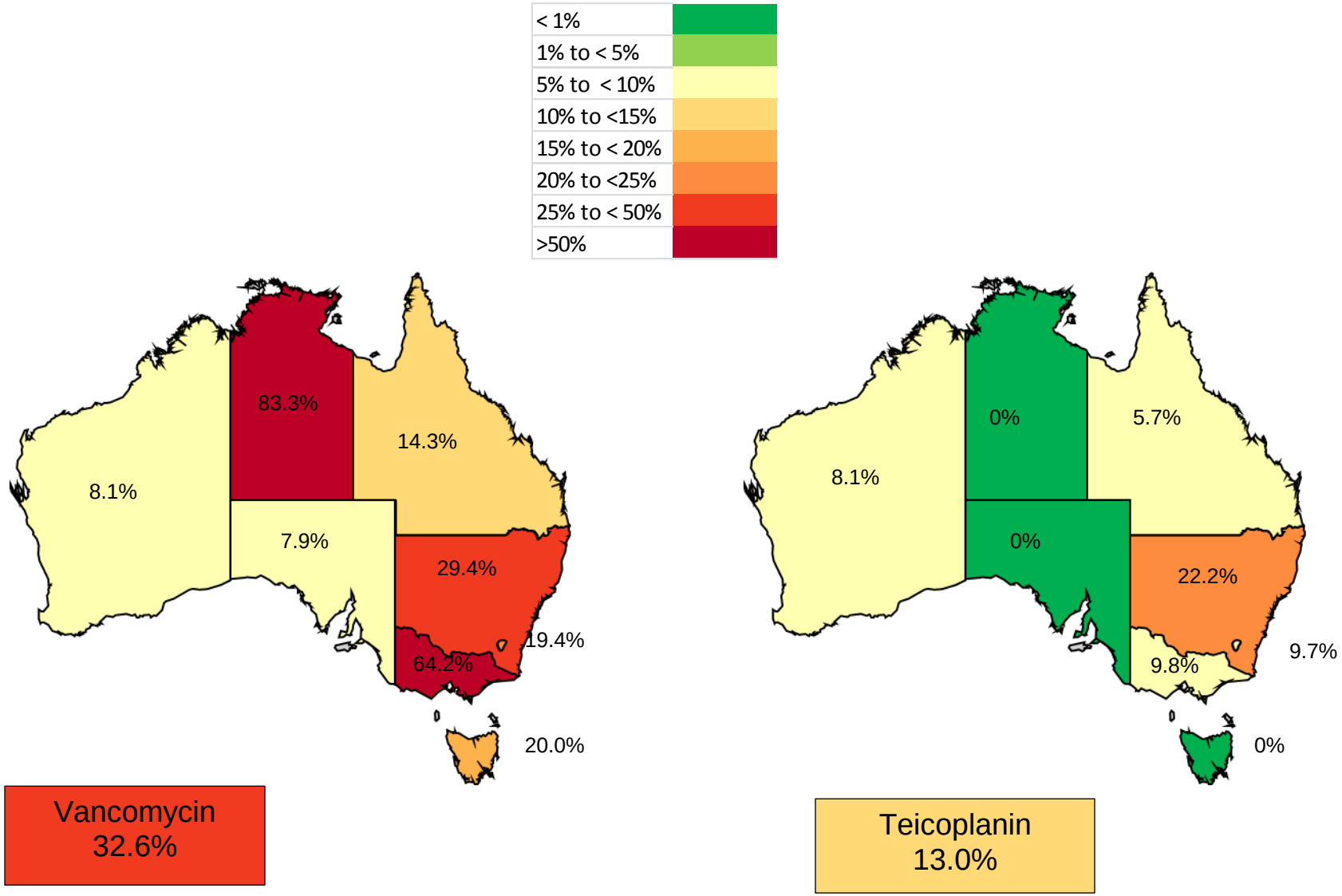
Table 13: The susceptibility of *E. faecalis* and *E. faecium* isolates to ampicillin, penicillin and the non-β-lactam antimicrobials

Species and Antimicrobial	Number Tested	CLSI		EUCAST	
		%I (n)	%R (n)	%I (n)	%R (n)
Enterococcus faecalis					
Ampicillin	666	–†	0.0 (0)	0.0 (0)	0.0 (0)
Benzylpenicillin	608	–†	1.3 (8)	–*	–*
Ciprofloxacin	406	6.9 (28)	88.2 (358)	–†	4.8 (19)
Daptomycin	650	43.1 (280)	0.2 (1)	–*	–*
Linezolid	666	1.5 (10)	0.0 (0)	–†	0.0 (0)
Teicoplanin	666	0.0 (0)	0.2 (1)	–†	0.2 (1)
Tetracycline/Dox	505	0.0 (0)	70.7 (357)	–*	–*
Vancomycin	666	0.0 (0)	0.2 (1)	–†	0.2 (1)
Enterococcus faecium					
Ampicillin	486	–†	88.1 (428)	0.0 (0)	88.1 (428)
Benzylpenicillin	441	–†	88.9 (392)	–*	–*
Ciprofloxacin	319	88.1 (281)	9.1 (29)	–†	85.9 (231)
Daptomycin	60	93.3 (56)	3.3 (2)	–*	–*
Linezolid	487	0.4 (2)	0.0 (0)	–†	0.0 (0)
Teicoplanin	486	0.4 (2)	11.3 (55)	–†	12.1 (59)
Tetracycline/Dox	374	0.0 (0)	69.3 (259)	–*	–*
Vancomycin	485	1.0 (5)	32.0 (155)	–†	32.6 (158)

* no guidelines, † no category defined

Antimicrobial resistance Data by Region

Figure 4. Percentage of resistance *E. faecium* by region for Vancomycin and Teicoplanin



Antimicrobial Resistance Versus Place of Onset

The antimicrobial resistance results for community-onset and hospital-onset *E. faecalis* and *E. faecium* episodes are shown in Table 14.

Table 14: The antibiotic resistance of *E. faecalis* and *E. faecium* isolates to ampicillin and the non-β-lactam antimicrobials by place of onset.

	Community-onset					Hospital-onset				
	Number	CLSI		EUCAST		Number	CLSI		EUCAST	
		%I (n)	%R (n)	%I (n)	%R (n)		%I (n)	%R (n)	%I (n)	%R (n)
Enterococcus faecalis										
Ampicillin	475	–†	0.0 (0)	0.0 (0)	0.0 (0)	191	–†	0.0 (0)	0.0 (0)	0.0 (0)
Benzylpenicillin	439	–†	1.8 (8)	–*	–*	169	–†	0.0 (0)	–*	–*
Ciprofloxacin	293	5.1 (15)	6.5 (19)	–*	–*	113	92.0 (104)	8.0 (9)	–*	–*
Daptomycin	459	42.7 (196)	0.2 (1)	–*	–*	183	41.0 (75)	0.0 (0)	–*	–*
Linezolid	473	1.3 (6)	0.0 (0)	–†	0.0 (0)	191	0.5 (1)	0.0 (0)	–†	0.0 (0)
Teicoplanin	475	0.0 (0)	0.2 (1)	–†	0.2 (1)	191	0.0 (0)	0.0 (0)	–†	0.0 (0)
Tetracycline/Dox	366	10.1 (37)	59.8 (219)	–*	–*	139	11.5 (16)	61.2 (85)	–*	–*
Vancomycin	475	0.0 (0)	0.2 (1)	–†	0.2 (1)	191	0.0 (0)	0.0 (0)	–†	0.0 (0)
Enterococcus faecium										
Ampicillin	161	–†	73.9 (119)	0.0 (0)	73.9 (119)	324	–†	95.4 (309)	0.0 (0)	95.4 (309)
Benzylpenicillin	139	–†	74.1 (103)	–*	–*	302	–†	95.7 (289)	–*	–*
Ciprofloxacin	103	5.8 (6)	72.8 (75)	–*	–*	216	1.4 (3)	95.4 (206)	–*	–*
Daptomycin	24	95.8 (23)	4.2 (1)	–*	–*	38	92.1 (35)	5.3 (2)	–*	–*
Linezolid	162	0.0 (0)	0.0 (0)	–†	0.0 (0)	325	0.6 (2)	0.0 (0)	–†	0.0 (0)
Teicoplanin	161	1.2 (2)	6.2 (10)	–†	8.1 (13)	324	0.3 (1)	13.6 (44)	–†	15.4 (50)
Tetracycline/Dox	116	6.0 (7)	47.4 (55)	–*	–*	258	4.7 (12)	71.7 (185)	–*	–*
Vancomycin	160	0.6 (1)	21.3 (34)	–†	21.9 (35)	325	0.6 (2)	37.2 (121)	–†	37.8 (123)

* no guidelines
† no category defined

Trend Data (2013-2020)

The CLSI breakpoints selected to determine resistance are described in *Performance Standards for Antimicrobial Susceptibility Testing*, M100 31st Edition, January 2021. EUCAST breakpoints are described in *European Committee on Antimicrobial Susceptibility Testing*, Version 11.0, 2021

Chi-squared tests for trends were calculated on data from 2016 to 2020.

Enterococcus faecalis

The following figures show the trends in antimicrobial susceptibility for *E. faecalis* 2013 to 2020 for CLSI and EUCAST where the breakpoints differ. (Figures. 5 – 16)

Figure 5: Antimicrobial susceptibility results of *E. faecalis* to Ampicillin using CLSI breakpoints (2013-2020)

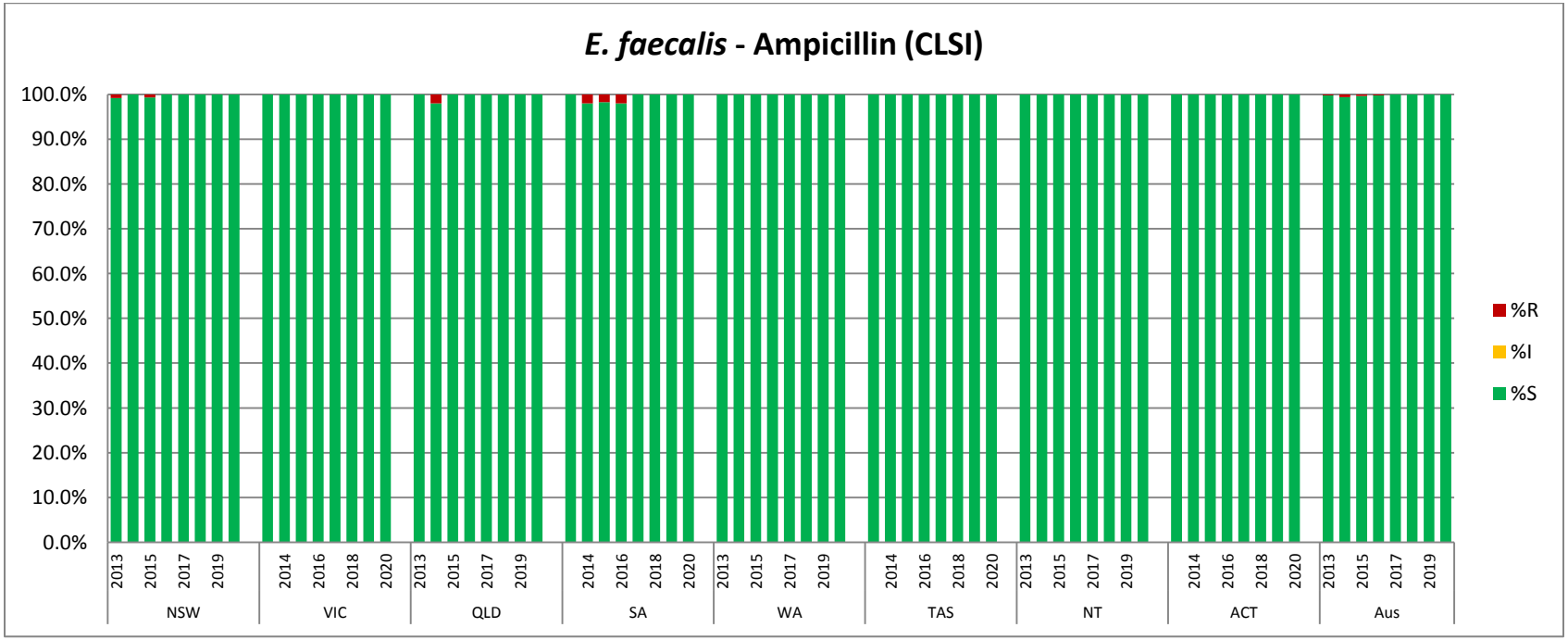


Table 15: Antimicrobial susceptibility results (number) for *E. faecalis* and Ampicillin using CLSI breakpoints (2013-2020)

	2013	2014	2015	2016	2017	2018	2019	2020
				NSW				
S	121	160	149	152	187	211	217	224
I								
R	1	0	1	0	0	0	0	0
Total	122	116	150	152	187	211	217	224
				Vic				
S	106	121	110	130	119	117	128	134
I								
R	0	0	0	0	0	0	0	0
Total	106	121	110	130	119	117	128	134
				Qld				
S	87	100	95	98	102	131	119	97
I								
R	0	2	0	0	0	0	0	0
Total	87	102	95	98	102	131	119	96
				SA				
S	51	50	57	50	31	57	64	59
I								
R	0	1	1	1	0	0	0	0
Total	51	51	58	51	31	57	64	59
				WA				
S	71	63	91	87	94	91	80	89
I								
R	0	0	0	0	0	0	0	0
Total	71	63	91	87	94	91	80	89
				Tas				
S	11	13	12	27	31	31	41	27
I								
R	0	0	0	0	0	0	0	0
Total	11	13	12	27	31	31	41	27
				NT				
S	6	6	10	7	10	11	7	5
I								
R	0	0	0	0	0	0	0	0
Total	6	6	10	7	10	11	7	5
				ACT				
S	24	26	35	40	28	26	36	31
I								

R	0	0	0	0	0	0	0	0
Total	24	26	35	40	28	26	36	31
				Australia				
S	477	519	599	590	602	675	692	666
I								
R	1	3	2	1	0	0	0	0
Total	478	522	561	591	602	675	692	666

Figure 6: Antimicrobial susceptibility results of *E. faecalis* to Ampicillin using EUCAST breakpoints (2013-2020)

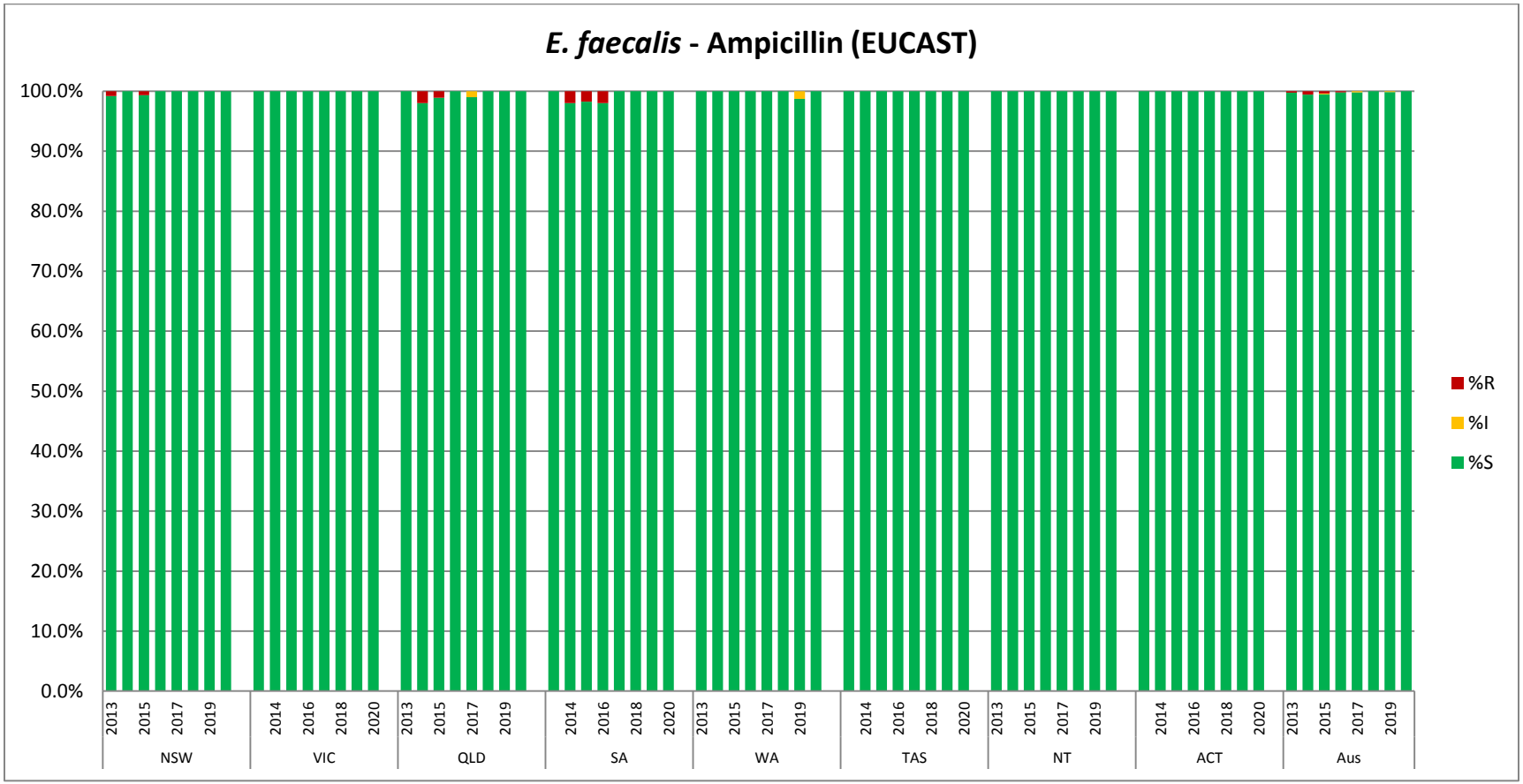
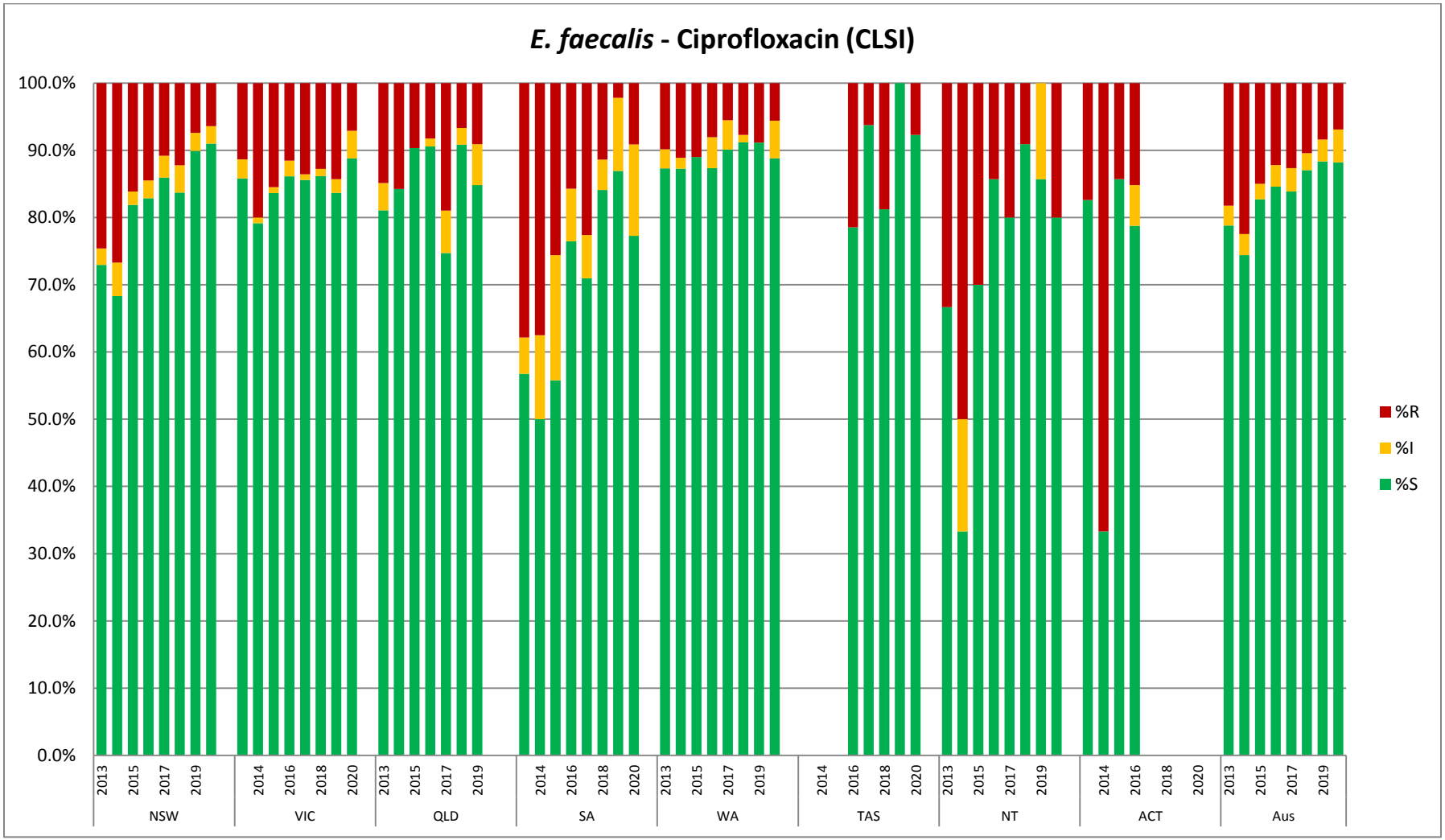


Table 16: Antimicrobial susceptibility results (number) for *E. faecalis* and Ampicillin using EUCAST breakpoints (2013-2020)

	2013	2014	2015	2016	2017	2018	2019	2020
				NSW				
S	121	160	149	152	187	211	217	224
I								
R	1	0	1	0	0	0	0	0
Total	122	116	150	152	187	211	217	224
				Vic				
S	106	121	110	130	119	117	128	134
I								
R	0	0	0	0	0	0	0	0
Total	106	121	110	130	119	117	128	134
				Qld				
S	87	100	95	98	101	131	119	97
I								
R	0	2	0	0	0	0	0	0
Total	87	102	95	98	102	131	119	97
				SA				
S	51	50	57	50	31	57	64	59
I								
R	0	1	1	1	0	0	0	0
Total	51	51	58	51	31	57	64	59
				WA				
S	71	63	91	87	94	91	79	89
I	0	0	0	0	0	0	1	0
R	0	0	0	0	0	0	0	0
Total	71	63	91	87	94	91	80	89
				Tas				
S	11	13	12	27	31	31	41	27
I								
R	0	0	0	0	0	0	0	0
Total	11	13	12	27	31	31	41	27
				NT				
S	6	6	10	7	10	11	7	5
I								
R	0	0	0	0	0	0	0	0
Total	6	6	10	7	10	11	7	5
				ACT				
S	24	26	35	40	28	26	36	31
I								

R	0	0	0	0	0	0	0	0
Total	24	26	35	40	28	26	36	31
Australia								
S	477	519	598	590	601	675	691	666
I	0	0	1	0	1	0	1	0
R	1	3	2	1	0	0	0	0
Total	478	522	561	591	602	675	692	666

Figure 7: Antimicrobial susceptibility results of *E. faecalis* to Ciprofloxacin using CLSI breakpoints (2013-2020)



Decreasing trend in resistance in NSW (Chi-sq for trend = 5.5802, p=0.02), and Australia overall (Chi-sq for trend = 5.4772, p=0.01).

Table 17: Antimicrobial susceptibility results (number) for *E. faecalis* and Ciprofloxacin using CLSI breakpoints (2013-2020)

	2013	2014	2015	2016	2017	2018	2019	2020
				NSW				
S	89	110	122	126	159	147	134	142
I	3	8	3	4	6	7	4	4
R	30	43	24	22	20	21	11	10
Total	122	161	149	152	185	172	149	156
				Vic				
S	91	95	92	112	101	81	82	87
I	3	1	1	3	1	1	2	4
R	12	24	17	15	16	12	14	7
Total	106	120	110	130	118	94	98	98
				Qld				
S	60	75	75	77	71	109	28	
I	3	0	0	1	6	3	2	
R	11	14	8	7	18	8	3	
Total	74	89	83	85	95	120	33	
				SA				
S	21	16	24	39	22	37	40	34
I	2	4	8	4	2	2	5	6
R	14	12	11	8	7	5	1	4
Total	37	32	43	51	31	44	46	44
				WA				
S	62	55	81	76	82	83	72	79
I	2	1	0	4	4	1	0	5
R	7	7	10	7	5	7	7	5
Total	71	63	91	87	91	91	79	89
				Tas				
S				11	15	13	17	12
I				0	0	0	0	0
R				3	1	3	0	1
Total				14	16	16	17	13
				NT				
S	4	2	7	6	8	10	6	4
I	0	1	0	0	0	0	1	0
R	2	3	3	1	2	1	0	1
Total	6	6	10	7	10	11	7	5
				ACT				
S	19	2	30	26				
I	0	0	0	2				

R	4	4	5	5				
Total	23	6	35	23				
				Australia				
S	346	355	431	473	458	477	379	358
I	13	15	12	18	19	14	14	20
R	80	107	78	68	69	57	36	28
Total	439	477	521	559	546	548	429	406

Figure 8: Antimicrobial susceptibility results of *E. faecalis* to Daptomycin using CLSI breakpoints (2014-2020)

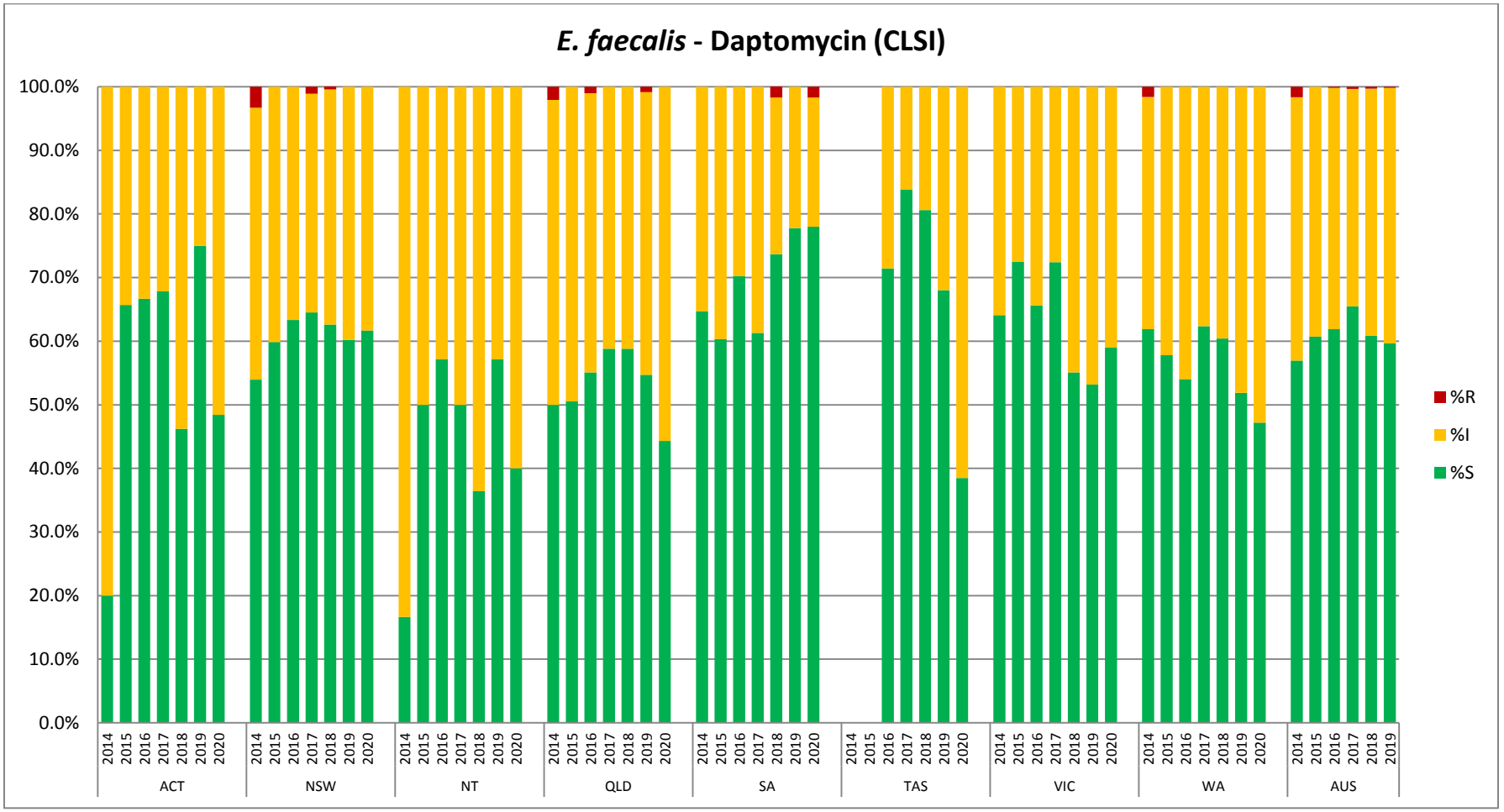
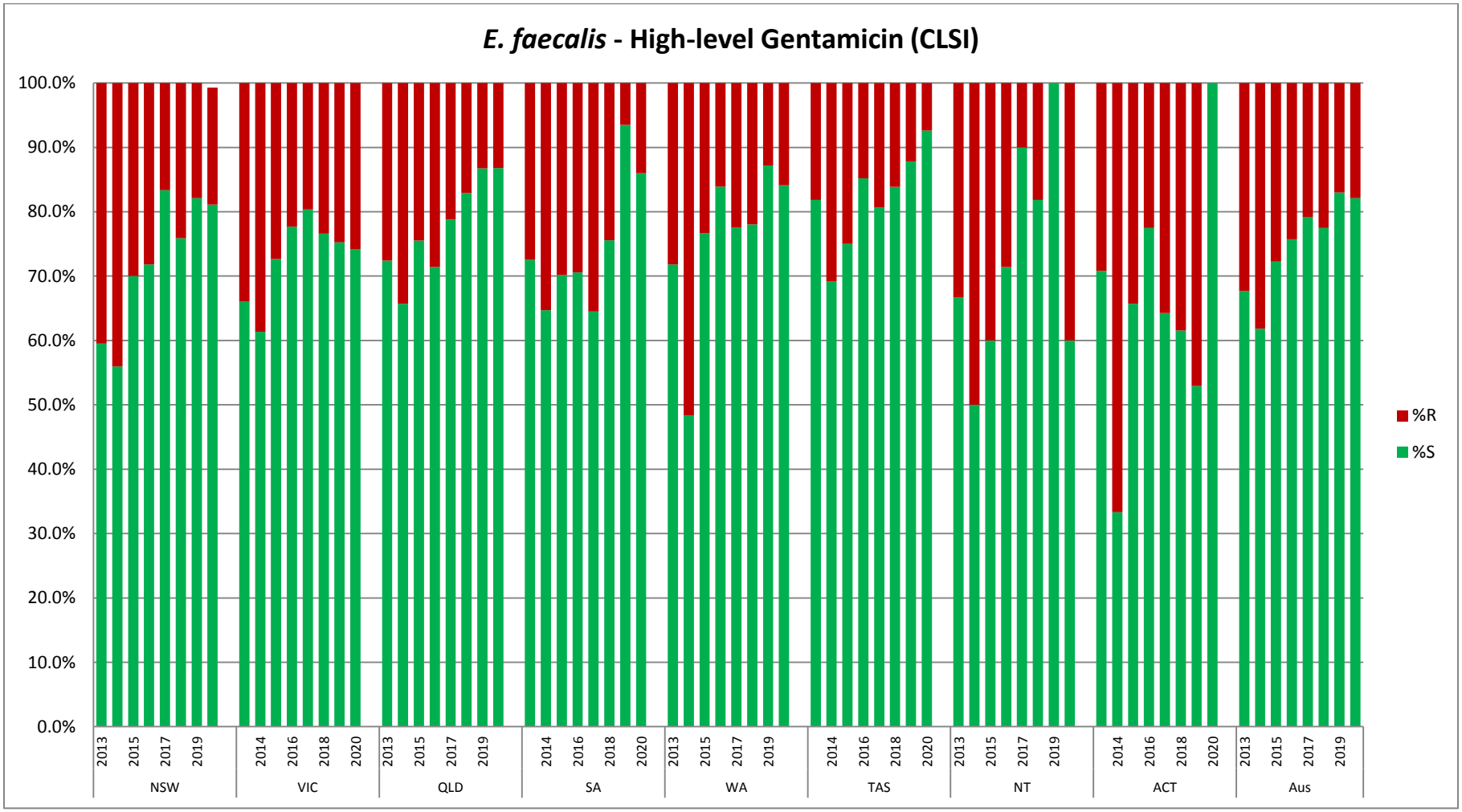


Table 18: Antimicrobial susceptibility results (number) for *E. faecalis* and Daptomycin using CLSI breakpoints (2014-2020)

	2013	2014	2015	2016	2017	2018	2019	2020
NSW								
S		82	88	95	120	132	130	137
I		65	59	55	64	78	86	81
R		5	0	0	2	1	0	0
Total		152	147	150	186	211	216	218
Vic								
S		75	79	82	84	65	67	80
I		42	30	43	32	53	59	53
R		0	0	0	0	0	0	0
Total		117	109	125	116	118	126	133
Qld								
S		48	47	54	60	77	64	43
I		46	46	43	42	54	52	53
R		2	0	1	0	0	1	0
Total		96	93	98	102	131	117	96
SA								
S			35	33	19	42	49	46
I			23	14	12	14	14	11
R			0	0	0	1	0	1
Total			58	47	31	57	63	58
WA								
S		39	52	47	58	55	41	42
I		23	38	40	35	36	38	46
R		1	0	0	0	0	63	0
Total		63	90	87	93	91	79	88
Tas								
S				10	26	25	17	5
I				4	5	6	8	8
R				0	0	0	0	0
Total				14	31	31	25	13
NT								
S			5	4	5	4	4	2
I			5	3	5	7	3	3
R			0	0	0	0	0	0
Total			10	7	10	11	7	5
ACT								
S		1	23	26	19	12	27	15
I		4	12	13	9	14	9	16

R	0	0	0	0	0	0	0
Total	5	35	39	28	26	36	31
Australia							
S	279	329	351	391	412	399	370
I	203	213	215	204	262	269	271
R	8	0	1	0	0	1	1
Total	490	542	567	597	676	669	642

Figure 9: Antimicrobial susceptibility results of *E. faecalis* to High-level Gentamicin using CLSI breakpoints (2013-2020)



Decreasing trend in resistance in QLD (Chi-sq for trend = 7.8464, p<0.005), SA (Chi-sq for trend = 8.7851, p=0.003), and Australia overall (Chi-sq for trend = 8.7115, p=0.003).

Table 19: Antimicrobial susceptibility results (number) for *E. faecalis* and High-level Gentamicin using CLSI breakpoints (2013-2020)

	2013	2014	2015	2016	2017	2018	2019	2020
NSW								
S	72	89	98	107	155	148	124	126
R	49	70	42	42	31	47	27	28
Total	121	159	140	149	186	195	151	154
Vic								
S	70	73	77	101	94	72	73	72
R	36	46	29	29	23	22	24	25
Total	106	119	106	130	117	94	97	97
QLD								
S	63	67	71	70	78	97	59	46
R	24	35	23	28	21	20	9	7
Total	87	102	94	98	99	117	68	53
SA								
S	37	33	40	36	20	34	43	37
R	14	18	17	15	11	11	3	6
Total	51	51	57	51	31	45	46	43
WA								
S	51	45	69	73	69	64	68	74
R	20	48	21	14	20	18	10	14
Total	71	93	90	87	89	82	78	88
Tas								
S	9	9	9	23	25	26	36	25
R	2	4	3	4	6	5	5	2
Total	11	13	12	27	31	31	41	27
NT								
S	4	3	6	5	9	9	7	3
R	2	3	4	2	1	2	0	2
Total	6	6	10	7	10	11	7	5
ACT								
S	17	2	23	31	18	16	9	
R	7	4	12	9	10	10	8	
Total	24	6	35	40	28	26	17	
Australia								
S	323	321	393	446	468	466	419	384
R	154	198	151	143	123	135	86	84
Total	477	519	544	589	591	601	505	468

Figure 10: Antimicrobial susceptibility results of *E. faecalis* to Linezolid using CLSI breakpoints (2013-2020)

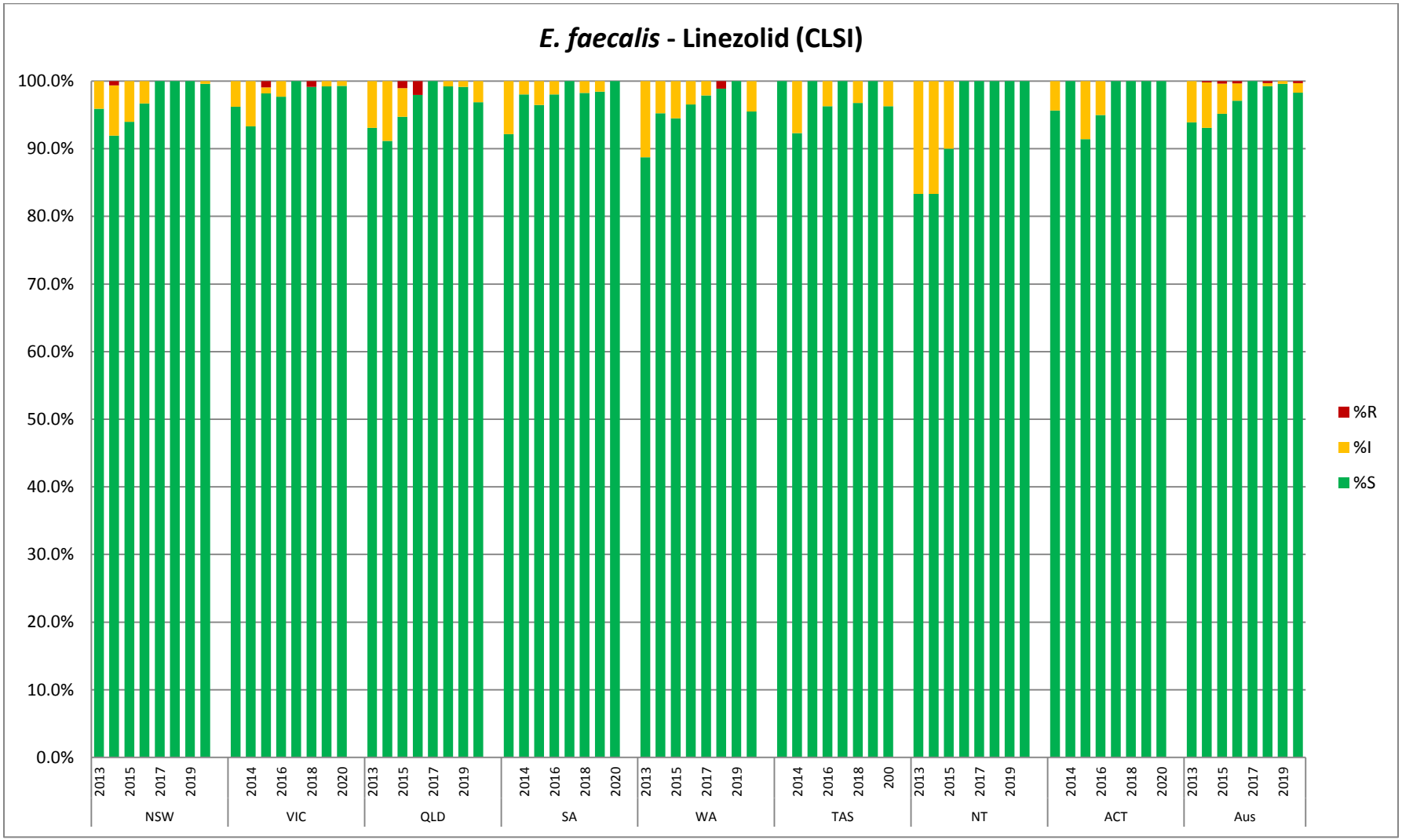


Table 20: Antimicrobial susceptibility results (number) for *E. faecalis* and Linezolid using CLSI breakpoints (2013-2020)

	2013	2014	2015	2016	2017	2018	2019	2020
				NSW				
S	117	148	141	146	186	211	217	223
I	5	12	9	5	0	0	0	1
R	0	1	0	0	0	0	0	0
Total	122	161	150	151	186	211	217	224
				Vic				
S	102	112	108	127	119	116	127	133
I	4	8	1	3	0	0	1	0
R	0	0	1	0	0	1	0	0
Total	106	120	110	130	119	117	128	133
				QLD				
S	81	93	90	96	102	130	118	94
I	6	9	4	0	0	1	1	3
R	0	0	1	2	0	0	0	0
Total	87	102	95	98	102	131	119	97
				SA				
S	47	50	55	50	31	56	43	59
I	4	1	2	1	0	1	1	0
R	0	0	0	0	0	0	0	0
Total	51	51	57	51	31	57	64	59
				WA				
S	63	60	86	84	92	90	80	85
I	8	3	5	3	1	0	0	3
R	0	0	0	0	0	1	0	0
Total	71	63	91	87	94	91	80	88
				Tas				
S	11	12	12	26	31	30	41	26
I	0	1	0	1	0	1	0	0
R	0	0	0	0	0	0	0	0
Total	11	13	12	27	31	31	41	26
				NT				
S	5	5	9	7	10	11	7	5
I	1	1	1	0	0	0	0	0
R	0	0	0	0	0	0	0	0
Total	6	6	10	7	10	11	7	5
				ACT				
S	22	6	32	38	28	26	36	31
I	1	0	3	2	0	0	0	0

R	0	0	0	0	0	0	0	0
Total	23	6	35	40	28	26	36	31
Australia								
S	448	486	533	574	601	670	689	656
I	29	35	25	15	0	3	3	7
R	0	1	2	2	0	2	0	0
Total	477	522	560	591	601	675	692	663

Figure 11: Antimicrobial susceptibility results of *E. faecalis* to Linezolid using EUCAST breakpoints (2013-2020)

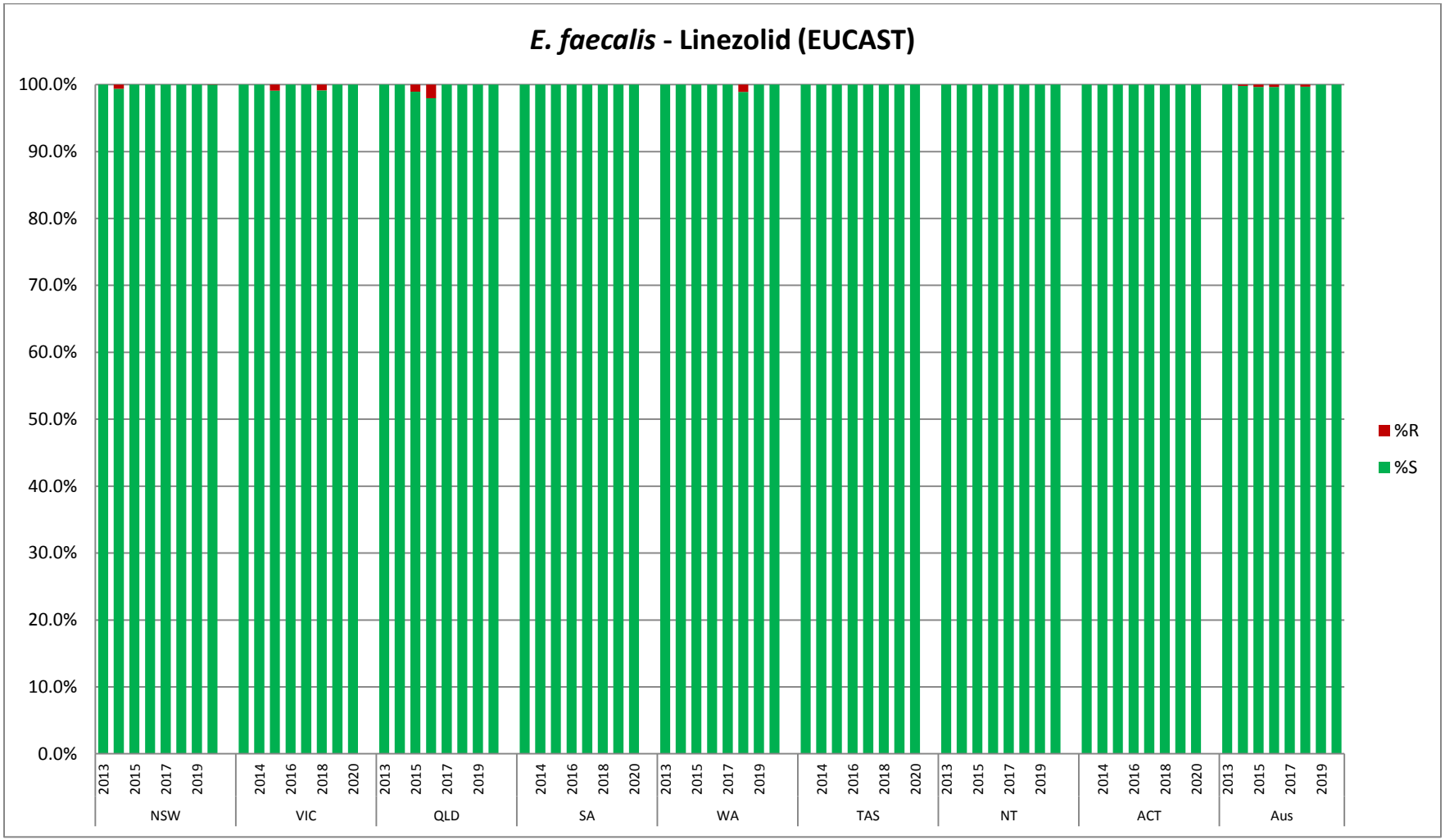


Table 21: Antimicrobial susceptibility results (number) for *E. faecalis* and Linezolid using EUCAST breakpoints (2013-2020)

	2013	2014	2015	2016	2017	2018	2019	2020
				NSW				
S	122	160	150	151	186	211	217	224
R	0	1	0	0	0	0	0	0
Total	122	161	150	151	186	211	217	224
				Vic				
S	106	120	109	130	119	116	128	134
R	0	0	1	0	0	1	0	0
Total	106	120	110	130	119	117	128	134
				QLD				
S	87	102	94	96	102	131	119	97
R	0	0	1	2	0	0	0	0
Total	87	102	95	98	102	131	119	97
				SA				
S	51	51	57	51	31	57	64	59
R	0	0	0	0	0	0	0	0
Total	51	51	57	51	31	57	64	59
				WA				
S	71	63	91	87	94	90	80	89
R	0	0	0	0	0	1	0	0
Total	71	63	91	87	94	91	80	89
				Tas				
S	11	13	12	27	31	31	41	27
R	0	0	0	0	0	0	0	0
Total	11	13	12	27	31	31	41	27
				NT				
S	6	6	10	7	10	11	7	5
R	0	0	0	0	0	0	0	0
Total	6	6	10	7	10	11	7	5
				ACT				
S	23	6	35	40	28	26	36	31
R	0	0	0	0	0	0	0	0
Total	23	6	35	40	28	26	36	31
				Australia				
S	477	521	558	589	601	673	692	666
R	0	1	2	2	0	2	0	0
Total	477	522	560	591	601	675	692	666

Figure 12: Antimicrobial susceptibility results of *E. faecalis* to Teicoplanin using CLSI breakpoints (2013-2020)

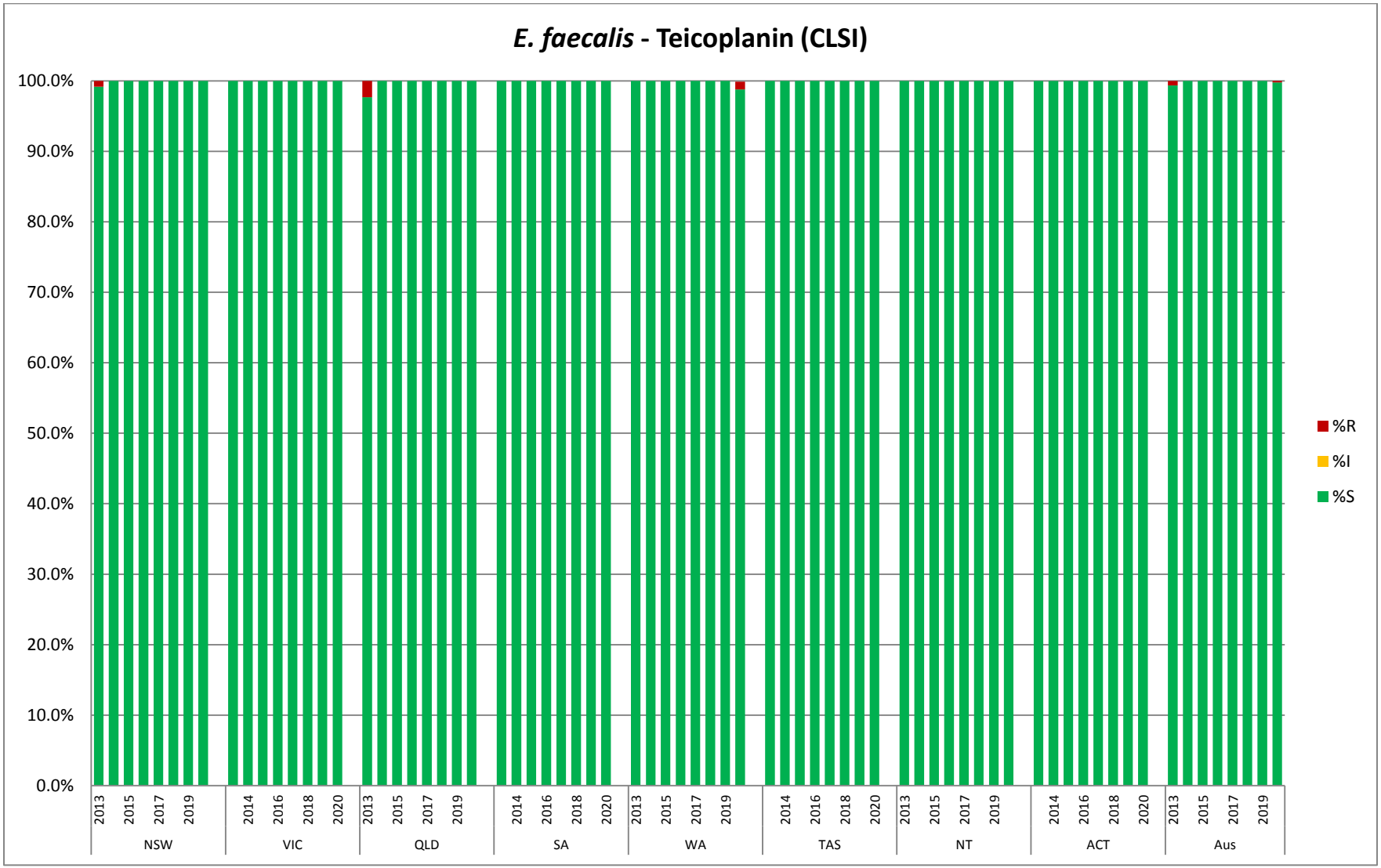


Table 22: Antimicrobial susceptibility results (number) for *E. faecalis* and Teicoplanin using CLSI breakpoints (2013-2020)

	2013	2014	2015	2016	2017	2018	2019	2020
				NSW				
S	120	160	149	152	187	211	217	224
I	0	0	0	0	0	0	0	0
R	1	0	0	0	0	0	0	0
Total	121	160	149	152	187	211	217	224
				Vic				
S	105	120	109	129	119	117	128	134
I	0	0	1	1	0	0	0	0
R	1	0	0	0	0	0	0	0
Total	106	120	110	130	119	117	128	134
				QLD				
S	85	102	95	100	102	131	119	97
I	0	0	0	0	0	0	0	0
R	2	0	0	0	0	0	0	0
Total	87	102	95	100	102	131	119	97
				SA				
S	51	51	57	52	31	57	64	59
I	0	0	0	0	0	0	0	0
R	0	0	0	0	0	0	0	0
Total	51	51	57	52	31	57	64	59
				WA				
S	71	63	91	87	94	91	80	88
I	0	0	0	0	0	0	0	0
R	0	0	0	0	0	0	0	1
Total	71	63	91	87	94	91	80	89
				Tas				
S	11	13	11	27	31	31	41	27
I	0	0	0	0	0	0	0	0
R	0	0	1	0	0	0	0	0
Total	11	13	12	27	31	31	41	27
				NT				
S	6	6	10	7	10	11	7	5
I	0	0	0	0	0	0	0	0
R	0	0	0	0	0	0	0	0
Total	6	6	10	7	10	11	7	5
				ACT				
S	23	6	35	40	28	26	36	31
I	0	0	0	0	0	0	0	0

R	0	0	0	0	0	0	0	0
Total	23	6	35	40	28	26	36	31
Australia								
S	473	521	558	595	602	675	692	665
I	0	0	0	0	0	0	0	0
R	3	0	0	0	0	0	0	1
Total	476	521	558	595	602	675	692	666

Figure 13: Antimicrobial susceptibility results of *E. faecalis* to Teicoplanin using EUCAST breakpoints (2013-2020)

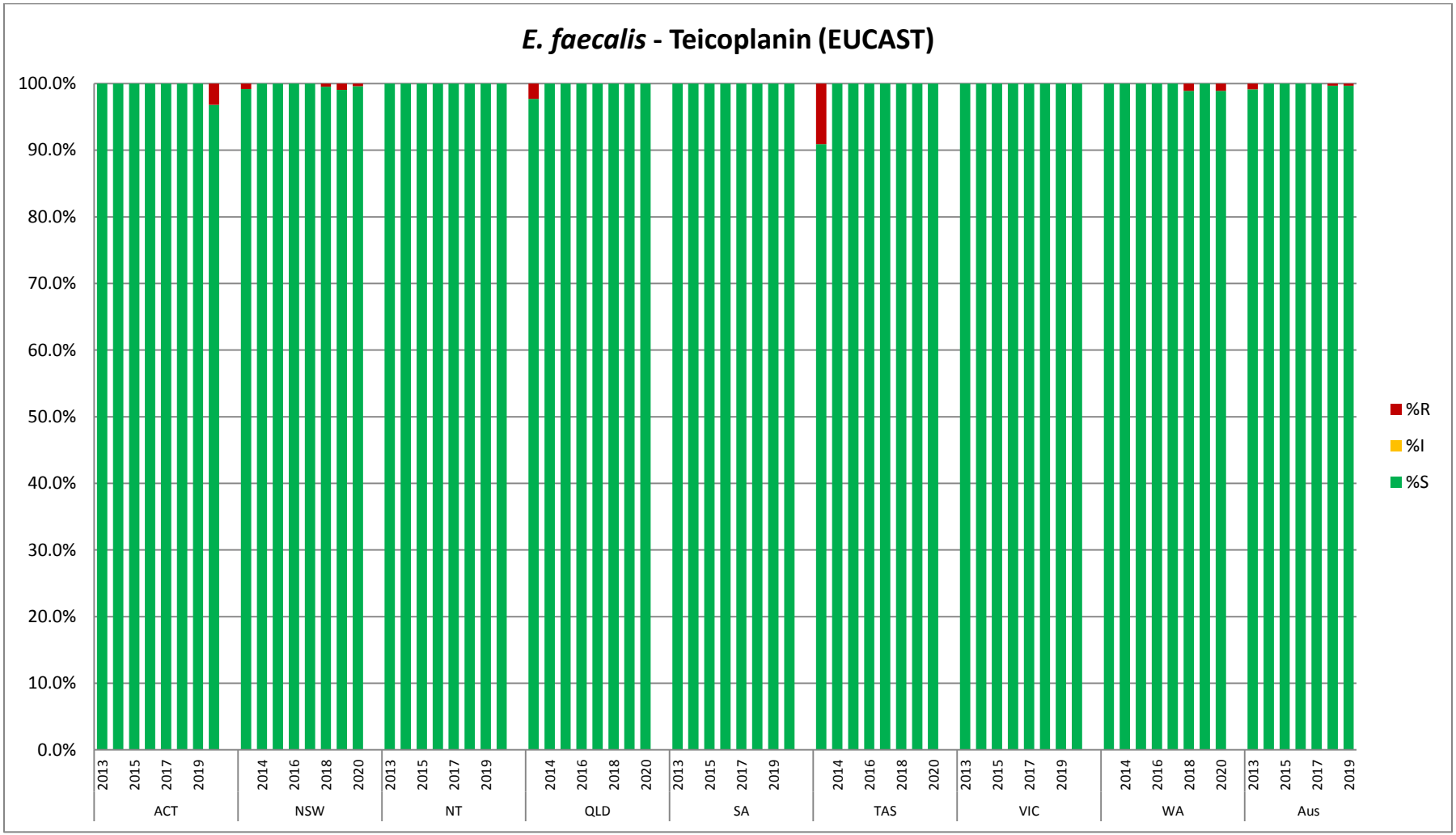


Table 23: Antimicrobial susceptibility results (number) for *E. faecalis* and Teicoplanin using EUCAST breakpoints (2013-2020)

	2013	2014	2015	2016	2017	2018	2019	2020
				NSW				
S	120	160	149	152	187	210	215	224
R	1	0	0	0	0	1	2	0
Total	121	160	149	152	187	211	217	224
				Vic				
S	106	120	109	129	119	117	128	134
R	0	0	0	0	0	0	0	0
Total	106	120	110	130	119	117	128	134
				QLD				
S	85	102	95	100	102	131	119	97
R	2	0	0	0	0	0	0	0
Total	87	102	95	100	102	131	119	97
				SA				
S	51	51	57	52	31	57	64	59
R	0	0	0	0	0	0	0	0
Total	51	51	57	52	31	57	64	59
				WA				
S	71	63	91	87	94	90	80	88
R	0	0	0	0	0	1	0	1
Total	71	63	91	87	94	91	80	89
				Tas				
S	10	13	11	27	31	31	41	27
R	1	0	1	0	0	0	0	0
Total	11	13	12	27	31	31	41	27
				NT				
S	6	6	10	7	10	11	7	5
R	0	0	0	0	0	0	0	0
Total	6	6	10	7	10	11	7	5
				ACT				
S	23	6	35	40	28	26	36	31
R	0	0	0	0	0	0	0	0
Total	23	6	35	40	28	26	36	31
				Australia				
S	472	521	558	595	602	673	690	665
R	4	0	0	0	0	2	2	1
Total	476	521	558	595	602	675	692	666

Figure 14: Antimicrobial susceptibility results of *E. faecalis* to Tetracycline/Doxycycline using CLSI breakpoints (2013-2020)

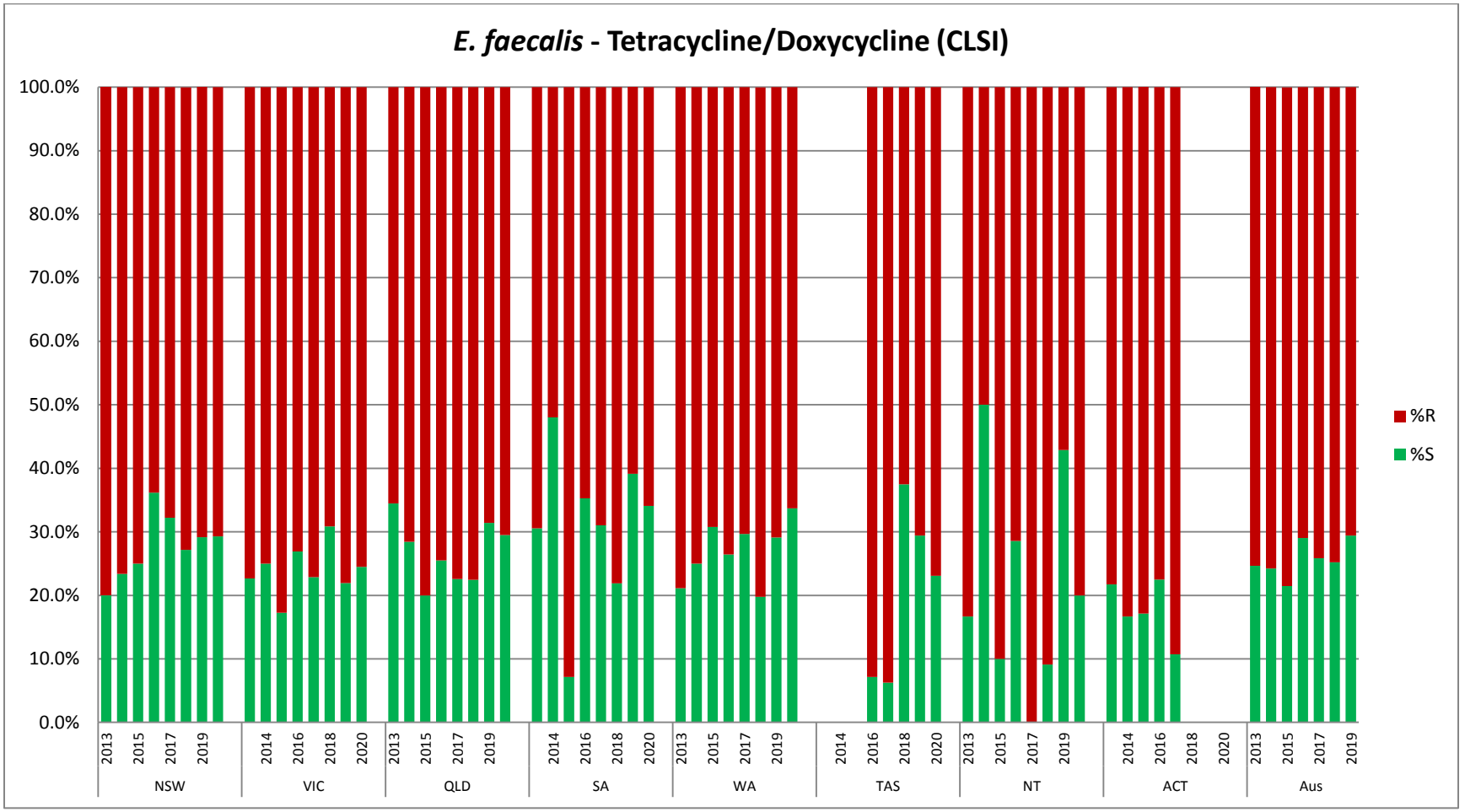


Table 24: Antimicrobial susceptibility results (number) for *E. faecalis* and Tetracycline/Doxycycline using CLSI breakpoints (2013-2020)

	2013	2014	2015	2016	2017	2018	2019	2020
				NSW				
S	21	36	30	55	58	44	51	53
NS	84	118	90	97	122	91	95	128
Total	105	154	120	152	180	162	175	181
				Vic				
S	24	30	19	35	27	29	18	23
NS	82	90	91	95	91	65	64	71
Total	106	120	110	131	118	94	82	94
				Qld				
S	30	29	19	25	21	22	22	23
NS	55	72	76	73	72	76	48	55
Total	87	102	95	98	93	98	70	78
				SA				
S	11	24	2	18	9	7	18	15
NS	25	26	26	33	20	0	1	29
Total	36	50	28	51	29	32	46	44
				WA				
S	15	16	28	23	27	18	23	30
NS	56	48	63	64	64	72	56	59
Total	71	64	91	87	91	91	79	89
				Tas				
S				1	1	6	5	3
NS				13	15	10	12	10
Total				14	16	16	17	13
				NT				
S	1	3	1	2	0	1	3	1
NS	5	3	9	5	10	10	4	4
Total	6	6	10	7	10	11	7	5
				ACT				
S	5	1	6	9	3			
NS	18	5	28	30	25			
Total	23	6	35	40	28			
				Australia				
S	107	116	105	168	146	127	140	148
NS	325	362	383	410	419	324	280	357
Total	434	479	489	579	565	504	476	505

In 2018 a new susceptibility card was introduced with upper range >4, therefore cannot be determined if intermediate or resistant (called NS – non-susceptible)

Figure 15: Antimicrobial susceptibility results of *E. faecalis* to Vancomycin using CLSI breakpoints (2013-2020)

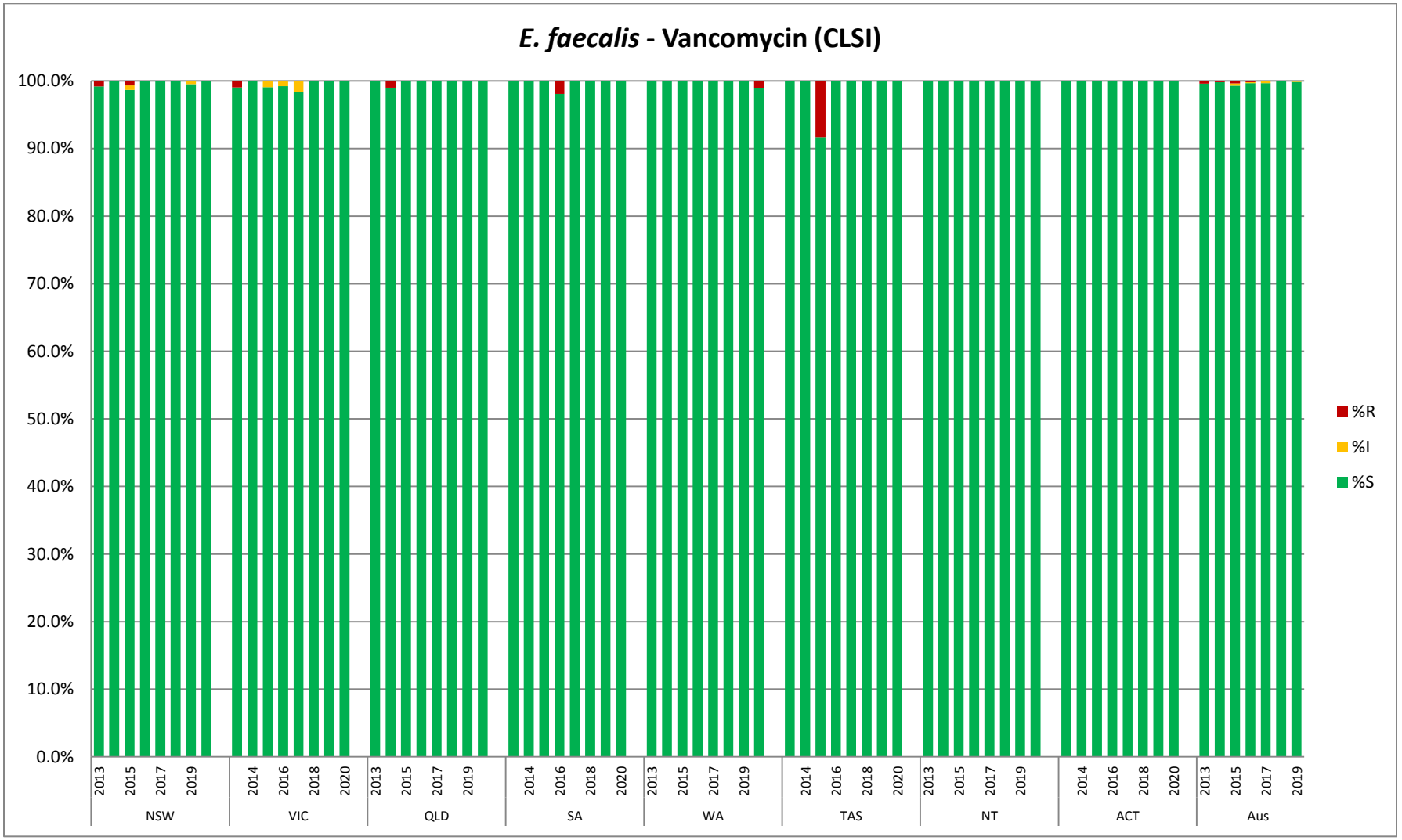


Table 25: Antimicrobial susceptibility results (number) for *E. faecalis* and Vancomycin using CLSI breakpoints (2013-2020)

	2013	2014	2015	2016	2017	2018	2019	2020
				NSW				
S	120	161	148	152	187	210	216	224
I	0	0	1	0	0	0	1	0
R	1	0	1	0	0	1	0	0
Total	121	161	150	152	187	211	217	224
				Vic				
S	106	120	109	130	119	117	128	134
I	0	0	1	0	0	0	0	0
R	0	0	0	0	0	0	0	0
Total	106	120	110	130	119	117	128	134
				QLD				
S	87	101	96	100	102	131	119	97
I	0	0	0	0	0	0	0	0
R	0	1	0	0	0	0	0	0
Total	87	102	96	100	102	131	119	97
				SA				
S	51	51	57	52	31	57	64	59
I	0	0	0	0	0	0	0	0
R	0	0	0	0	0	0	0	0
Total	51	51	57	52	31	57	64	59
				WA				
S	71	63	91	87	94	91	80	88
I	0	0	0	0	0	0	0	0
R	0	0	0	0	0	0	0	1
Total	71	63	91	87	94	91	80	89
				Tas				
S	11	13	12	27	31	31	41	27
I	0	0	0	0	0	0	0	0
R	0	0	0	0	0	0	0	0
Total	11	13	12	27	31	31	41	27
				NT				
S	6	6	10	7	10	11	7	5
I	0	0	0	0	0	0	0	0
R	0	0	0	0	0	0	0	0
Total	6	6	10	7	10	11	7	5
				ACT				
S	24	6	35	40	28	26	36	31
I	0	0	0	0	0	0	0	0

R	0	0	0	0	0	0	0	0
Total	24	6	35	40	28	26	36	31
Australia								
S	475	522	557	593	600	675	691	665
I	0	0	2	1	2	0	1	0
R	2	1	2	1	0	0	0	1
Total	477	523	561	595	602	675	692	666

Figure 16: Antimicrobial susceptibility results of *E. faecalis* to Vancomycin using EUCAST breakpoints (2013-2020)

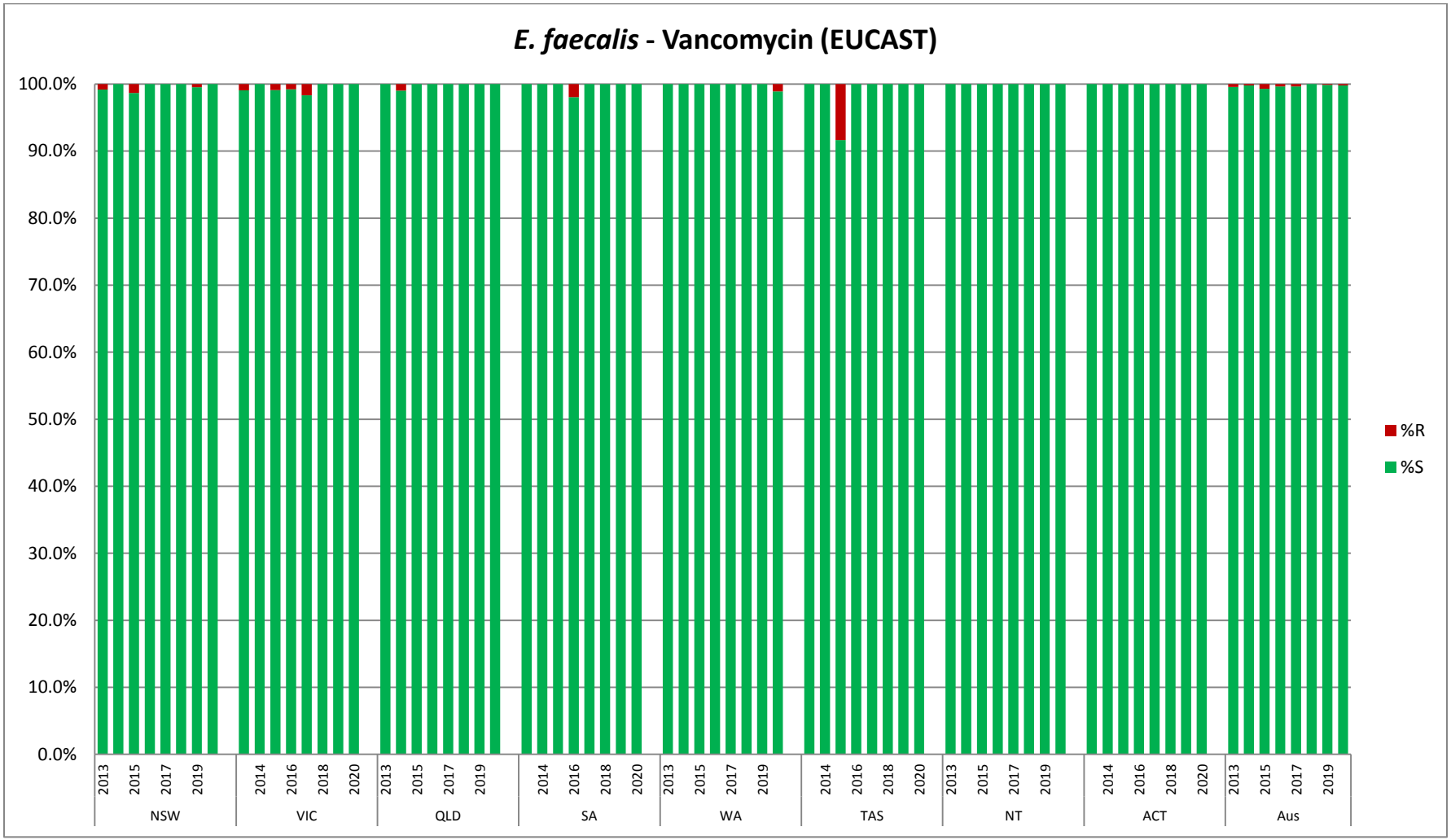


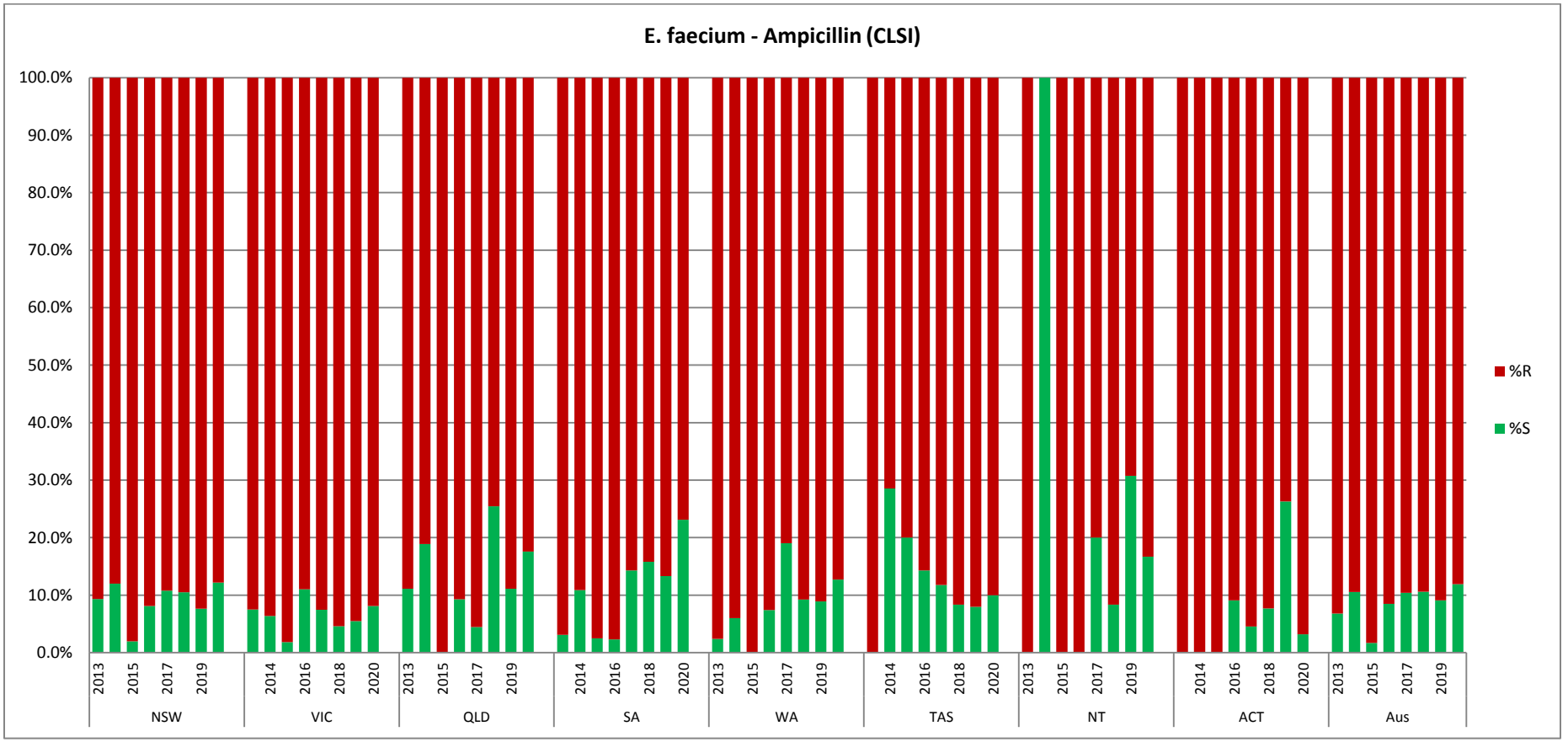
Table 26: Antimicrobial susceptibility results (number) for *E. faecalis* and Vancomycin using EUCAST breakpoints (2013-2020)

	2013	2014	2015	2016	2017	2018	2019	2020
				NSW				
S	120	161	148	152	187	210	216	224
R	1	0	2	0	0	1	1	0
Total	122	161	150	152	187	211	217	224
				Vic				
S	105	120	109	129	117	117	128	134
R	1	0	1	1	2	0	0	0
Total	106	120	110	130	119	117	128	134
				QLD				
S	87	101	96	100	102	131	119	97
R	0	1	0	0	0	0	0	0
Total	87	102	96	100	102	131	119	97
				SA				
S	51	51	57	51	31	57	64	59
R	0	0	0	1	0	0	0	0
Total	51	51	57	52	31	57	64	59
				WA				
S	71	63	91	87	94	91	80	88
R	0	0	0	0	0	0	0	1
Total	71	63	91	87	94	91	80	89
				Tas				
S	11	13	11	27	31	31	41	27
R	0	0	1	0	0	0	0	0
Total	11	13	12	27	31	31	41	27
				NT				
S	6	6	10	7	10	11	7	5
R	0	0	0	0	0	0	0	0
Total	6	6	10	7	10	11	7	5
				ACT				
S	24	6	35	40	28	26	36	31
R	0	0	0	0	0	0	0	0
Total	24	6	35	40	28	26	36	31
				Australia				
S	475	522	557	593	600	675	691	665
R	0	1	4	2	2	0	1	1
Total	2	523	561	595	602	675	692	666

Enterococcus faecium

The following figures show the trends in antimicrobial susceptibility for *E. faecium* from 2013 to 2020 using CLSI and EUCAST guidelines. (Figures. 17 - 29)

Figure 17: Antimicrobial susceptibility results of *E. faecium* to Ampicillin using CLSI breakpoints (2013-2020)



Decreasing trend in resistance in SA (Chi-sq for trend = 6.0355, p=0.014).

Table 27: Antimicrobial susceptibility results (number) for *E. faecium* and Ampicillin using CLSI breakpoints (2013-2020)

	2013	2014	2015	2016	2017	2018	2019	2020
				NSW				
S	10	16	2	10	18	16	16	21
R	97	117	99	113	149	136	193	158
Total	107	133	101	123	167	152	209	179
				Vic				
S	6	6	2	12	10	6	9	10
R	74	88	106	97	124	124	155	113
Total	80	94	108	109	134	130	164	123
				QLD				
S	4	7	0	4	2	14	7	6
R	32	30	25	39	43	41	56	28
Total	36	37	25	43	45	55	63	34
				SA				
S	1	5	1	1	4	6	6	9
R	31	41	40	42	24	32	39	30
Total	32	46	41	43	28	38	45	39
				WA				
S	1	3	0	4	12	5	5	8
R	41	47	42	50	51	49	57	55
Total	42	50	42	54	63	54	56	63
				Tas				
S	0	2	1	2	2	2	2	1
R	5	5	4	12	15	22	23	9
Total	5	7	5	14	17	24	25	10
				NT				
S	0	1	0	0	1	1	4	1
R	3	0	7	4	4	11	9	5
Total	3	1	7	4	5	12	13	6
				ACT				
S	0	0	0	2	1	2	5	1
R	18	11	21	20	21	24	14	30
Total	18	11	21	22	22	26	19	31
				Australia				
S	22	40	6	35	50	52	54	57
R	301	339	343	377	431	439	540	428
Total	323	379	349	412	481	491	594	485

Figure 18: Antimicrobial susceptibility results of *E. faecium* to Ampicillin using EUCAST breakpoints (2013-2020)

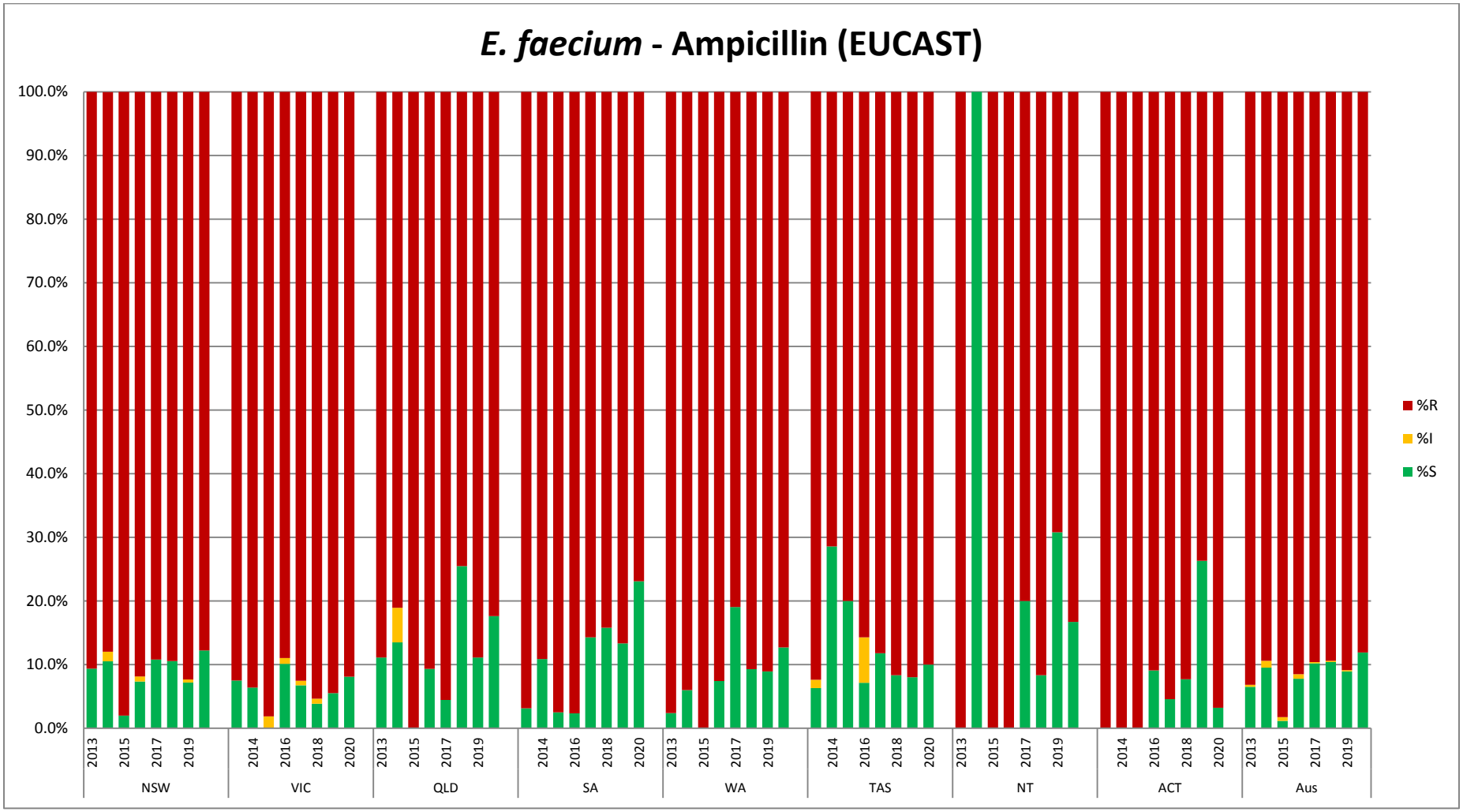


Table 28: Antimicrobial susceptibility results (number) for *E. faecium* and Ampicillin using EUCAST breakpoints (2013-2020)

	2013	2014	2015	2016	2017	2018	2019	2020
				NSW				
S	10	14	2	9	18	16	15	21
I	0	2	0	1	0	0	1	0
R	97	117	99	113	149	136	193	158
Total	107	133	101	123	167	152	209	179
				Vic				
S	5	6	0	11	9	5	9	10
I	1	0	2	1	1	1	0	0
R	74	88	106	97	124	124	155	113
Total	80	94	108	109	134	130	164	123
				QLD				
S	4	5	0	4	2	14	7	6
I	0	2	0	0	0	0	0	0
R	32	30	25	39	43	41	56	28
Total	36	37	25	43	45	55	63	34
				SA				
S	1	5	1	1	4	6	6	9
I	0	0	0	0	0	0	0	0
R	31	41	40	42	24	32	39	30
Total	32	46	41	43	28	38	45	39
				WA				
S	1	3	0	4	12	5	5	8
I	0	0	0	0	0	0	0	0
R	41	47	42	50	51	49	57	55
Total	42	50	42	54	63	54	56	63
				Tas				
S	0	2	1	1	2	2	2	1
I	0	0	0	1	0	0	0	0
R	5	5	4	12	15	22	23	9
Total	5	7	5	14	17	24	25	10
				NT				
S	0	1	0	0	1	1	4	1
I	0	0	0	0	0	0	0	0
R	3	0	7	4	4	11	9	5
Total	3	1	7	4	5	12	13	6
				ACT				
S	0	0	0	2	1	2	5	1
I	0	0	0	0	0	0	0	0

R	18	11	21	20	21	24	14	30
Total	18	11	21	22	22	26	19	31
Australia								
S	21	36	4	32	49	51	53	57
I	1	4	2	3	1	1	1	0
R	301	339	343	377	431	359	540	428
Total	323	379	349	412	481	491	594	485

Figure 19: Antimicrobial susceptibility results of *E. faecium* to Ciprofloxacin using CLSI breakpoints (2013-2020)

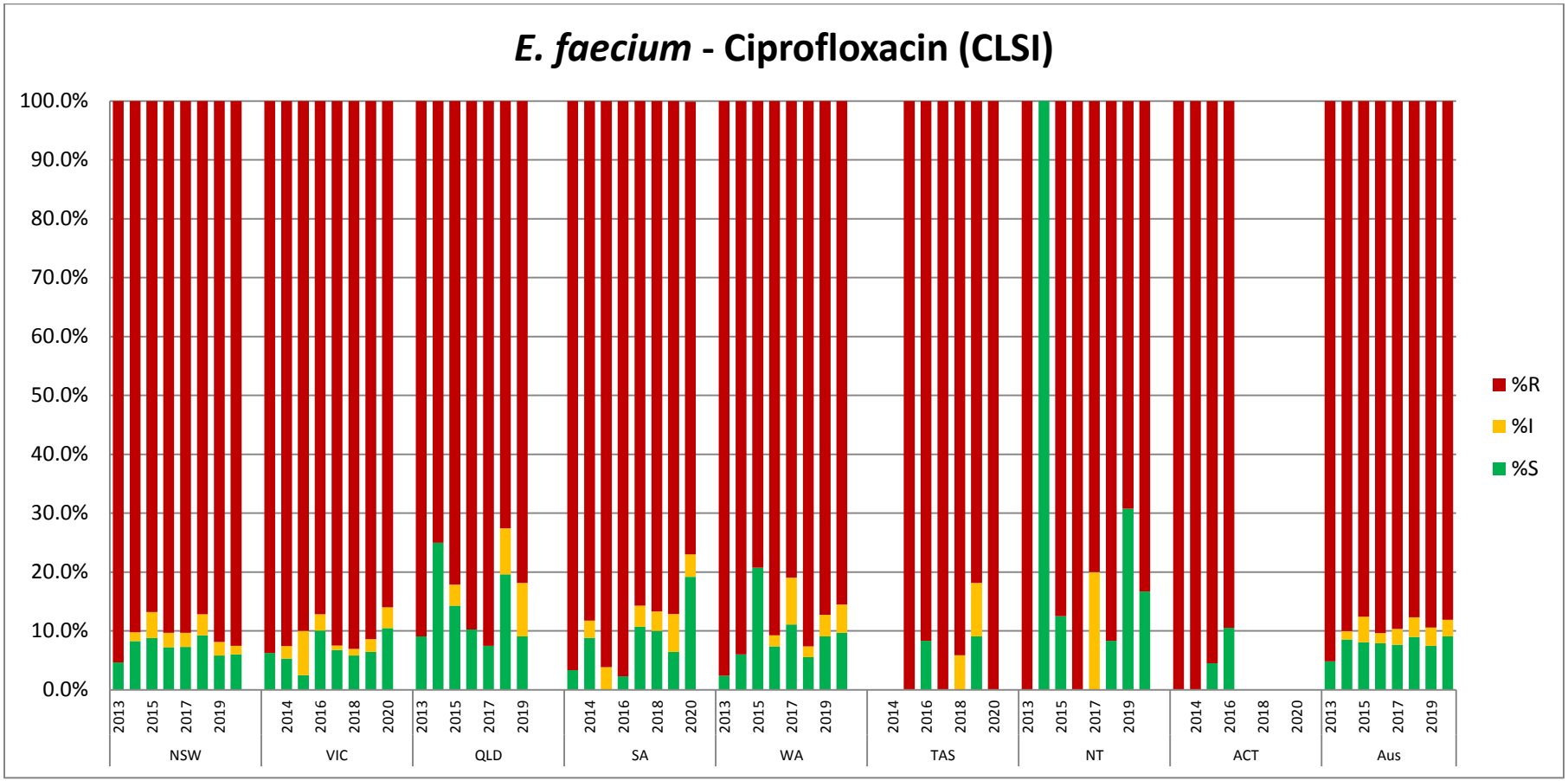
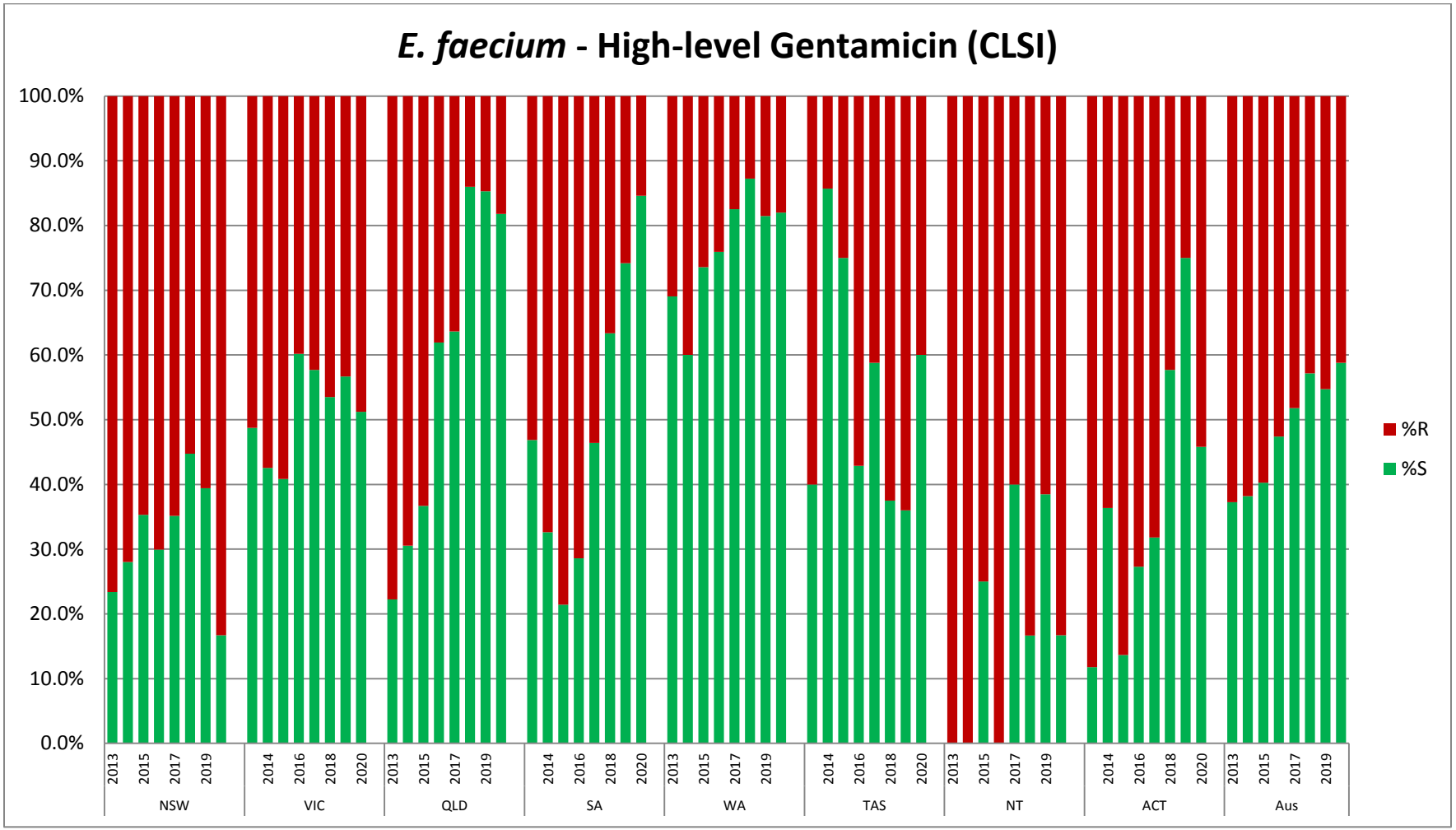


Table 29: Antimicrobial susceptibility results (number) for *E. faecium* and Ciprofloxacin using CLSI breakpoints (2013-2020)

	2013	2014	2015	2016	2017	2018	2019	2020
				NSW				
S	10	14	2	9	18	16	15	8
I	0	2	0	1	0	0	1	2
R	97	117	99	113	149	136	193	123
Total	107	133	101	123	167	152	209	133
				Vic				
S	5	6	0	11	9	5	9	9
I	1	0	2	1	1	1	0	3
R	74	88	106	97	124	124	155	74
Total	80	94	108	109	134	130	164	86
				QLD				
S	4	5	0	4	2	14	7	
I	0	2	0	0	0	0	0	
R	32	30	25	39	43	41	56	
Total	36	37	25	43	45	55	63	
				SA				
S	1	5	1	1	4	6	6	5
I	0	0	0	0	0	0	0	1
R	31	41	40	42	24	32	39	20
Total	32	46	41	43	28	38	45	26
				WA				
S	1	3	0	4	12	5	5	6
I	0	0	0	0	0	0	0	3
R	41	47	42	50	51	49	57	53
Total	42	50	42	54	63	54	56	62
				Tas				
S	0	2	1	1	2	2	2	0
I	0	0	0	1	0	0	0	0
R	5	5	4	12	15	22	23	5
Total	5	7	5	14	17	24	25	5
				NT				
S	0	1	0	0	1	1	4	1
I	0	0	0	0	0	0	0	0
R	3	0	7	4	4	11	9	5
Total	3	1	7	4	5	12	13	6
				ACT				
S	0	0	0	2	1	2	5	
I	0	0	0	0	0	0	0	

R	18	11	21	20	21	24	14	
Total	18	11	21	22	22	26	19	
Australia								
S	21	36	4	32	49	51	53	29
I	1	4	2	3	1	1	1	9
R	301	339	343	377	431	359	540	281
Total	323	379	349	412	481	491	594	319

Figure 20: Antimicrobial susceptibility results of *E. faecium* to High-level Gentamicin using CLSI breakpoints (2013-2020)



Decreasing trend in resistance in ACT (Chi-sq for trend = 12.789, p=0.003), NSW (Chi-sq for trend = 6.7184, p=0.0095), QLD (Chi-sq for trend = 7.6072 p=0.0058), SA (Chi-sq for trend = 26.391, p<0.0001), WA (Chi-sq for trend = 33.268, p<0.0001) and Australia overall (Chi-sq for trend = 10.111, p=0.0015).

Table 30: Antimicrobial susceptibility results (number) for *E. faecium* and High-level Gentamicin using CLSI breakpoints (2013-2020)

	2013	2014	2015	2016	2017	2018	2019	2020
				NSW				
S	25	37	36	35	58	64	69	60
R	82	95	66	82	107	79	106	71
Total	107	132	102	117	165	143	175	131
				Vic				
S	39	40	49	65	75	46	51	43
R	41	54	71	43	55	40	39	41
Total	80	94	120	108	130	86	90	84
				QLD				
S	8	11	11	26	28	43	29	18
R	28	25	19	16	16	7	5	4
Total	36	36	30	42	44	50	34	22
				SA				
S	15	15	9	12	13	19	23	22
R	17	31	33	30	15	11	8	4
Total	32	46	42	42	28	30	31	26
				WA				
S	29	30	39	41	52	41	44	50
R	13	20	14	13	11	6	10	11
Total	42	50	53	54	63	47	54	61
				Tas				
S	2	6	6	6	10	9	9	6
R	3	1	2	8	6	15	16	4
Total	5	7	8	14	16	24	25	10
				NT				
S	0	0	2	0	2	2	5	1
R	3	1	6	4	3	10	8	5
Total	3	1	8	4	5	12	13	6
				ACT				
S	2	4	3	6	7	15	3	
R	15	7	19	16	15	11	1	
Total	17	11	22	22	22	26	4	
				Australia				
S	120	144	155	191	245	239	233	200
R	202	233	230	212	228	179	193	140
Total	322	377	385	403	473	418	426	340

Figure 21: Antimicrobial susceptibility results of *E. faecium* to Linezolid using CLSI breakpoints (2013-2020)

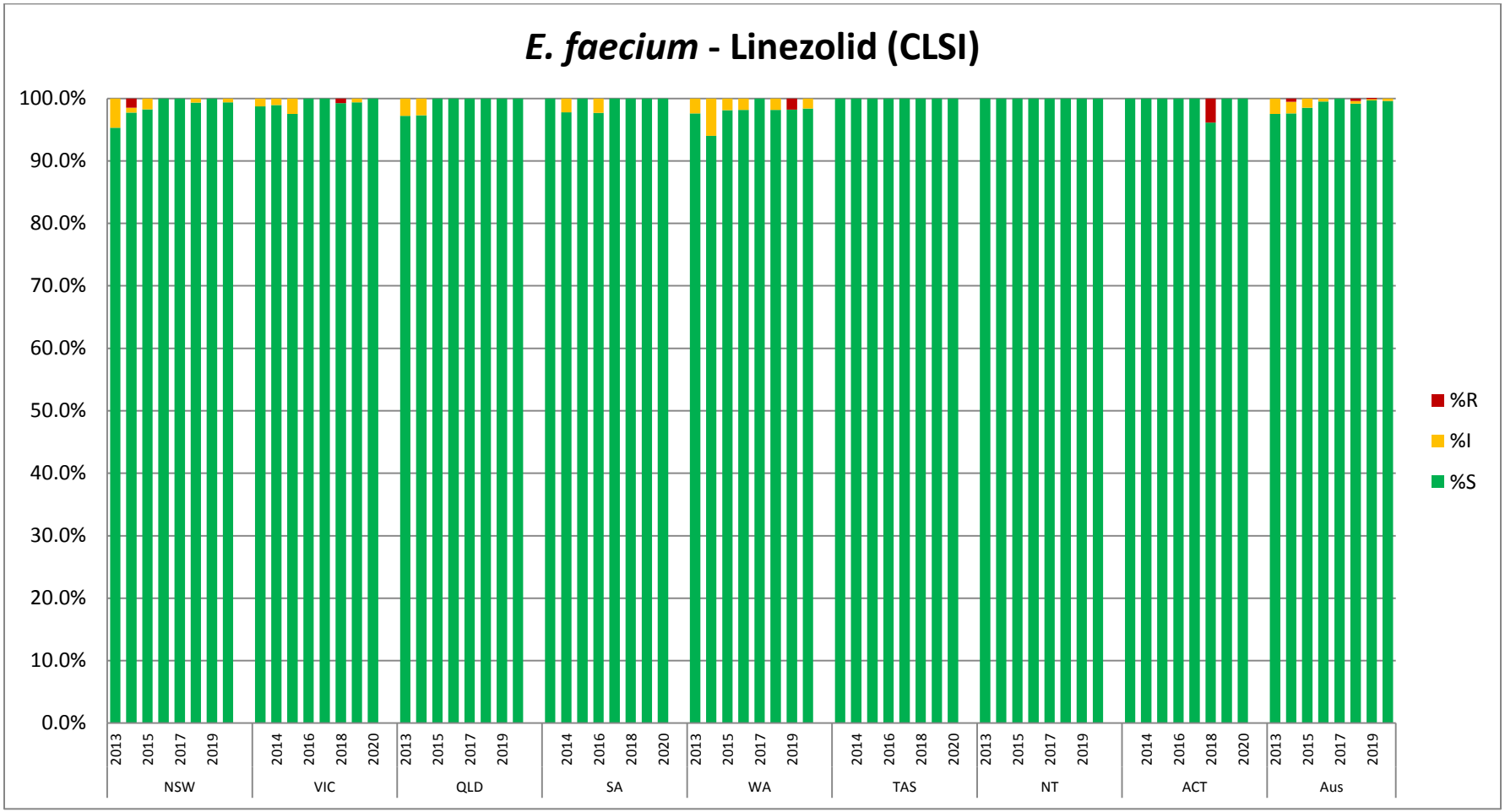


Table 31: Antimicrobial susceptibility results (number) for *E. faecium* and Linezolid using CLSI breakpoints (2013-2020)

	2013	2014	2015	2016	2017	2018	2019	2020
				NSW				
S	102	130	113	120	167	151	209	179
I	5	1	2	0	0	1	0	1
R	0	2	0	0	0	0	0	0
Total	107	133	115	120	167	152	209	180
				Vic				
S	79	93	117	108	134	129	163	123
I	1	1	3	0	0	0	1	0
R	0	0	0	0	0	1	0	0
Total	80	94	120	108	134	130	164	123
				QLD				
S	35	36	31	43	45	54	63	35
I	1	1	0	0	0	0	0	0
R	0	0	0	0	0	0	0	0
Total	36	37	31	43	45	54	63	35
				SA				
S	32	44	42	42	28	38	44	39
I	0	1	0	1	0	0	0	0
R	0	0	0	0	0	0	0	0
Total	32	45	42	43	28	38	44	39
				WA				
S	41	47	52	53	63	53	55	62
I	1	3	1	1	0	1	0	1
R	0	0	0	0	0	0	1	0
Total	42	50	53	54	63	54	56	63
				Tas				
S	5	7	8	14	17	24	25	10
I	0	0	0	0	0	0	0	0
R	0	0	0	0	0	0	0	0
Total	5	7	8	14	17	24	25	10
				NT				
S	3	1	8	4	5	12	13	6
I	0	0	0	0	0	0	0	0
R	0	0	0	0	0	0	0	0
Total	3	1	8	4	5	12	13	6
				ACT				
S	16	11	22	22	22	25	19	31
I	0	0	0	0	0	0	0	0

R	0	0	0	0	0	1	0	0
Total	16	11	22	22	22	26	19	31
Australia								
S	313	369	393	406	481	486	591	485
I	8	7	6	2	0	2	1	2
R	0	2	0	0	0	2	1	0
Total	321	378	399	408	481	490	593	487

Figure 22: Antimicrobial susceptibility results of *E. faecium* to Linezolid using EUCAST breakpoints (2013-2020)

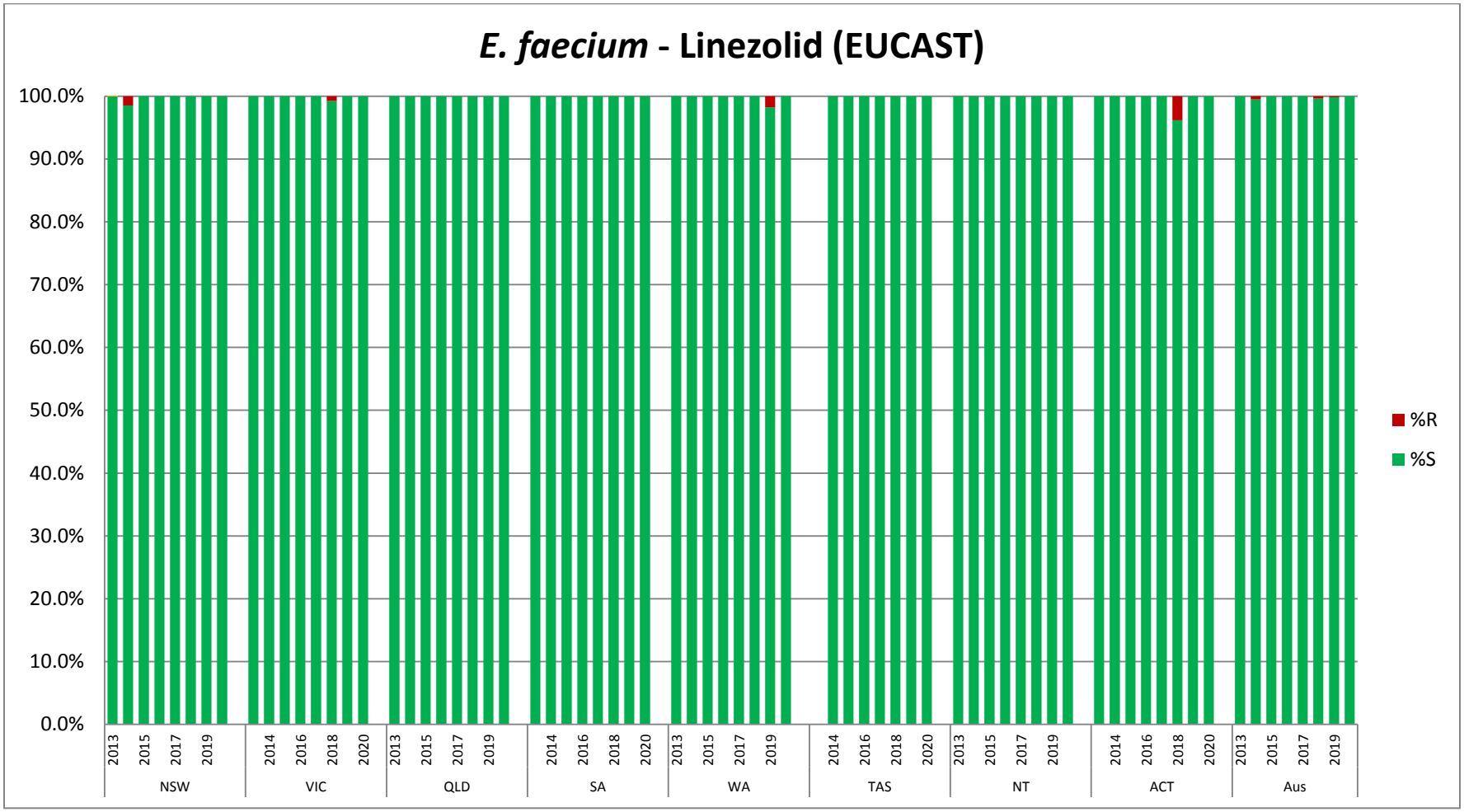
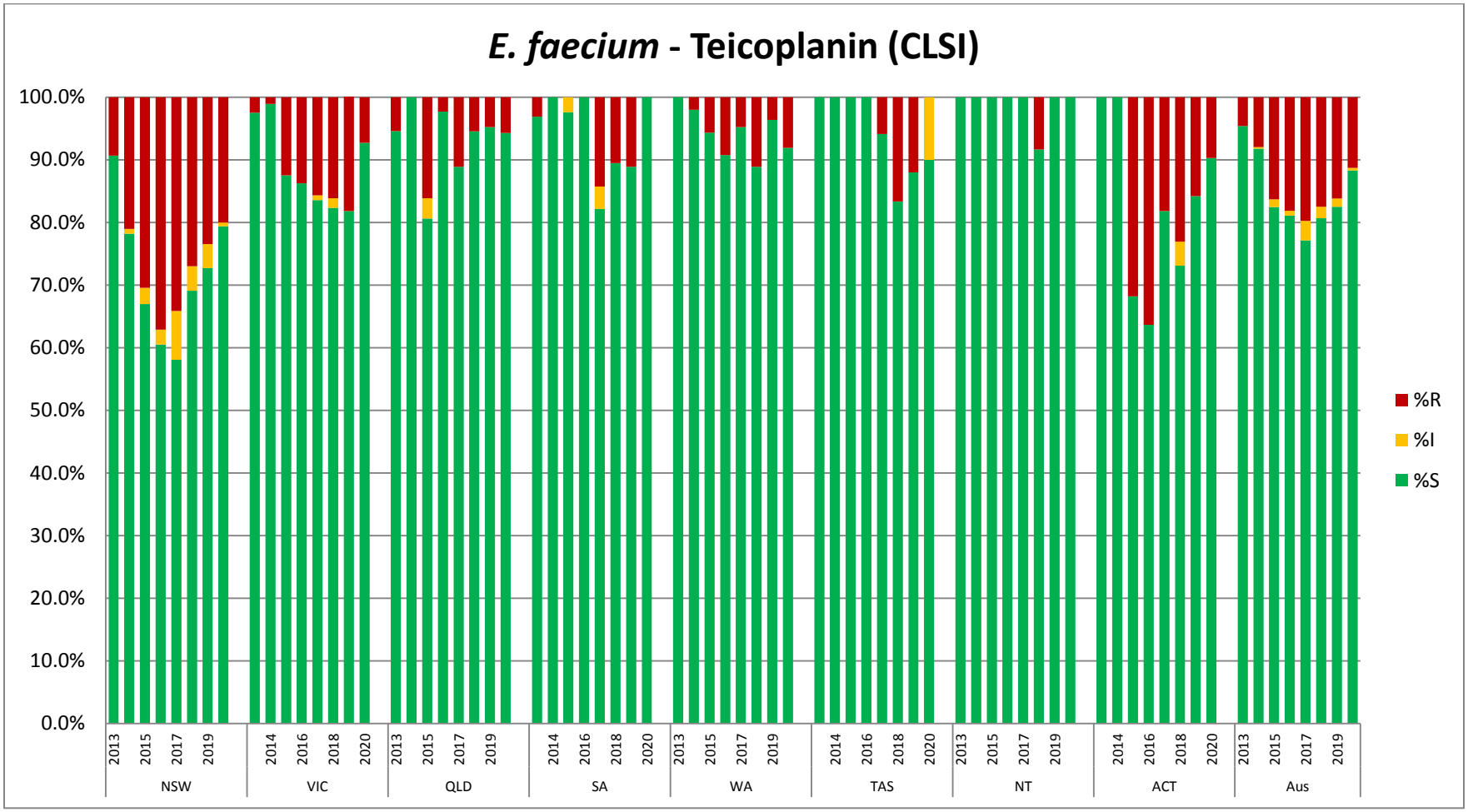


Table 32: Antimicrobial susceptibility results (number) for *E. faecium* and Linezolid using EUCAST breakpoints (2013-2020)

	2013	2014	2015	2016	2017	2018	2019	2020
				NSW				
S	107	132	115	120	167	152	209	180
R	0	3	0	0	0	0	0	0
Total	107	135	115	120	167	152	209	180
				Vic				
S	80	94	120	108	134	129	164	123
R	0	0	0	0	0	1	0	0
Total	80	94	120	108	134	130	164	123
				QLD				
S	36	37	31	43	45	54	63	35
R	0	0	0	0	0	0	0	0
Total	36	37	31	43	45	54	63	35
				SA				
S	32	45	42	43	28	38	44	39
R	0	0	0	0	0	0	0	0
Total	32	45	42	43	28	38	44	39
				WA				
S	42	50	53	54	63	54	55	63
R	0	0	0	0	0	0	1	0
Total	42	50	53	54	63	54	56	63
				Tas				
S	5	7	8	14	17	24	25	10
R	0	0	0	0	0	0	0	0
Total	5	7	8	14	17	24	25	10
				NT				
S	3	1	8	4	5	12	13	6
R	0	0	0	0	0	0	0	0
Total	3	1	8	4	5	12	13	6
				ACT				
S	16	11	22	22	22	25	19	31
R	0	0	0	0	0	1	0	0
Total	16	11	22	22	22	26	19	31
				Australia				
S	321	378	399	408	481	488	592	487
R	0	2	0	0	0	2	1	0
Total	321	378	399	408	481	490	593	487

Figure 23: Antimicrobial susceptibility results of *E. faecium* to Teicoplanin using CLSI breakpoints (2013-2020)



Decreasing trend in resistance in the ACT (Chi-sq for trend = 4.8171, p=0.03), NSW (Chi-sq for trend = 19.406 p<0.0001), Vic (Chi-sq for trend = 4.7406, p=0.03) and Australia overall (Chi-sq for trend = 10.816, p=0.001).

Table 33: Antimicrobial susceptibility results (number) for *E. faecium* and Teicoplanin using CLSI breakpoints (2013-2020)

	2013	2014	2015	2016	2017	2018	2019	2020
				NSW				
S	97	104	77	75	97	105	152	143
I	0	1	3	3	13	6	8	2
R	10	28	35	46	57	41	49	35
Total	107	133	115	124	167	152	209	180
				Vic				
S	78	93	105	94	112	107	133	113
I	0	0	0	0	1	2	0	0
R	2	1	15	15	21	21	31	9
Total	80	94	120	109	134	130	164	122
				QLD				
S	35	36	25	42	40	52	60	33
I	0	0	1	0	0	0	0	0
R	2	0	5	1	5	3	3	2
Total	37	36	31	43	45	55	63	35
				SA				
S	31	45	41	43	23	34	40	39
I	0	0	1	0	1	0	0	0
R	1	0	0	0	4	4	5	0
Total	32	45	42	43	28	38	45	39
				WA				
S	42	49	50	49	60	48	53	57
I	0	0	0	0	0	0	0	0
R	0	1	3	5	3	6	2	5
Total	42	50	53	54	63	54	55	62
				Tas				
S	5	7	8	14	16	20	22	9
I	0	0	0	0	0	0	0	1
R	0	0	0	0	1	4	3	0
Total	5	7	8	14	17	24	25	10
				NT				
S	3	1	8	4	5	11	13	6
I	0	0	0	0	0	0	0	0
R	0	0	0	0	0	1	0	0
Total	3	1	8	14	5	12	13	6
				ACT				
S	18	11	15	14	18	19	16	28
I	0	0	0	0	0	1	0	0

R	0	0	7	8	4	6	3	3
Total	18	11	22	22	22	26	19	31
Australia								
S	309	346	329	335	371	396	489	428
I	0	1	5	3	15	9	8	3
R	15	30	65	75	95	86	96	54
Total	324	377	399	413	481	491	593	485

Figure 24: Antimicrobial susceptibility results of *E. faecium* to Teicoplanin using EUCAST breakpoints (2013-2020)

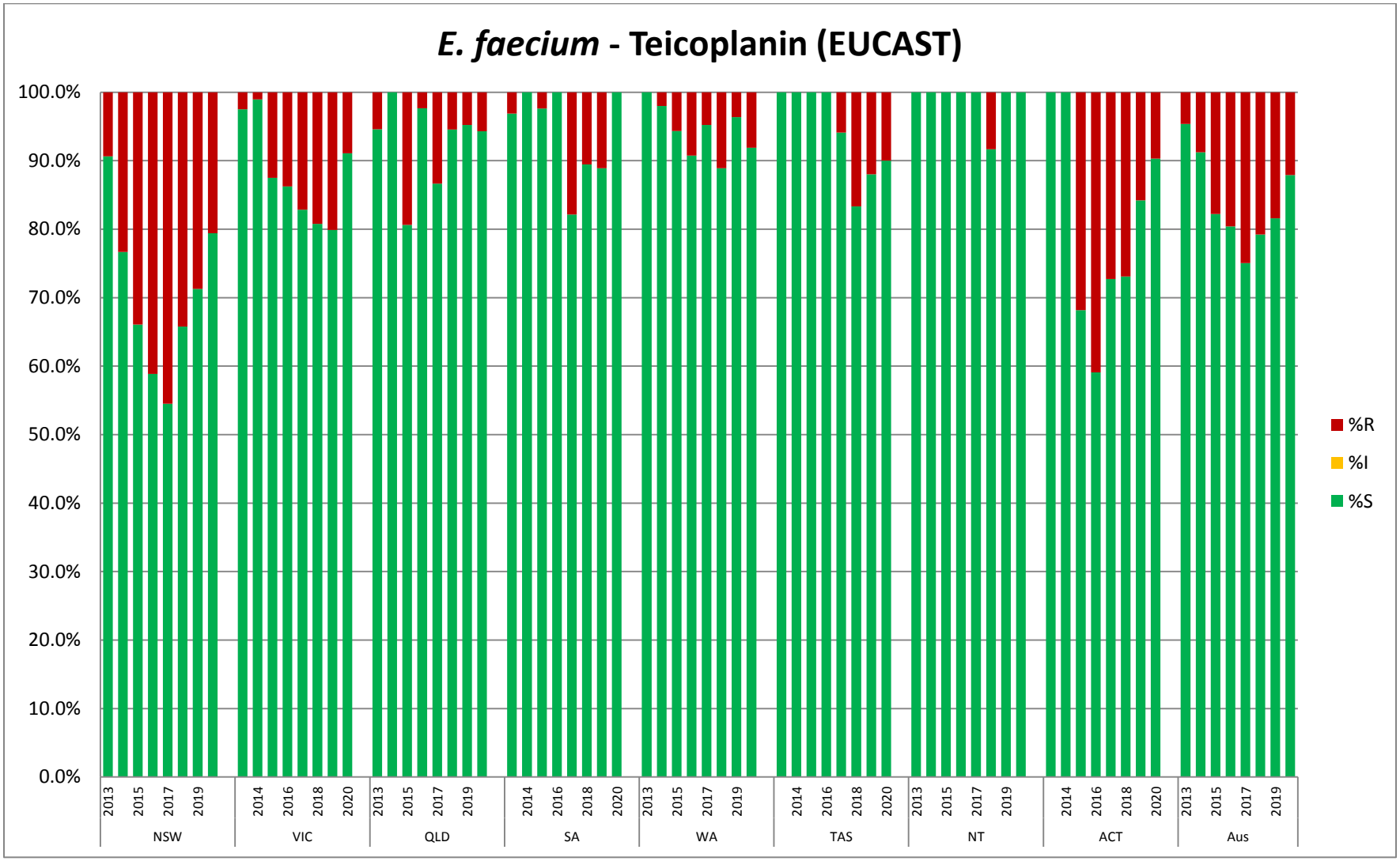
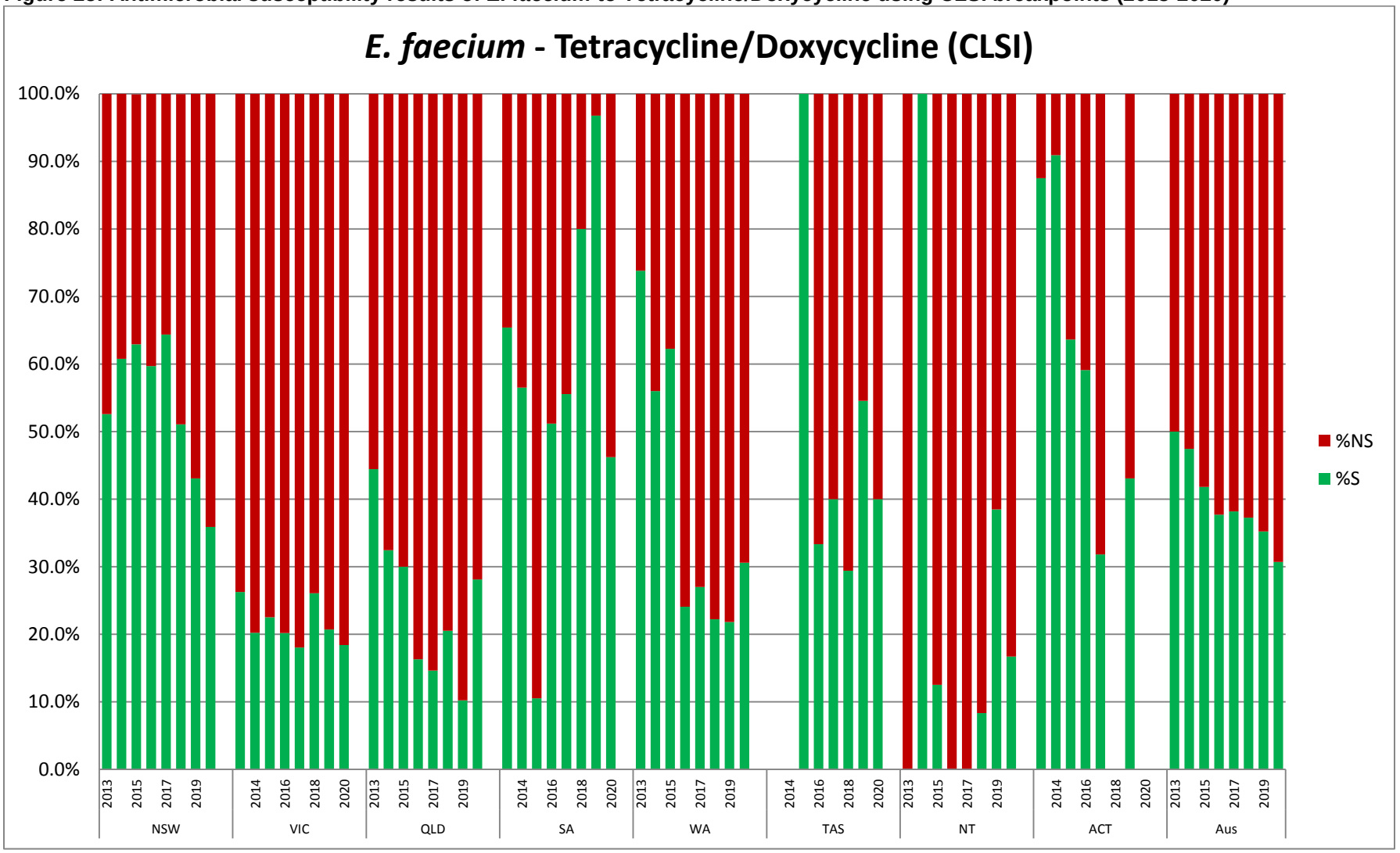


Table 34: Antimicrobial susceptibility results (number) for *E. faecium* and Teicoplanin using EUCAST breakpoints (2013-2020)

	2013	2014	2015	2016	2017	2018	2019	2020
				NSW				
S	97	102	76	73	91	100	149	140
R	10	30	39	51	76	52	60	40
Total	107	133	115	124	167	152	209	180
				Vic				
S	78	93	105	94	111	105	131	110
R	2	1	15	15	23	25	33	12
Total	80	94	120	109	134	130	164	122
				QLD				
S	35	36	25	42	39	52	60	33
R	2	0	6	1	6	3	3	2
Total	37	36	31	43	45	55	63	35
				SA				
S	31	45	41	43	23	34	40	39
R	1	0	1	0	5	4	5	0
Total	32	45	42	43	28	38	45	39
				WA				
S	42	49	50	49	60	48	53	57
R	0	1	3	5	3	6	2	5
Total	42	50	53	54	63	54	55	62
				Tas				
S	5	7	8	14	16	20	22	9
R	0	0	0	0	1	4	3	1
Total	5	7	8	14	17	24	25	10
				NT				
S	3	1	8	4	5	11	13	6
R	0	0	0	0	0	1	0	0
Total	3	1	8	14	5	12	13	6
				ACT				
S	18	11	15	13	16	19	16	28
R	0	0	7	9	6	7	3	3
Total	18	11	22	22	22	26	19	31
				Australia				
S	309	344	328	332	361	389	484	422
R	15	33	71	81	120	102	109	63
Total	324	377	399	413	481	491	593	486

Figure 25: Antimicrobial susceptibility results of *E. faecium* to Tetracycline/Doxycycline using CLSI breakpoints (2013-2020)

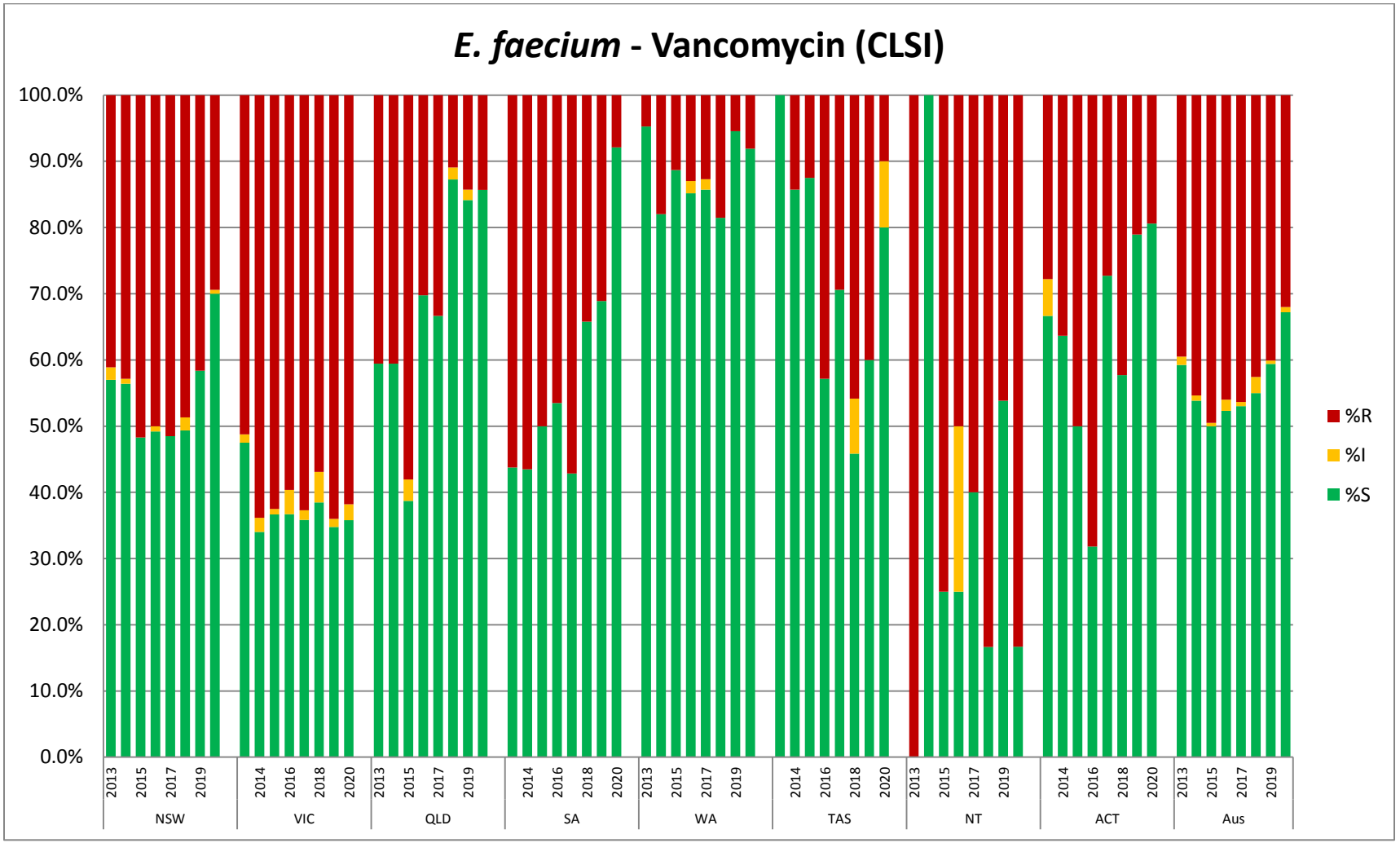


Increasing trend in resistance in ACT (Chi-sq for trend = 15.262, p=0.0001), NSW (Chi-sq for trend = 29.762, p<0.0001), and Australia overall (Chi-sq for trend = 4.8703, p=0.03).

Table 35: Antimicrobial susceptibility results (number) for *E. faecium* and Tetracycline/Doxycycline using CLSI breakpoints (2013-2020)

	2013	2014	2015	2016	2017	2018	2019	2020
				NSW				
S	51	79	56	74	103	72	81	56
NS	46	51	33	50	124	69	107	100
Total	97	130	89	124	160	141	188	156
				Vic				
S	21	19	27	22	24	30	24	16
NS	59	75	93	87	109	85	92	71
Total	80	94	120	109	133	115	116	87
				QLD				
S	16	12	9	7	6	8	5	9
NS	20	25	21	36	35	31	44	23
Total	36	37	30	43	41	39	49	32
				SA				
S	17	26	2	22	15	24	30	12
NS	9	20	17	21	12	6	1	14
Total	26	46	19	43	27	30	31	26
				WA				
S	31	28	33	13	17	12	12	19
NS	11	22	20	41	46	42	43	43
Total	42	50	53	54	63	54	55	62
				Tas				
S			1	4	4	5	6	2
NS			0	8	6	12	5	3
Total			1	12	10	17	11	5
				NT				
S	0	1	1	0	0	1	5	1
NS	3	0	7	4	5	11	8	5
Total	3	1	8	4	5	12	13	6
				ACT				
S	14	10	14	13	7			
NS	2	1	8	9	15			
Total	16	11	22	22	22			
				Australia				
S	150	175	143	155	176	152	163	115
NS	150	194	199	256	285	254	300	259
Total	300	369	342	411	461	408	463	374

Figure 26: Antimicrobial susceptibility results of *E. faecium* to Vancomycin using CLSI breakpoints (2013-2020)



Decreasing trend in resistance in ACT (Chi-sq for trend =11.16, p=0.0008), NSW (Chi-sq for trend = 17.899, p<0.0001), QLD (Chi-sq for trend = 6.0796, p=0.01), SA (Chi-sq for trend = 16.481, p<0.0001), and Australia overall (Chi-sq for trend = 24.095, p<0.0001).

Table 36: Antimicrobial susceptibility results (number) for *E. faecium* and Vancomycin using CLSI breakpoints (2013-2020)

	2013	2014	2015	2016	2017	2018	2019	2020
				NSW				
S	61	75	56	61	81	75	122	127
I	2	1	0	1	0	3	0	
R	44	57	60	62	86	74	87	53
Total	107	133	116	124	167	152	209	180
				Vic				
S	38	32	44	40	48	50	57	44
I	1	2	1	4	2	6	2	2
R	41	60	75	65	84	74	105	77
Total	80	94	120	109	134	130	164	123
				QLD				
S	22	22	12	30	30	48	53	30
I	0	0	1	0	0	1	1	0
R	15	15	18	13	15	6	9	5
Total	37	37	31	43	45	55	63	35
				SA				
S	14	20	21	23	12	25	31	35
I	0	0	0	0	0	0	0	0
R	18	26	21	20	16	13	14	3
Total	32	46	42	43	28	38	45	38
				WA				
S	40	41	47	46	54	44	52	57
I	0	0	0	1	1	0	0	0
R	2	9	6	7	8	10	3	5
Total	42	50	53	54	63	54	55	62
				Tas				
S	5	6	7	8	12	11	15	8
I	0	0	0	0	0	2	0	0
R	0	1	1	6	5	11	10	2
Total	5	7	8	14	17	24	25	10
				NT				
S	0	1	2	1	2	2	7	1
I	0	0	0	1	0	0	0	0
R	3	0	6	2	3	10	6	5
Total	3	1	8	4	5	12	13	6
				ACT				
S	12	7	11	7	16	15	15	25
I	1	0	0	0	0	0	0	0

R	5	4	11	15	6	11	4	6
Total	18	11	22	22	22	26	19	31
Australia								
S	192	204	200	216	255	270	352	327
I	4	3	2	7	3	12	3	3
R	128	172	198	190	223	209	238	155
Total	324	379	400	413	481	491	593	485

Figure 27: Antimicrobial susceptibility results of *E. faecium* to Vancomycin using EUCAST breakpoints (2013-2020)

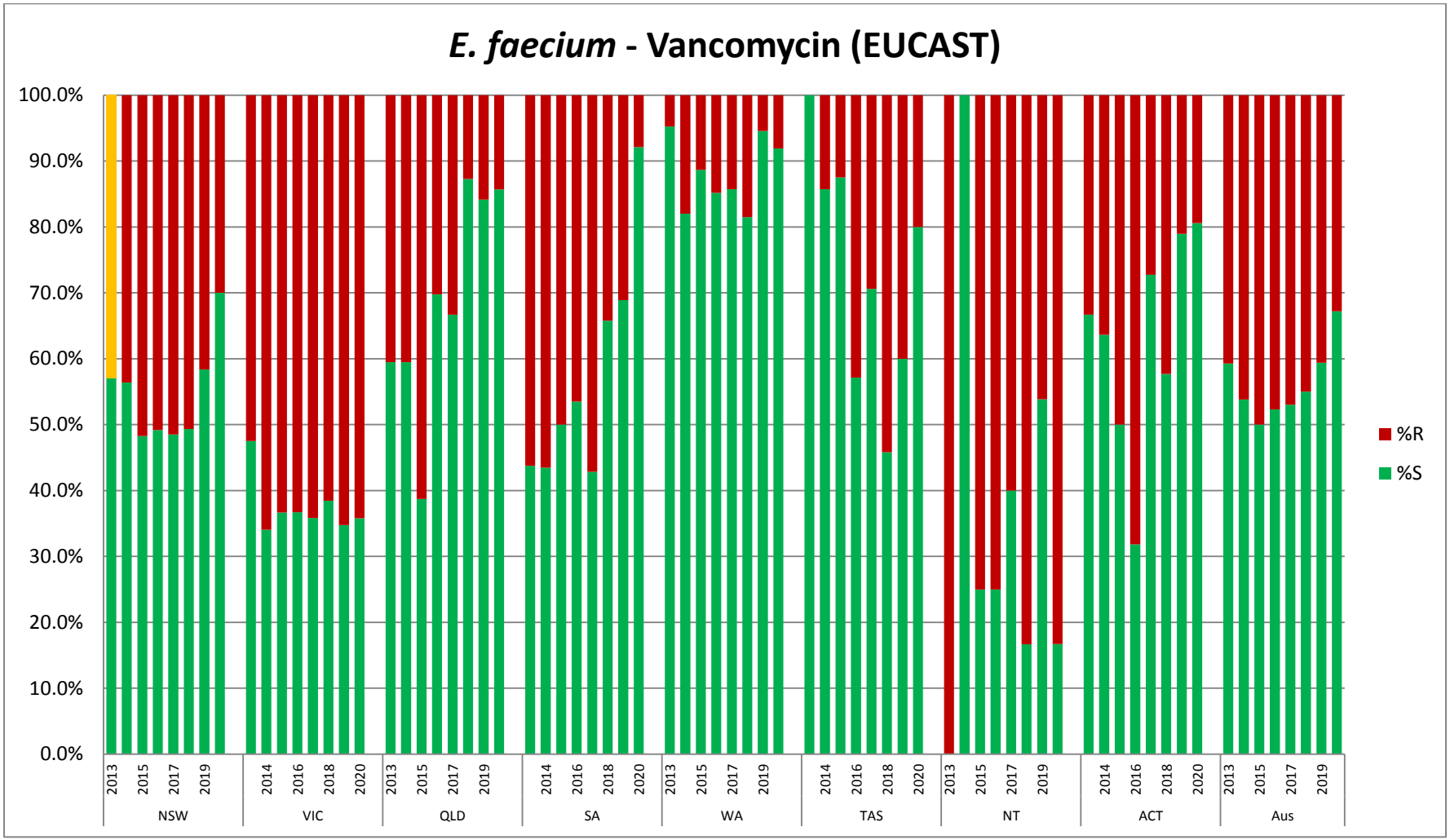


Table 37: Antimicrobial susceptibility results (number) for *E. faecium* and Vancomycin using EUCAST breakpoints (2013-2020)

	2013	2014	2015	2016	2017	2018	2019	2020
				NSW				
S	61	75	56	61	81	75	122	127
R	46	58	60	63	86	77	87	53
Total	107	133	116	124	167	152	209	180
				Vic				
S	38	32	44	40	48	50	57	44
R	42	62	76	69	86	80	107	79
Total	80	94	120	109	134	130	164	123
				QLD				
S	22	22	12	30	30	48	53	30
R	15	15	19	13	15	7	10	5
Total	37	37	31	43	45	55	63	35
				SA				
S	14	20	21	23	12	25	31	35
R	18	26	21	20	16	13	14	3
Total	32	46	42	43	28	38	45	38
				WA				
S	40	41	47	46	54	44	52	57
R	2	9	6	7	8	10	3	5
Total	42	50	53	54	63	54	55	62
				Tas				
S	5	6	7	8	12	11	15	8
R	0	1	1	6	5	13	10	2
Total	5	7	8	14	17	24	25	10
				NT				
S	0	1	2	1	2	2	7	1
R	3	0	6	3	3	10	6	5
Total	3	1	8	4	5	12	13	6
				ACT				
S	12	7	11	7	16	11	15	25
R	6	4	11	15	6	15	4	6
Total	18	11	22	22	22	26	19	31
				Australia				
S	192	204	200	216	255	270	352	327
R	132	175	200	197	226	221	241	158
Total	324	379	400	413	481	491	593	485

The Molecular Epidemiology of Enterococcus faecium

van Genes

van gene PCR results were available for 483 (99.0%) of the 488 *E. faecium* isolates.

vanA and *vanB* genes were detected in 66 (13.7%) and 103 (21.3%) isolates respectively. One isolate (0.2%) contained both *vanA* and *vanB* genes.

For the 157 vancomycin non-susceptible *E. faecium* isolates that were available for PCR, *vanA* was detected in 57 isolates, *vanB* was detected in 99 isolates, one isolate contained both *vanA* and *vanB* genes.

For the 323 vancomycin susceptible *E. faecium* isolates (MIC<=4mg/L) available for PCR, *vanA* was detected in nine isolates and *vanB* was detected in three isolates.. All isolates had vancomycin MIC ≤ 2 mg/L.

Multilocus Sequence Type (MLST)

Of the 488 *E. faecium* isolates reported, 470 (96.3%) were available for typing by whole genome sequencing (WGS) (Table 38).

Based on the MLST, 71 sequence types (STs) were identified.

Overall 81.5% of *E. faecium* could be characterised into eight STs (≥10 isolates): ST17 (116 isolates); ST 1424 (94 isolates); ST80 (52 isolates); ST796 (47 isolates); ST78 (34 isolates); ST1421 (20 isolates); ST555 (11 isolates) and ST117 (10 isolates).

- ST17 was identified in all regions except the Northern Territory and was the most predominant ST in Western Australia, Queensland and South Australia.
- ST1424 was identified in all regions except South Australia and the Northern Territory and was the most predominant ST in New South Wales and Tasmania.
- ST80 was identified in all regions except the Northern Territory and Tasmania and was the most predominant ST in the Australian Capital Territory.
- ST796 was identified in Victoria where it was the most predominant ST and also in New South Wales and Tasmania.
- ST78 was identified in all regions except the Northern Territory, Tasmania and Western Australia.
- ST1421 was identified only in the Australian Capital Territory and New South Wales.
- ST117 was identified only in New South Wales and Western Australia.

There were 50 MLSTs with a single isolate.

MLST and *van* genes

vanA was detected in seven STs: ST1424 (46 isolates); ST1421 (9 isolates); ST117 (5 isolates); and one isolate of ST80, ST262, ST1965, and ST780.

vanB was detected in eleven STs: ST796 (46 isolates); ST78 (34 isolates); ST555 (8 isolates); ST17 (3 isolates); ST1424 and ST80 (2 isolates); and one isolate of ST203, ST16, ST1743, ST1929 and ST1977.

Both *vanA* and *vanB* genes were identified was found in one isolate of ST796 (Table 39).

Table 38: The number and proportion of *Enterococcus faecium* MLST by region

	NSW	Vic	Qld	SA	WA	Tas	NT	ACT	Australia
MLST	% (n)	% (n)	% (n)	% (n)	% (n)	% (n)	% (n)	% (n)	% (n)
ST17	13.3 (24)	12.1 (15)	54.3 (19)	43.6 (17)	60.3 (38)	20.0 (2)	0.0 (0)	3.2 (1)	23.8 (116)
ST1424	35.0 (63)	12.1 (15)	8.6 (3)	0.0 (0)	1.6 (1)	40.0 (4)	0.0 (0)	25.8 (8)	19.3 (94)
ST80	12.2 (22)	5.6 (7)	5.7 (2)	7.7 (3)	7.9 (5)	0.0 (0)	0.0 (0)	41.9 (13)	10.7 (52)
ST796	4.4 (8)	30.6 (38)	0.0 (0)	0.0 (0)	0.0 (0)	10.0 (1)	0.0 (0)	0.0 (0)	9.6 (47)
ST78	2.8 (5)	18.5 (23)	5.7 (2)	2.6 (1)	0.0 (0)	0.0 (0)	0.0 (0)	9.7 (3)	7.0 (34)
ST1421	10.6 (19)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	3.2 (1)	4.1 (20)
ST555	1.1 (2)	2.4 (3)	2.9 (1)	5.1 (2)	0.0 (0)	0.0 (0)	50.0 (3)	0.0 (0)	2.3 (11)
ST117	1.7 (3)	0.0 (0)	0.0 (0)	0.0 (0)	11.1 (7)	0.0 (0)	0.0 (0)	0.0 (0)	2.0 (10)
ST32	0.6 (1)	2.4 (3)	0.0 (0)	0.0 (0)	1.6 (1)	0.0 (0)	0.0 (0)	0.0 (0)	1.0 (5)
ST262	0.0 (0)	1.6 (2)	0.0 (0)	2.6 (1)	0.0 (0)	0.0 (0)	0.0 (0)	3.2 (1)	0.8 (4)
ST54	1.1 (2)	0.8 (1)	2.9 (1)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.8 (4)
ST192	0.0 (0)	1.6 (2)	0.0 (0)	0.0 (0)	1.6 (1)	0.0 (0)	0.0 (0)	0.0 (0)	0.6 (3)
ST21	0.0 (0)	1.6 (2)	0.0 (0)	2.6 (1)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.6 (3)
ST789	0.6 (1)	0.0 (0)	0.0 (0)	2.6 (1)	1.6 (1)	0.0 (0)	0.0 (0)	0.0 (0)	0.6 (3)
ST1760	0.0 (0)	0.0 (0)	0.0 (0)	2.6 (1)	0.0 (0)	10.0 (1)	0.0 (0)	0.0 (0)	0.4 (2)
ST203	0.6 (1)	0.0 (0)	0.0 (0)	2.6 (1)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.4 (2)
ST361	1.1 (2)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.4 (2)
ST538	1.1 (2)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.4 (2)
ST60	0.0 (0)	0.8 (1)	2.9 (1)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.4 (2)
ST612	0.6 (1)	0.0 (0)	0.0 (0)	2.6 (1)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.4 (2)
ST92	0.6 (1)	0.0 (0)	0.0 (0)	0.0 (0)	1.6 (1)	0.0 (0)	0.0 (0)	0.0 (0)	0.4 (2)
ST1036	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	1.6 (1)	0.0 (0)	0.0 (0)	0.0 (0)	0.2 (1)
ST121	0.6 (1)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.2 (1)
ST1283	0.6 (1)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.2 (1)
ST137	0.6 (1)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.2 (1)
ST152	0.0 (0)	0.0 (0)	0.0 (0)	2.6 (1)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.2 (1)
ST1548	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	1.6 (1)	0.0 (0)	0.0 (0)	0.0 (0)	0.2 (1)
ST16	0.0 (0)	0.8 (1)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.2 (1)

	NSW	Vic	Qld	SA	WA	Tas	NT	ACT	Australia
ST170	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	3.2 (1)	0.2 (1)
ST1743	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	16.7 (1)	0.0 (0)	0.2 (1)
ST1757	0.6 (1)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.2 (1)
ST1758	0.6 (1)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.2 (1)
ST1759	0.0 (0)	0.8 (1)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.2 (1)
ST1761	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	1.6 (1)	0.0 (0)	0.0 (0)	0.0 (0)	0.2 (1)
ST1929	0.0 (0)	0.8 (1)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.2 (1)
ST1942	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	3.2 (1)	0.2 (1)
ST1943	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	3.2 (1)	0.2 (1)
ST1947	0.6 (1)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.2 (1)
ST1953	0.6 (1)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.2 (1)
ST1954	0.6 (1)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.2 (1)
ST1961	0.6 (1)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.2 (1)
ST1964	0.6 (1)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.2 (1)
ST1965	0.6 (1)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.2 (1)
ST1974	0.6 (1)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.2 (1)
ST1977	0.0 (0)	0.8 (1)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.2 (1)
ST1984	0.0 (0)	0.8 (1)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.2 (1)
ST1986	0.0 (0)	0.8 (1)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.2 (1)
ST1987	0.0 (0)	0.0 (0)	0.0 (0)	2.6 (1)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.2 (1)
ST1988	0.0 (0)	0.0 (0)	0.0 (0)	2.6 (1)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.2 (1)
ST1992	0.0 (0)	0.0 (0)	0.0 (0)	2.6 (1)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.2 (1)
ST2001	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	1.6 (1)	0.0 (0)	0.0 (0)	0.0 (0)	0.2 (1)
ST2004	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	1.6 (1)	0.0 (0)	0.0 (0)	0.0 (0)	0.2 (1)
ST2028	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	16.7 (1)	0.0 (0)	0.2 (1)
ST2030	0.0 (0)	0.0 (0)	2.9 (1)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.2 (1)
ST2043	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	1.6 (1)	0.0 (0)	0.0 (0)	0.0 (0)	0.2 (1)
ST22	0.6 (1)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.2 (1)
ST240	0.6 (1)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.2 (1)
ST253	0.0 (0)	0.0 (0)	0.0 (0)	2.6 (1)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.2 (1)
ST266	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	3.2 (1)	0.2 (1)

	NSW	Vic	Qld	SA	WA	Tas	NT	ACT	Australia
ST27	0.0 (0)	0.8 (1)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.2 (1)
ST289	0.6 (1)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.2 (1)
ST29	0.0 (0)	0.0 (0)	2.9 (1)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.2 (1)
ST323	0.0 (0)	0.0 (0)	0.0 (0)	2.6 (1)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.2 (1)
ST55	0.6 (1)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.2 (1)
ST583	0.0 (0)	0.8 (1)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.2 (1)
ST623	0.6 (1)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.2 (1)
ST648	0.0 (0)	0.0 (0)	2.9 (1)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.2 (1)
ST780	0.0 (0)	0.0 (0)	2.9 (1)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.2 (1)
ST79	0.0 (0)	0.0 (0)	0.0 (0)	2.6 (1)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.2 (1)
ST819	0.0 (0)	0.0 (0)	0.0 (0)	2.6 (1)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.2 (1)
ST94	0.0 (0)	0.0 (0)	2.9 (1)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.2 (1)
Total	174	120	34	37	61	8	5	31	470

NSW = New South Wales, Vic = Victoria, Qld = Queensland, , SA = South Australia, WA = Western Australia, Tas = Tasmania, NT = Northern Territory, ACT= Australian Capital Territory.

Table 39: The number and proportion of *Enterococcus faecium* MLST harbouring *vanA/B* genes.

	Not Detected	vanA	vanAB	vanB	Total
MSLT	% (n)	% (n)	% (n)	% (n)	
ST17	97.4 (113)	0.0 (0)	0.0 (0)	2.6 (3)	116
ST1424	48.9 (46)	48.9 (46)	0.0 (0)	2.1 (2)	94
ST80	94.2 (49)	1.9 (1)	0.0 (0)	3.8 (2)	52
ST796	0.0 (0)	0.0 (0)	2.1 (1)	97.9 (46)	47
ST78	0.0 (0)	0.0 (0)	0.0 (0)	100.0 (34)	34
ST1421	55.0 (11)	45.0 (9)	0.0 (0)	0.0 (0)	20
ST555	27.3 (3)	0.0 (0)	0.0 (0)	72.7 (8)	11
ST117	50.0 (5)	50.0 (5)	0.0 (0)	0.0 (0)	10
ST32	100.0 (5)	0.0 (0)	0.0 (0)	0.0 (0)	5
ST262	75.0 (3)	25.0 (1)	0.0 (0)	0.0 (0)	4
ST54	100.0 (4)	0.0 (0)	0.0 (0)	0.0 (0)	4
ST192	100.0 (3)	0.0 (0)	0.0 (0)	0.0 (0)	3
ST21	100.0 (3)	0.0 (0)	0.0 (0)	0.0 (0)	3
ST789	100.0 (3)	0.0 (0)	0.0 (0)	0.0 (0)	3
ST1760	100.0 (2)	0.0 (0)	0.0 (0)	0.0 (0)	2
ST203	50.0 (1)	0.0 (0)	0.0 (0)	50.0 (1)	2
ST361	100.0 (2)	0.0 (0)	0.0 (0)	0.0 (0)	2
ST538	100.0 (2)	0.0 (0)	0.0 (0)	0.0 (0)	2
ST60	100.0 (2)	0.0 (0)	0.0 (0)	0.0 (0)	2
ST612	100.0 (2)	0.0 (0)	0.0 (0)	0.0 (0)	2
ST92	100.0 (2)	0.0 (0)	0.0 (0)	0.0 (0)	2
ST1036	100.0 (1)	0.0 (0)	0.0 (0)	0.0 (0)	1
ST121	100.0 (1)	0.0 (0)	0.0 (0)	0.0 (0)	1
ST1283	100.0 (1)	0.0 (0)	0.0 (0)	0.0 (0)	1
ST137	100.0 (1)	0.0 (0)	0.0 (0)	0.0 (0)	1
ST152	100.0 (1)	0.0 (0)	0.0 (0)	0.0 (0)	1
ST1548	100.0 (1)	0.0 (0)	0.0 (0)	0.0 (0)	1
ST16	0.0 (0)	0.0 (0)	0.0 (0)	100.0 (1)	1

	Not Detected	vanA	vanAB	vanB	Total
ST170	100.0 (1)	0.0 (0)	0.0 (0)	0.0 (0)	1
ST1743	0.0 (0)	0.0 (0)	0.0 (0)	100.0 (1)	1
ST1757	100.0 (1)	0.0 (0)	0.0 (0)	0.0 (0)	1
ST1758	100.0 (1)	0.0 (0)	0.0 (0)	0.0 (0)	1
ST1759	100.0 (1)	0.0 (0)	0.0 (0)	0.0 (0)	1
ST1761	100.0 (1)	0.0 (0)	0.0 (0)	0.0 (0)	1
ST1929	0.0 (0)	0.0 (0)	0.0 (0)	100.0 (1)	1
ST1942	100.0 (1)	0.0 (0)	0.0 (0)	0.0 (0)	1
ST1943	100.0 (1)	0.0 (0)	0.0 (0)	0.0 (0)	1
ST1947	100.0 (1)	0.0 (0)	0.0 (0)	0.0 (0)	1
ST1953	100.0 (1)	0.0 (0)	0.0 (0)	0.0 (0)	1
ST1954	100.0 (1)	0.0 (0)	0.0 (0)	0.0 (0)	1
ST1961	100.0 (1)	0.0 (0)	0.0 (0)	0.0 (0)	1
ST1964	100.0 (1)	0.0 (0)	0.0 (0)	0.0 (0)	1
ST1965	0.0 (0)	100.0 (1)	0.0 (0)	0.0 (0)	1
ST1974	100.0 (1)	0.0 (0)	0.0 (0)	0.0 (0)	1
ST1977	0.0 (0)	0.0 (0)	0.0 (0)	100.0 (1)	1
ST1984	100.0 (1)	0.0 (0)	0.0 (0)	0.0 (0)	1
ST1986	100.0 (1)	0.0 (0)	0.0 (0)	0.0 (0)	1
ST1987	100.0 (1)	0.0 (0)	0.0 (0)	0.0 (0)	1
ST1988	100.0 (1)	0.0 (0)	0.0 (0)	0.0 (0)	1
ST1992	100.0 (1)	0.0 (0)	0.0 (0)	0.0 (0)	1
ST2001	100.0 (1)	0.0 (0)	0.0 (0)	0.0 (0)	1
ST2004	100.0 (1)	0.0 (0)	0.0 (0)	0.0 (0)	1
ST2028	100.0 (1)	0.0 (0)	0.0 (0)	0.0 (0)	1
ST2030	100.0 (1)	0.0 (0)	0.0 (0)	0.0 (0)	1
ST2043	100.0 (1)	0.0 (0)	0.0 (0)	0.0 (0)	1
ST22	100.0 (1)	0.0 (0)	0.0 (0)	0.0 (0)	1
ST240	100.0 (1)	0.0 (0)	0.0 (0)	0.0 (0)	1
ST253	100.0 (1)	0.0 (0)	0.0 (0)	0.0 (0)	1
ST266	100.0 (1)	0.0 (0)	0.0 (0)	0.0 (0)	1

	Not Detected	vanA	vanAB	vanB	Total
ST27	100.0 (1)	0.0 (0)	0.0 (0)	0.0 (0)	1
ST289	100.0 (1)	0.0 (0)	0.0 (0)	0.0 (0)	1
ST29	100.0 (1)	0.0 (0)	0.0 (0)	0.0 (0)	1
ST323	100.0 (1)	0.0 (0)	0.0 (0)	0.0 (0)	1
ST55	100.0 (1)	0.0 (0)	0.0 (0)	0.0 (0)	1
ST583	100.0 (1)	0.0 (0)	0.0 (0)	0.0 (0)	1
ST623	100.0 (1)	0.0 (0)	0.0 (0)	0.0 (0)	1
ST648	100.0 (1)	0.0 (0)	0.0 (0)	0.0 (0)	1
ST780	0.0 (0)	100.0 (1)	0.0 (0)	0.0 (0)	1
ST79	100.0 (1)	0.0 (0)	0.0 (0)	0.0 (0)	1
ST819	100.0 (1)	0.0 (0)	0.0 (0)	0.0 (0)	1
ST94	100.0 (1)	0.0 (0)	0.0 (0)	0.0 (0)	1
Total	64.9 (305)	13.6 (64)	0.2 (1)	21.3 (100)	470

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