Does Passive Reporting of *Streptococcus* spp Identified by Rapid Molecular Assay Change Antibacterial Prescribing Compared to Gram Stain (GS) Alone?

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INTRODUCTION

Streptococci are a diverse genus of gram positive bacteria with varying pathogenicity, including many classical and opportunistic pathogens that can cause invasive disease[1]. Empiric treatment of *Streptococcus* spp bacteremia is a nuanced clinical decision, with published treatment algorithms that vary depending on local epidemiology[2-4].

At University of Virginia Health, the detection of *Streptococcus* spp (excluding *S. agalactiae*, *S. anginosus* group, *S. pneumoniae*, or *S. pyogenes*) via the ePlex® rapid molecular assay (GenMark Diagnostics) blood culture identification (BCID) panel was not historically reported in the electronic medical record (EMR) until the isolate was further speciated. This was reconsidered following anecdotal observation of inappropriate vancomycin (VAN) prescribing with GS alone.

The purpose of this study was to investigate the impact of passively reporting "*Streptococcus* spp" upon BCID result on antibacterial prescribing patterns, with a focus on VAN.

METHODS

Single-center pre-post quasi-experimental study of adult inpatients with non-duplicate *Streptococcus* spp identified via BCID before and after implementing passive reporting of *Streptococcus* spp.

- Pre-Intervention: July 2020 – Sep 2021
  - Gram positive cocci on GS actively reported to primary team
- Post-Intervention: Oct 2021 – Apr 2022
  - Gram positive cocci on GS actively reported to primary team
  - "*Streptococcus* spp by nucleic acid microarray" passively reported into EMR

Primary outcome measures:

- Any antibacterial switch within 24 hours post-GS

Secondary outcome measures:

- Antibacterial days of therapy (DOT) within 7 days post-GS
- VAN DOT within 7 days post-GS
  - Patients receiving VAN > 24 hours post-GS
- *Streptococcus* spp deemed contaminants by primary team
  - Antibacterial DOT for results later deemed contaminant

RESULTS

Table 1. Baseline characteristics

Characteristic	Pre-Intervention* (n=58)	Post-Intervention* (n=25)
Age, median years (range)	59 (20-94)	66 (34-86)
Male	32 (55)	14 (56)
Foreign material	32 (55)	15 (60)
Immunocompromised	26 (45)	13 (52)
Malignancy		
Solid tumor	6 (10)	5 (20)
Hematologic	19 (33)	10 (40)
Stem cell transplant	5 (9)	2 (8)
Solid organ transplant	2 (3)	0 (0)
Other†	0 (0)	2 (8)
Admission status		
Medical service	52 (90)	24 (96)

*Data are presented as n (%) unless specified.
†Other: systemic lupus erythematosus, autoimmune hepatitis

Table 2. Infection and microbiologic characteristics

Characteristic	Pre-Intervention (n=58)	Post-Intervention (n=25)
Streptococcus†		
Viridans Group streptococci	53 (91)	21 (84)
Group C and G streptococci	5 (9)	2 (8)
Group D streptococci	2 (3)	3 (12)
Presumed source of infection at time of GS		
Mucosal barrier injury	8 (14)	7 (28)
Line-related	10 (17)	3 (12)
Intra-abdominal	9 (16)	4 (16)
Bone and joint	6 (10)	4 (16)
Skin and soft tissue	4 (7)	4 (16)
Respiratory	8 (14)	1 (4)
Endovascular	5 (9)	2 (8)
Other‡	3 (5)	0 (0)
No infection	5 (9)	0 (0)
Febrile neutropenia	16 (28)	7 (28)
Polymicrobial	21 (36)	9 (36)
Concomitant bacterial infection	7 (14)	5 (20)

*Data are presented as n (%).
†Viridans Group streptococci included *S. mitis, S. parasanguinis, S. salivarius*; Group C and G streptococci included *S. dysgalactiae ssp equisimilis*. Group D streptococci included *S. gallolyticus ssp pasteurianus, S. infantarius ssp infantarius, S. infantarius ssp coli*
‡Other: Urinary tract infection, pelvic inflammatory disease

Table 3. Antibacterial changes within 24 hours post-GS

Antibacterial therapy	Pre-Intervention (n=58)*	Post-Intervention* (n=25)		P-value
		Pre-*Strep* spp report	Post-*Strep* spp report	
Any switch	34 (59)	7 (28)	11 (44)	-
Total number of antibacterial switches	38	7	13	
Escalation	28 (48)	7 (28)	6 (24)	-
VAN	25 (43)	5 (20)	3 (12)	0.09†
Other‡	9 (16)	2 (8)	3 (12)	-
De-escalation	10 (17)	0	7 (28)	-
VAN	5 (9)	0	6 (24)	0.50
Other‡	7 (12)	0	1 (4)	-

*Data are presented as n (%).
†Comparison of VAN escalation between pre-intervention vs combined pre-*Streptococcus* spp report and post-*Streptococcus* spp report post-intervention groups.
‡ Other antimicrobials include: daptomycin, ampicillin, cefazolin, ceftriaxone, cefepime, piperacillin/tazobactam, and meropenem

Figure 1. Changes in VAN Antimicrobial Therapy Post-GS

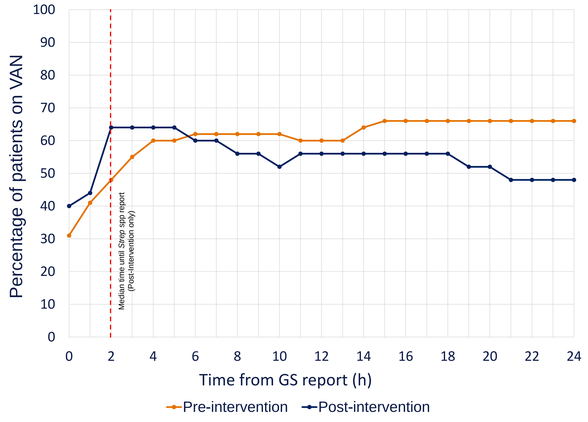

Table 4. Treatment Outcomes

	Pre-Intervention (n=58)	Post-Intervention (n=25)	P-value
Primary Outcome			
Antibacterial switch within 24 hours of GS, n (%)	34 (59)	16 (64)	0.81
Secondary Outcomes			
Antibacterial DOT within 7 days post-GS, median	7	7	-
VAN DOT within 7 days post-GS, median	2	2	-
Patients on VAN at 24 hours post-GS, n (%)	38 (66)	12 (48)	0.15
Streptococcus spp deemed contaminant, n (%)	16 (28)	3 (12)	0.16
Antibacterial DOT for results deemed contaminant, median	2	4	-

CONCLUSIONS

VAN was the most commonly prescribed antibiotic following the report of gram-positive cocci on GS and molecular detection of *Streptococcus* spp (post-intervention only).

VAN was more frequently added in the pre-intervention group, however more patients were on empiric VAN prior to GS in the post-intervention group. There was no difference in de-escalation of VAN.

Passively reporting *Streptococcus* spp identified by rapid molecular assay without paired stewardship intervention did not impact antibacterial prescribing.

The significance of *Streptococcus* spp in blood culture may be complicated by heterogeneous circumstances requiring nuanced real-time stewardship intervention.

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