NARRATE : Characterization of Prescribing Practices For Streptococcal and Enterococcal Bacteremias

Tracy Liu, Pharm.D.; Michelle Hinch, B.Sc. (Pharm)., Pharm.D.; Colin Lee, B.Sc. (Pharm)., Pharm.D., MSc; Victor Leung, M.D.

Background

- No clear guidelines for duration of therapy and step down to oral antibiotics for gram-positive non-staphylococcal blood stream infections (BSIs) not associated with deep seated infections
- Given the variability in prescribing practices, characterizing the various management strategies may aid in determining the optimal treatment approach

Methods

Design

- Retrospective chart review
- Patients at Providence Health Care (PHC) from Nov 2019 - Oct 2020

Inclusion Criteria

- Adult population (≥18 years old)
- BSI with *Streptococcus spp.* or *Enterococcus spp.*

Exclusion Criteria

- Polymicrobial bacteremia
- Deep seated infections
- Mortality or discharged ≤48 hours from admission

Analysis

- Wilcoxon rank sum test for continuous outcomes and Fisher's exact test for binary outcomes
- Univariate and multivariate regression analysis for primary outcomes and step down to oral antibiotics
  - Co-variates: age, immunocompromised status, community acquired infections, bacterial isolates, ID consulted, qPitt bacteremia scores, sources of infection, and comorbidities

Study Objectives

Primary Objectives

- Duration of IV antibiotic therapy (days)
- Total duration of antibiotic (IV + PO) therapy (days)
- Time to appropriate oral step down (days)

Secondary Objectives

- Re-initiation of antibiotics for same infection within the same admission
- Re-admission within 30 days with recurrent BSI
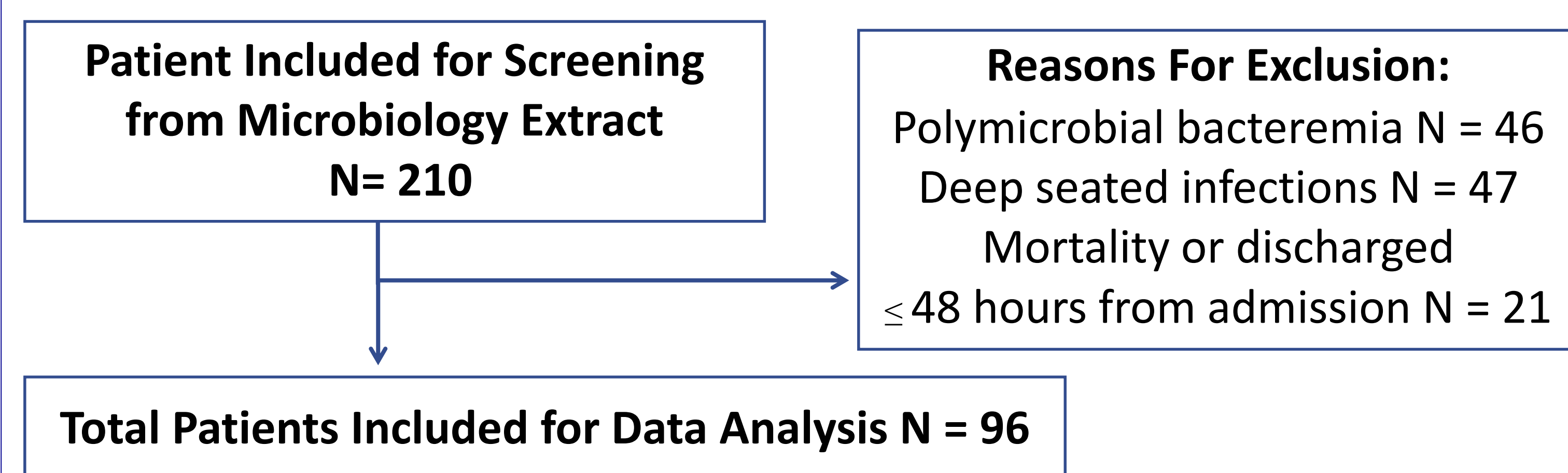
Figure 1. Patient Flow Chart

```
Patient Included for Screening          Reasons For Exclusion:
from Microbiology Extract               Polymicrobial bacteremia N = 46
N= 210                                  Deep seated infections N = 47
                                        Mortality or discharged
                                        ≤ 48 hours from admission N = 21

Total Patients Included for Data Analysis N = 96
```

Table 1. Baseline Characteristics

Age, mean years ± SD	54.5 ± 17.5
Male, N (%)	70 (72.9)
Immunocompromised (%)	12.5
Had ID consulted (%)	51

qPitt Bacteremia Score (%)	
Score 0	57.3
Score 1	29.2
Score 2	13.5

Comorbidities (%)	
CKD	17.7
Diabetes	14.6
HIV	14.6
COPD	13.5
CHF	10.4
Cirrhosis	10.4
Malignancy	8.3
Solid Organ Transplant	2.1

Bacteria Isolated (%)	
Streptococcus pneumoniae	30.2
Group A Streptococcus	25
Enterococcus spp.	15.6
Alpha-hemolytic Streptococcus	7.3
Group B Streptococcus	7.3
Group C Streptococcus	5.2
Group G Streptococcus	5.2
Mixed Species	4.2

Source of Infection (%)	
Respiratory	39.6
SSTI	27.1
GU	11.5
GI	6.3
Other	4.2
Unknown	11.5

Table 2. Duration of Antibiotic Therapy and Oral Step Down

	Alpha-hemolytic Streptococcus (n=7)	Beta-hemolytic Streptococcus (n=43)	*Enterococcus spp.* (n=17)	*Streptococcus pneumoniae* (n=29)	P value
Duration of IV Therapy, median days (Q1, Q3)	15 (7, 23)	13 (8, 17)	11 (7, 15)	5 (5, 8)	<0.001
Total Duration of Therapy, median days (Q1, Q3)	17 (15, 29)	16 (13, 18)	15 (11, 19)	15 (11, 17)	0.28
Number of Oral Step Down Patients, N (%)	3 (42.9)	16 (37.2)	7 (41.2)	24 (82.8)	<0.001
Time to Oral Step Down, median days (Q1, Q3)*	9 (6, 12)	9 (6, 11)	8 (4, 12)	6 (5, 8.5)	0.19

*Among patients who were step down to oral antibiotics, n=50

Limitations

- Limited generalizability: antimicrobial practices focused at PHC, limited patients with *Enterococcus spp.*
- Small sample size
- Unable to capture outpatient antibiotics prolonged or non-adherence
- Unable to capture readmission to another health authority

Results

Secondary Objectives

- No patients identified with re-initiation for same infection within the same admission
- 1 patient was readmitted with recurrent BSI within 30 days

Regression Analysis

Duration of IV Antibiotic Therapy

- *Streptococcus pneumoniae* BSIs had significantly shorter duration
  - Multivariate analysis - 42.0% shorter duration (days) compared to beta-hemolytic Streptococcal BSIs
- ID consulted patients had significantly longer duration
  - Multivariate analysis - 45.8% longer duration (days) compared to those without ID consults

Total Duration (IV + Oral) of Antibiotic Therapy

- ID consulted patients had longer total duration
  - Multivariate analysis - 46.4% longer duration (days) compared to those without ID consults

Time to Oral Step Down

- No statistically significant differences between any of the identified covariates
- Analysis restricted to patients who were stepped down (N=50)

Step Down to Oral Antibiotics

- 52.1% of patients were stepped to oral antibiotics and nearly all patients were stepped down appropriately based on clinical status and hemodynamic stability
- *Streptococcus pneumoniae* BSIs were significantly more likely to be stepped down compared to beta-hemolytic Streptococcal BSIs (Odds Ratio 8.1, 95% CI 2.6, 25.5)

Conclusions

- Median of ~2 weeks of total therapy observed for non-staphylococcal non-deep seated BSIs
- *Streptococcus pneumoniae* BSI had shorter duration of IV therapy (median 5 days) and were more likely to step down to oral antibiotics (82.8%)
- No recurrent BSI observed with most of the patients being step down to oral antibiotics (52.1%)
- Given low findings for our secondary outcomes, exploration warranted for shorter duration of antibiotic therapy and increase in oral step down as optimal treatment approaches
- Other future outcomes of interest is optimal time to oral step down based on clinical status and hemodynamic stability