

Viridans group streptococcal (VGS) bacteraemia: species specific infection association, a 5 year retrospective cohort analysis

Stuart D. Gallacher¹ & Pauline Wright¹
Department of Microbiology, Queen Elizabeth University Hospital, Glasgow, UK

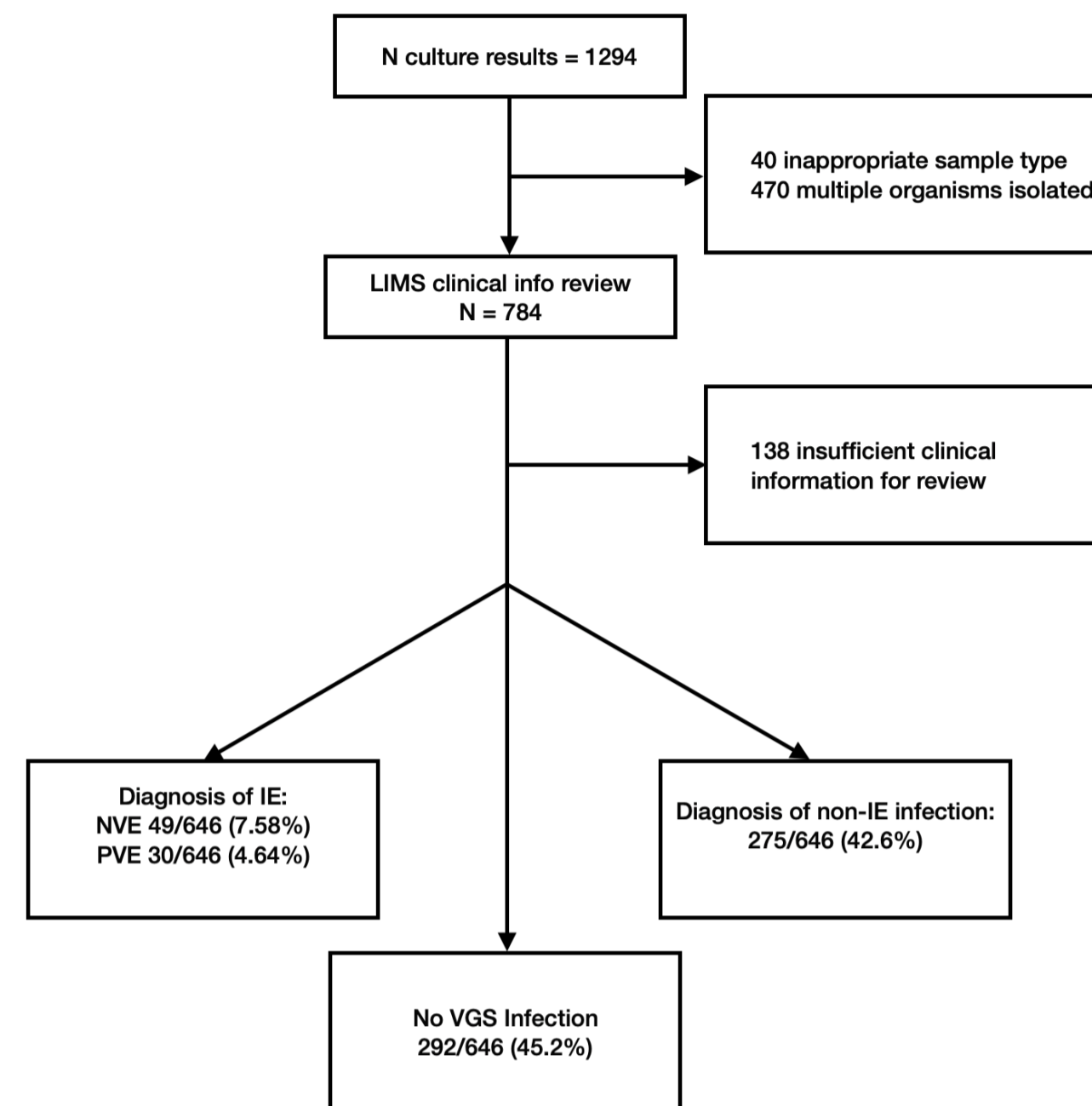
Background

- VGS species are gastrointestinal, genitourinary, and oral commensal bacteria commonly isolated in blood culture
- VGS cause a variety of infections including native valve (NV) and prosthetic valve (PV) infective endocarditis (IE), as well as contamination
- Differing associations of infections between groups of VGS is well recognised
- Accurate identification to species level has improved with the widespread adoption of Matrix Assisted Laser Desorption/Ionisation - Time of Flight Mass Spectrometry (MALDI-TOF).
- Recent work has highlighted the degree to which VGS species influences risk for IE¹
- Established high risk species, like those in the Bovis group, currently prompt specific automated comments on laboratory reports released to the end-user highlighting this risk
- Local rates of VGS IE, non-IE VGS infection, and blood culture contamination with VGS were not known
- A retrospective review of results obtained in our laboratory was undertaken to determine these

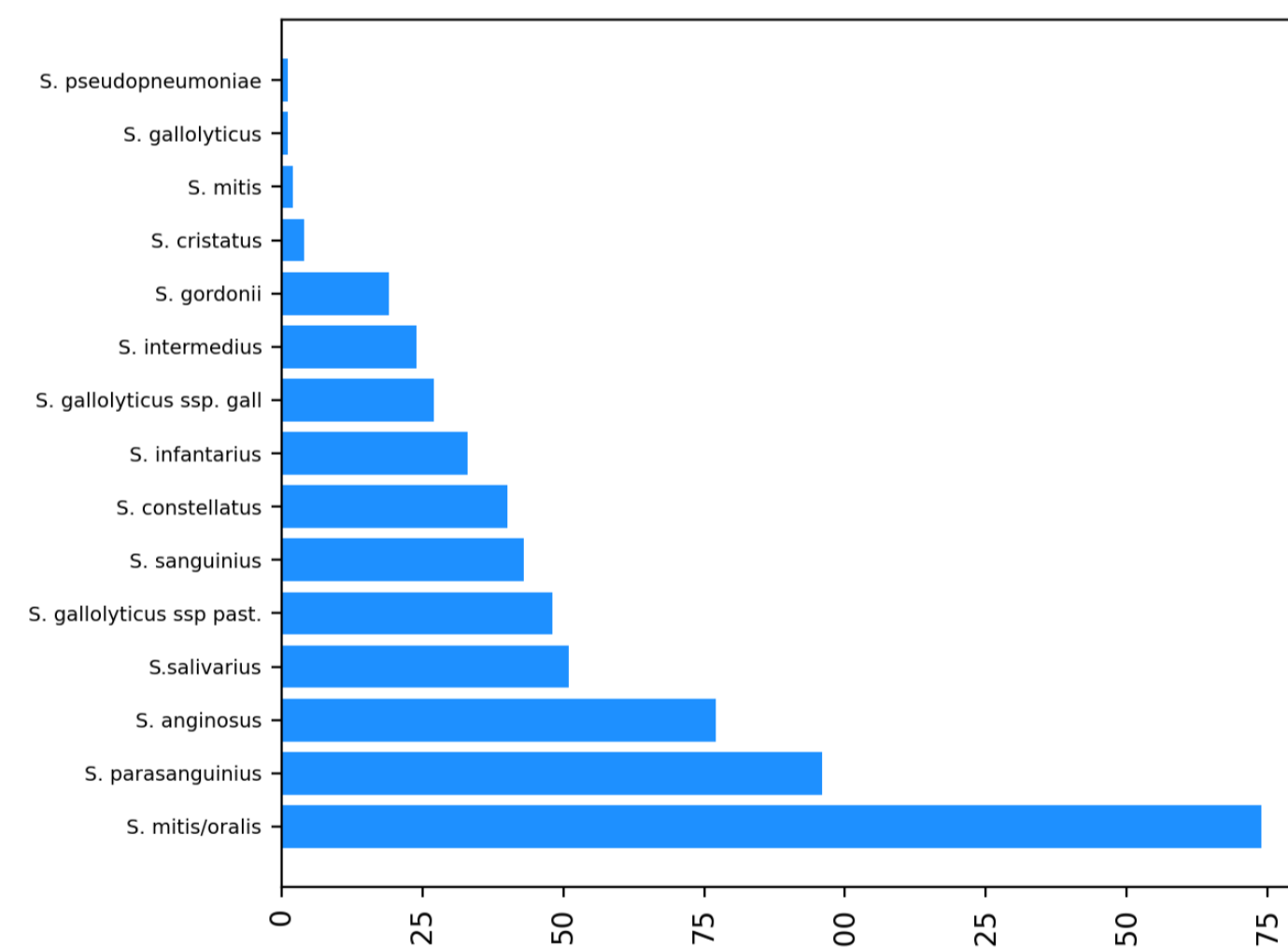
Methods

- Between 01/01/2016 - 31/12/2020:
 - All patients aged >16 years of age with blood cultures containing any of: *S. anginosus*, *S. australis*, *S. bovis*, *S. constellatus*, *S. cristatus*, *S. equinus*, *S. gallolyticus*, *S. gordonii*, *S. infantarius*, *S. intermedius*, *S. infantis*, *S. mitis*, *S. mitis/oralis*, *S. oligofermentans*, *S. oralis*, *S. parasanguinis*, *S. pseudopneumoniae*, *S. sanguinis*, *S. salivarius*, *S. sinensis*, *S. sobrinus*, *S. vestibularis*
 - Identified from an electronic search of Laboratory Information Management system (LIMS)
- Where multiple organisms were identified in a single blood culture, this was removed from analysis unless both species were relevant VGS infecting organisms as determined in both clinical and microbiological review
- Electronic patient records were reviewed and diagnosis was determined as one of:
 - IE
 - Non-IE VGS Infection
 - No VGS Infection
- Risk for each infection scenario was calculated for individual VGS species

Results

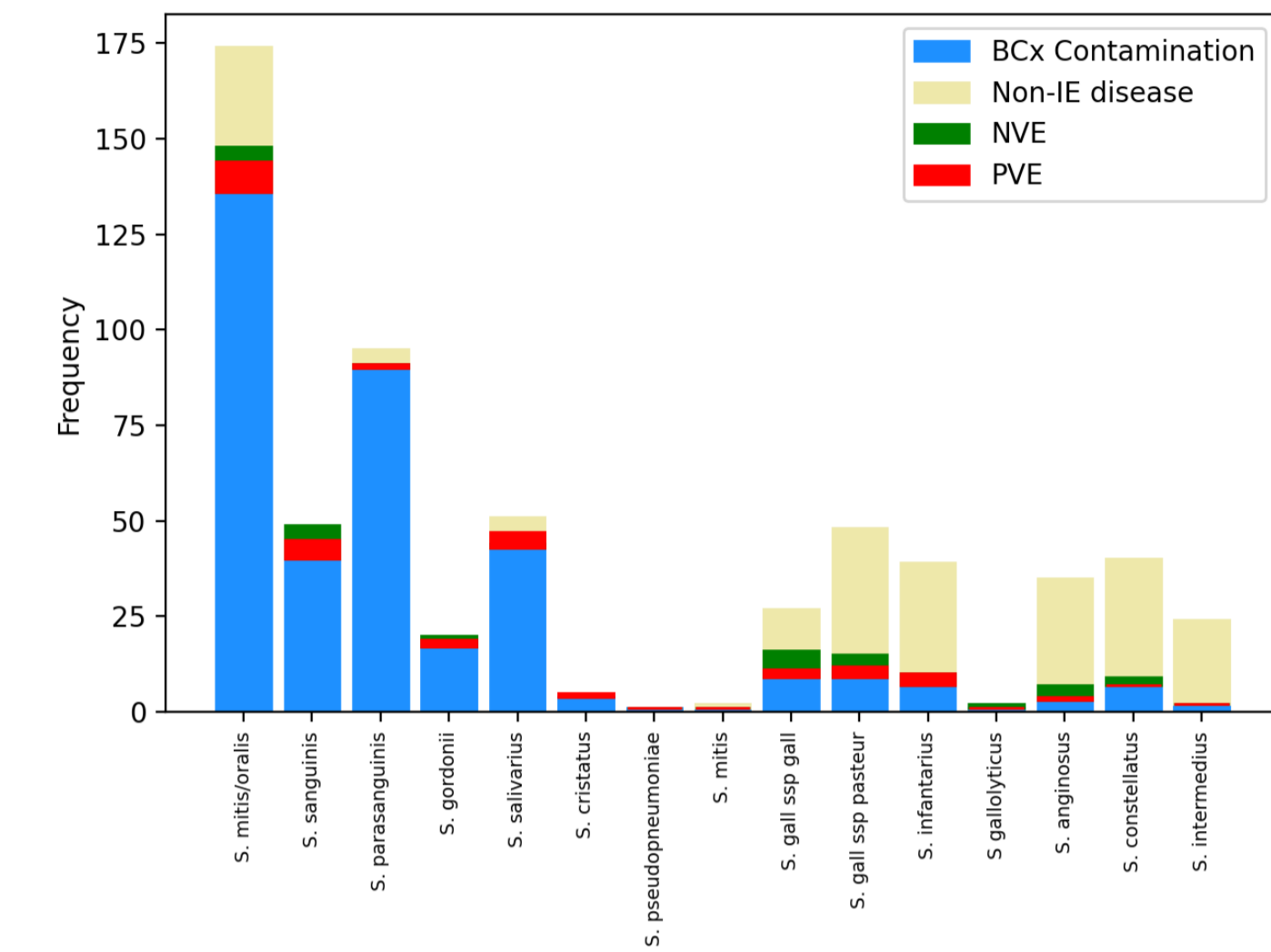


Number of Infection Episodes by Species



Species	Number of Infection Episodes	Number (%) of Infection Episodes with NV IE	Number (%) of Infection Episodes with PV IE	Number (%) of Infection Episodes with Non-IE infection
<i>S. mitis/oralis</i>	174	12 (6.9)	8 (4.6)	38 (21.8)
<i>S. parasanguinis</i>	96	1 (1)	1 (1)	5 (5.2)
<i>S. anginosus</i>	78	4 (5.1)	1 (1.2)	32 (41)
<i>S. salivarius</i>	51	1 (1.9)	4 (7.8)	8 (15.7)
<i>S. gallolyticus ssp. pasteurianus</i>	48	6 (12.5)	3 (6.3)	39 (81.3)
<i>S. sanguinis</i>	43	9 (20.9)	5 (11.6)	3 (6.9)
<i>S. constellatus</i>	40	2 (5)	0 (0)	33 (82.5)
<i>S. infantarius</i>	39	3 (7.7)	3 (7.7)	32 (82)
<i>S. gallolyticus ssp. gallolyticus</i>	27	7 (25.9)	2 (7.4)	18 (66)
<i>S. intermedius</i>	24	2 (8.3)	0(0)	22 (91.7)
<i>S. gordonii</i>	19	3 (15.7)	2 (10.5)	2 (10.5)
<i>S. cristatus</i>	4	0 (0)	1 (25)	0 (0)

IE and non-IE infection by Species



Discussion

- There are notable differences in rates of IE and non-IE infection between different species of VGS in monospecies blood culture
- High risk organisms for IE alone include *S. gordonii*, *S. sanguinis*, and *S. cristatus*
- Organisms in the Bovis group were high risk for both IE and non-IE infections
- Organisms in the Anginosus group were high risk for non-IE infection and low risk for IE
- Several organisms including *S. parasanguinis* and *S. salivarius* were low risk for both IE and non-IE infection
- Rates and species level associations were broadly similar with those previously reported in literature¹
- These data can help inform different investigative strategies for IE and non-IE infection for individual species
- Consideration can be given to comments on released reports to assist end-user interpretation of risks associated with different VGS species

Conclusion

- Different rates of both IE and non-IE infection are reliably associated with specific VGS species and should be used to tailor the investigative strategy through close clinico-microbiology liaison
- Our work confirms previously demonstrated VGS species level IE associations

References

1. Chamat-Hedemand S, Dahl A, Østergaard L, Arpi M, Fosbøl E, Boel J, Oestergaard LB, Lauridsen TK, Gislason G, Torp-Pedersen C, Bruun NE. Prevalence of Infective Endocarditis in Streptococcal Bloodstream Infections Is Dependent on Streptococcal Species. *Circulation*. 2020 Aug 25;142(8):720-730. doi: 10.1161/CIRCULATIONAHA.120.046723. Epub 2020 Jun 25. PMID: 32580572.