Prevalence of Antimicrobial Resistance in Enterococci in Australian Teaching Hospitals

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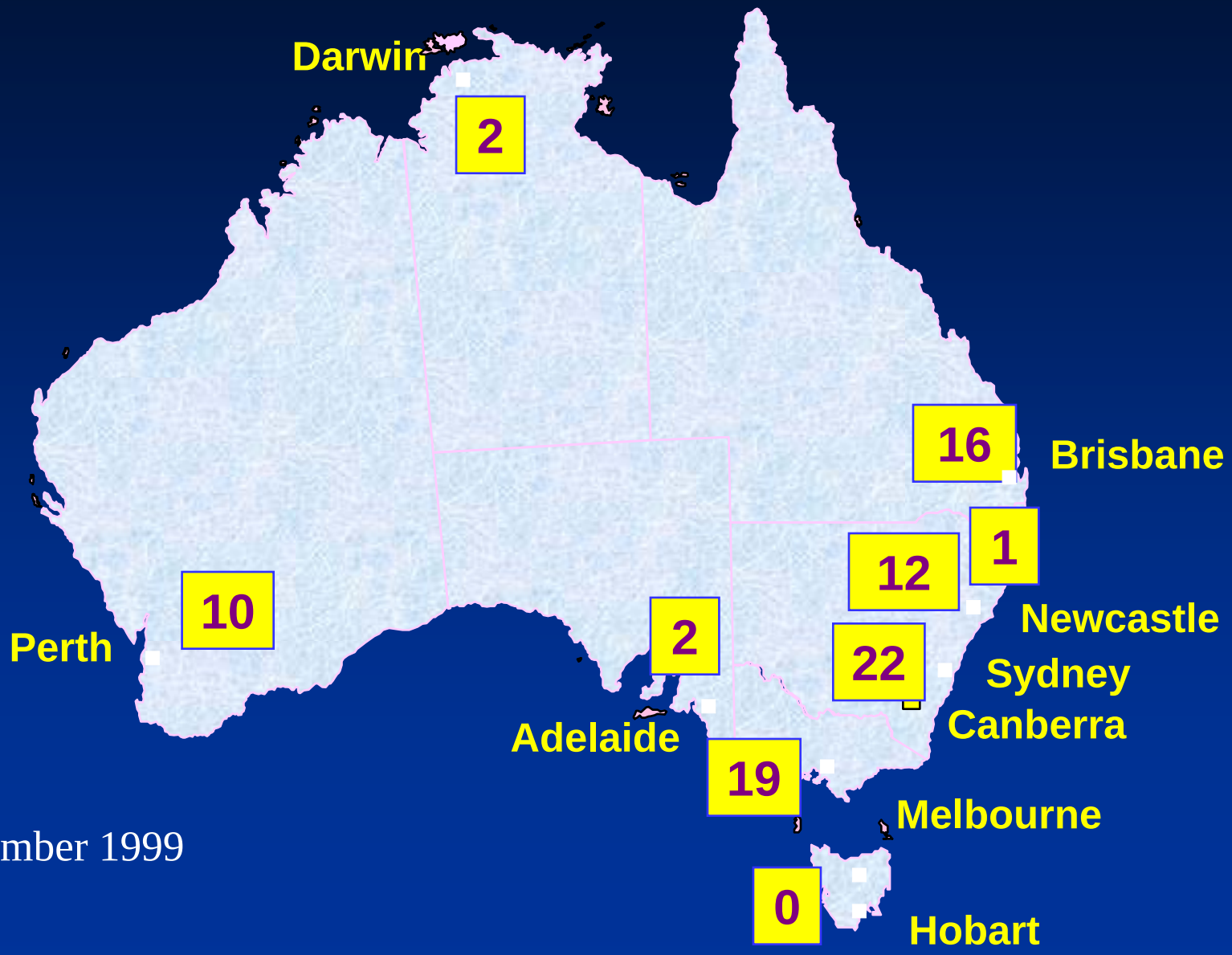
&
Australian Group on Antimicrobial Resistance (AGAR)

VRE in Australia

- First documented VRE detected in 1994
  - *vanA E. faecium*
- Since 1996, at least 81 ‘index’ cases reported
  - many more isolates from screening specimens
- 31 institutions in 11 widely separated cities
- Identification and susceptibility testing problems

VRE in Australia



December 1999

NARSP - VRE

Resistance Genotypes → December 1999

Species	*vanA*	*vanB*	*vanG*	Total
E. faecium	17	45	-	62
E. faecalis	5	11	3	19
Total	22	56	3	81

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Study objectives:

- To determine the extent of AMP, VAN, HLAR resistance
- To look for changes in resistances
- Ability of laboratories to
  - detect VRE
  - detect other resistances
  - accurately identify enterococci to species

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- National surveys
  1995 (15 labs); 1999 (18 labs)
- 100 consecutive clinical isolates
  Enterococcus spp.
- No repeats
- Routine method for ID & AST
- Referred if:
  - resistant to Amp, Van, HLG or HLS
  - not speciated
  - isolated from a normally sterile site

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Referral laboratory:

- MIC determination by Agar Dilution (NCCLS)
- Identification
- Confirmation of identification by PCR
- Vancomycin genotype by PCR
- β-lactamase tests

Identification Methods

- ‘Routine’ method

  +

- Pyrrolidonyl arylamidase (PYR)
- Group D antigen, Bile esculin, growth at 45^{o}
- pyruvate utilization
- arabinose & raffinose fermentation
- Non *E. faecalis* isolates
  - motility
  - pigment production

Antimicrobial Susceptibility Tests

- ‘Routine’ methods

  ampicillin, vancomycin

  high-level gentamicin and streptomycin

Replicator	8	8
Vitek	4	5
MicroScan	1	1
CDS	1	1
ATB/CDS	1	1
Other		3

- β-lactamase (nitrocefin)

  all isolates from normally sterile sites

Source - 1995

Source	*E. faecalis*	*E. faecium*	Other	Total	
Urine	893	36	21	950	(67%)
Other	283	17	7	307	(22%)
Blood/CSF	70	19	10	99	(7%)
Fluid	39	8	6	53	(4%)
All	1,285 (91%)	80 (6%)	44 (3%)	1,409	

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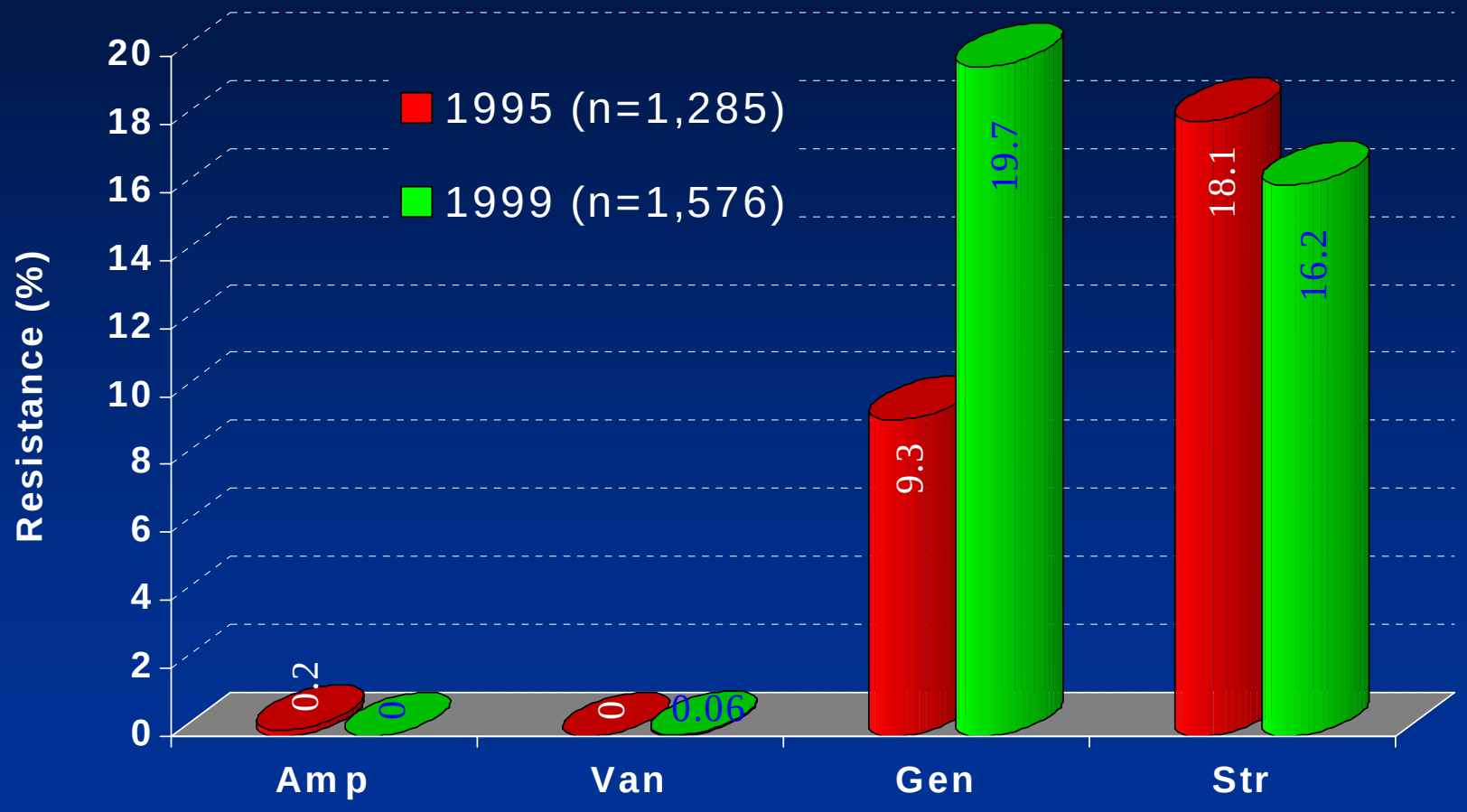
Source - 1999

Source	*E. faecalis*	*E. faecium*	Other	Total	
Urine	1,080	102	9	1,191	(67%)
Other	326	37	6	369	(20%)
Blood/CSF	109	24	6	139	(8%)
Fluid	65	18	5	88	(5%)
All	1,580 (88%)	181 (10%)	26 (2%)	1,787	

Enterococcus faecalis Resistance



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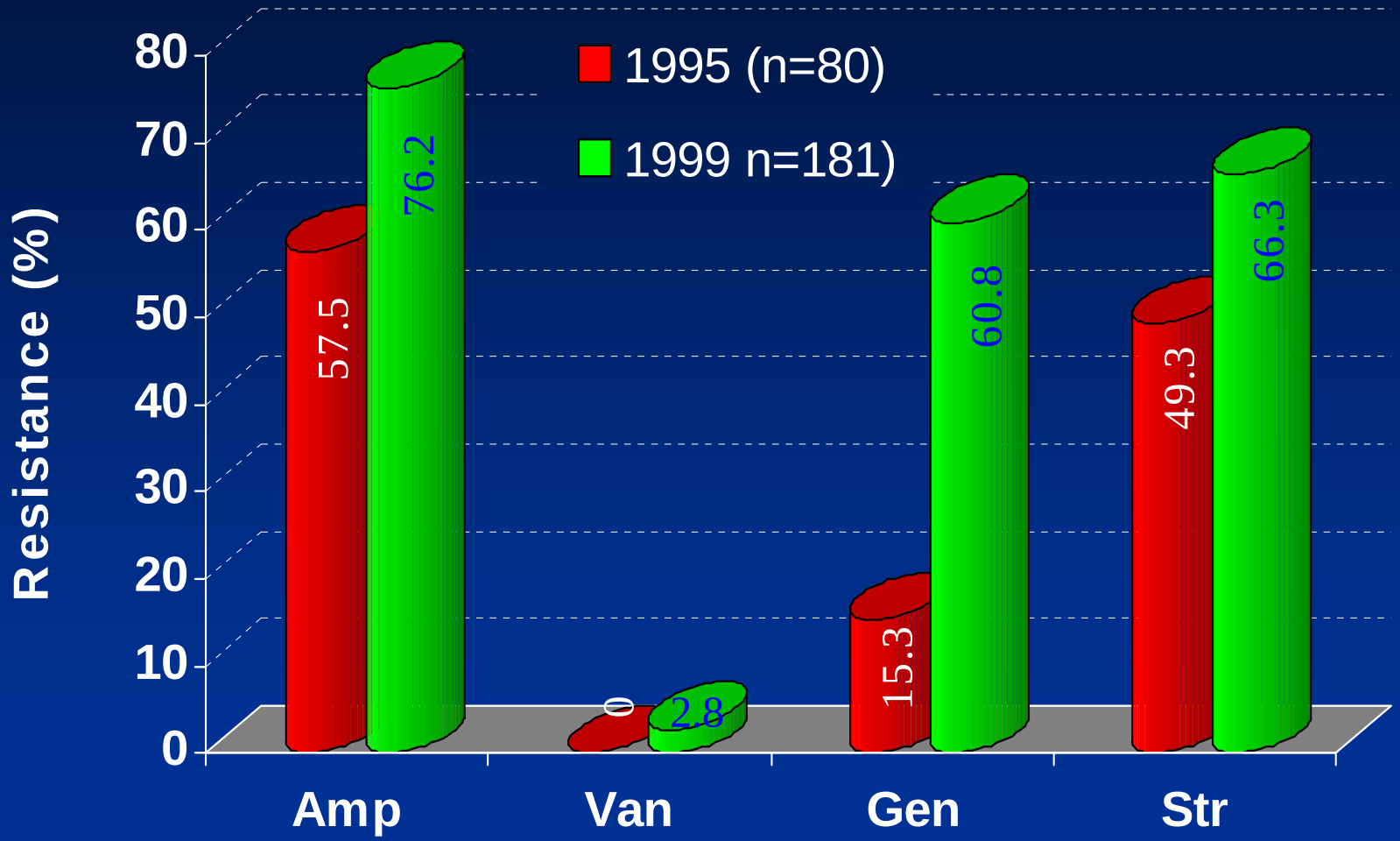
Enterococcus faecium Resistance



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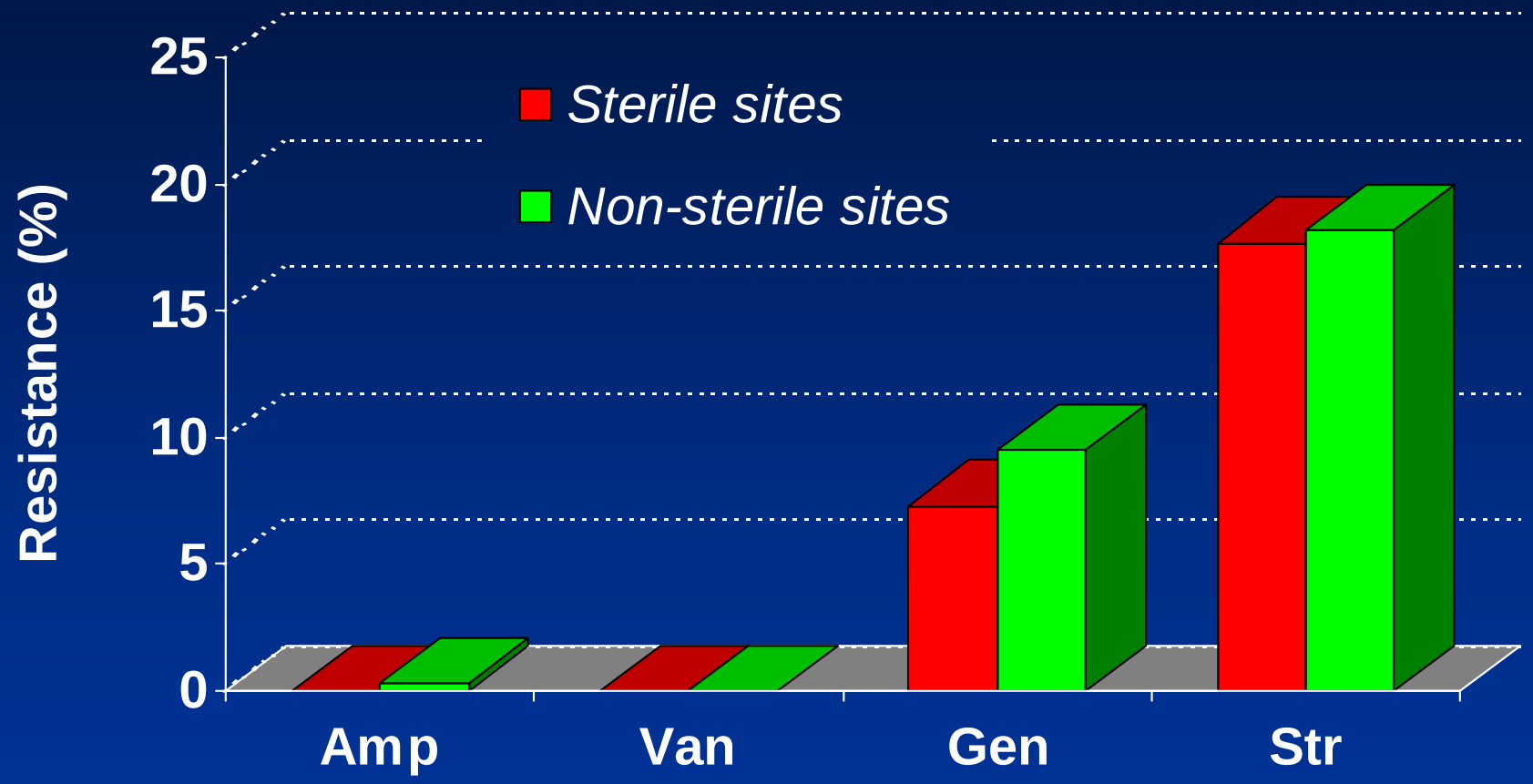
Enterococcus faecalis - 1995



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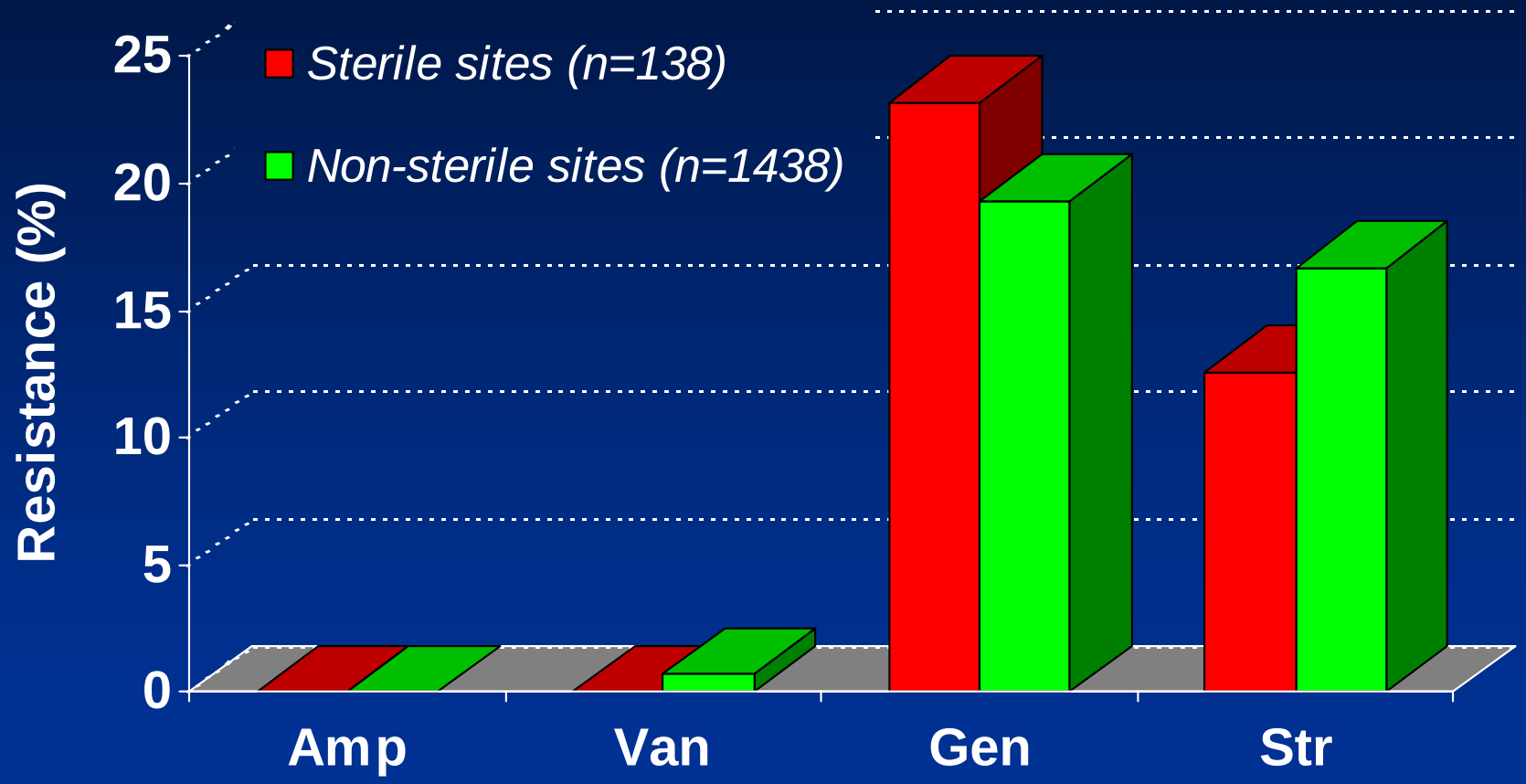
Enterococcus faecalis - 1999



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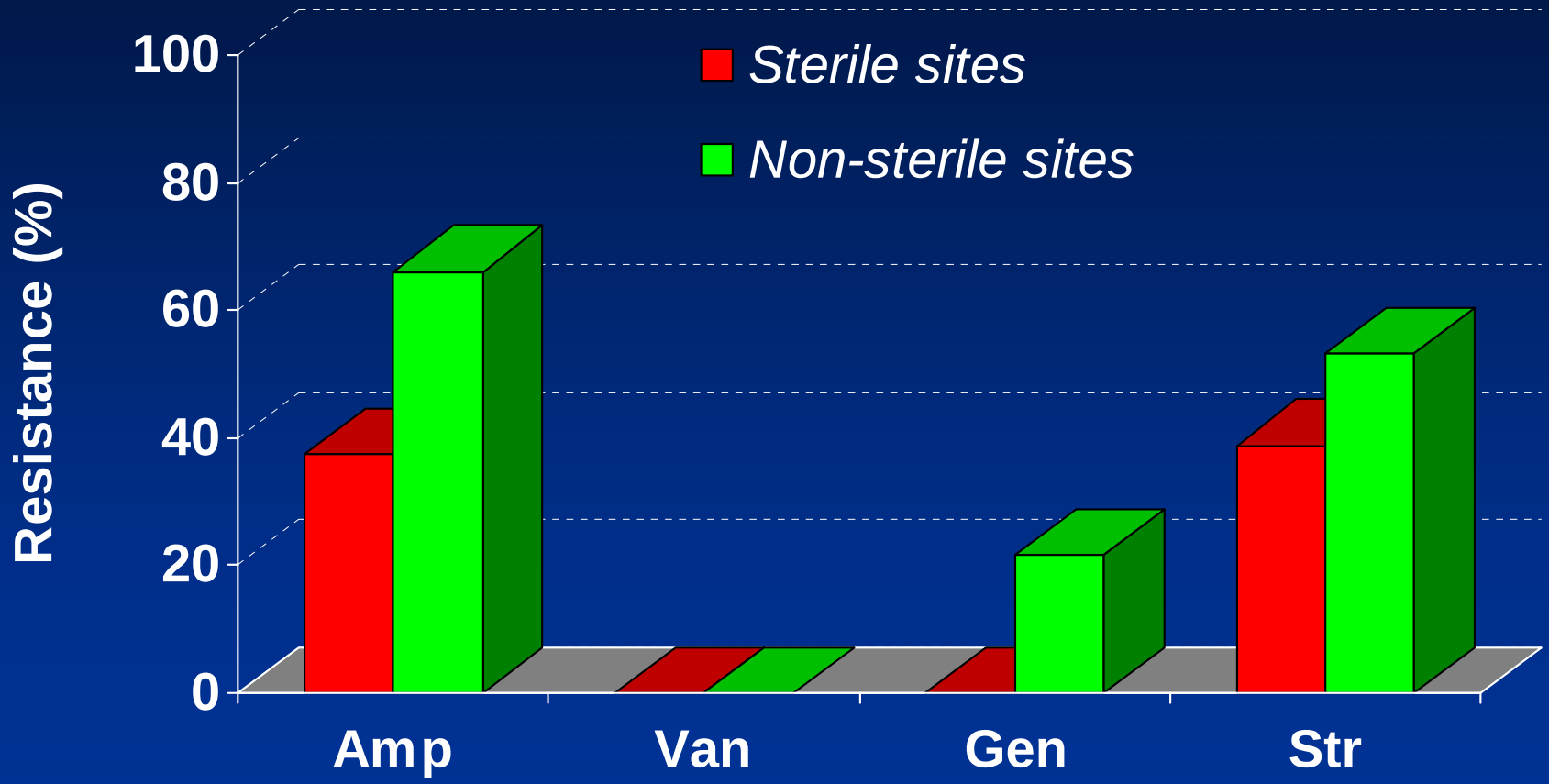
Enterococcus faecium 1995



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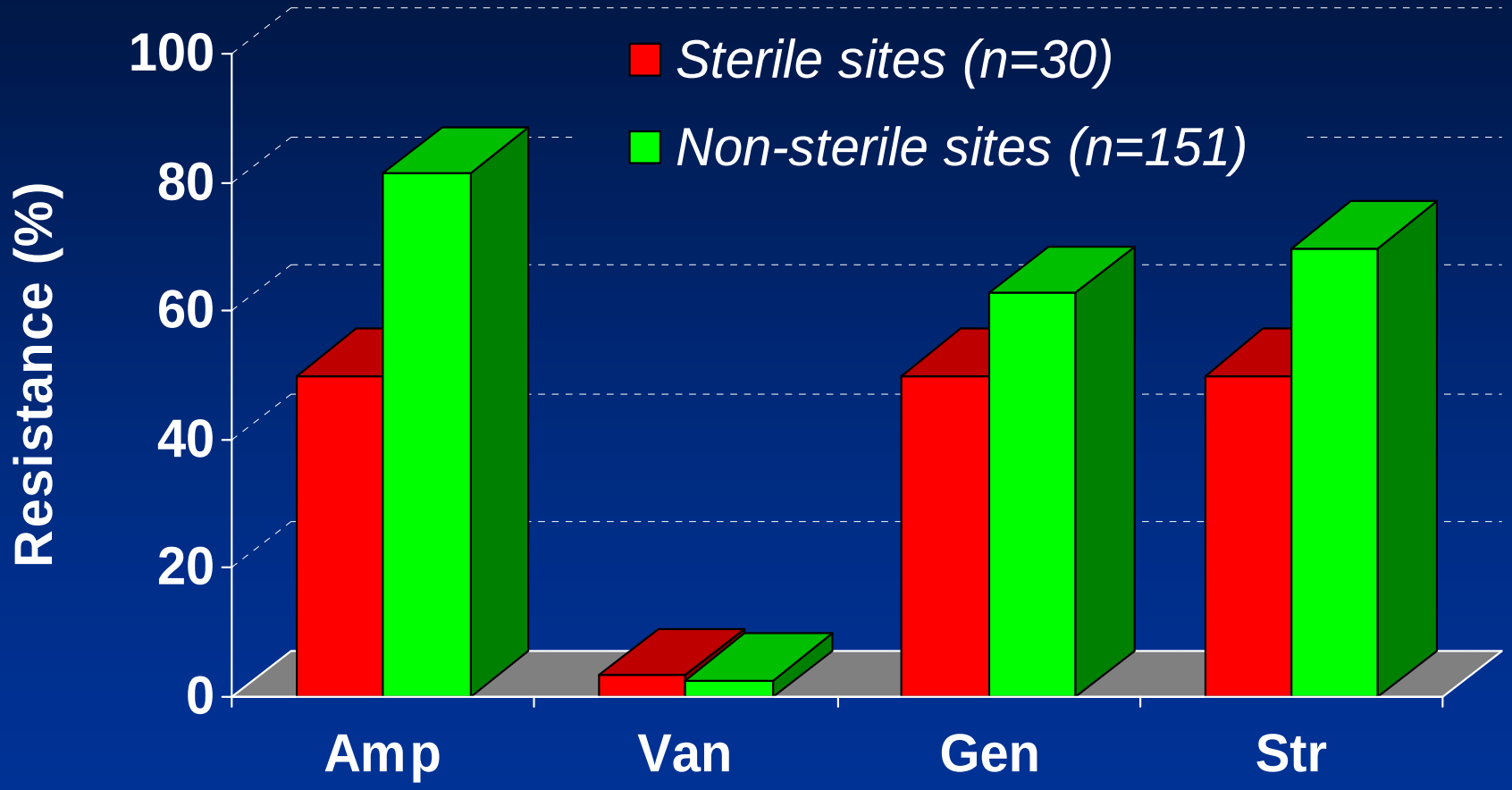
Enterococcus faecium 1999



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High-level Aminoglycoside Resistance

HLG	HLS	*E. faecalis* (n=977)		*E. faecium* (n=63)	
s	R	123	(13%)	23	(37%)
R	s	47	(5%)	2	(3%)
R	R	54	(6%)	8	(13%)
		224	(23%)	33	(52%)

Vancomycin Resistance

Source	Species	Amp	HLG	HLS	Genotype
Urine	*E. faecium*	R	s	s	*vanB*
Urine	*E. faecium*	R	R	s	*vanA*
Tissue	*E. faecium*	s	s	s	*vanA*
CSU	*E. faecalis*	s	R	s	*vanB*
Bile	*E. faecium*	R	s	R	*vanB*
Blood	*E. faecium*	R	s	s	*vanB*

Conclusions

- Slight increase in the isolation rate of *E. faecium*
- Increase in HLAR
- Increase in vancomycin resistance
- One β-lactamase-positive strain in 1995
- Need for regular surveillance studies

Acknowledgements

Members of the Australian Group for Antimicrobial Resistance (AGAR)

Jan Bell, Lorna Fernandes, Geoff Coombs