Broad-Spectrum Antibiotic use in Outpatient Parenteral Antibiotic Therapy (OPAT): Opportunities for Antibiotic Stewardship

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BACKGROUND

- Broad-spectrum antibiotics are often chosen for OPAT for the convenience of once daily dosing[1,2,3]
- Current literature suggests at least 20-30% of these regimens have the potential to be narrowed, but this has not been well defined[1,2]
- The purpose of this study is to define how much opportunity there is within an OPAT program to further narrow a select group of broad-spectrum antibiotic regimens in order to better understand and define the need and role of antimicrobial stewardship in this setting

METHODS

- **Design:** IRB-approved, two-center, observational, retrospective cohort study from January 1, 2019 through June 30, 2019
- **Inclusion Criteria:** Adult outpatients > 18 years of age evaluated by the URMC inpatient ID consult service and followed by the URMC OPAT clinic with culture-positive infections with corresponding susceptibility information (*not including certain organisms – see QR code)* on the following IV antibiotics:
  - Ampicillin
  - Ampicillin-sulbactam
  - Cefazolin
  - Ceftriaxone
  - Daptomycin
  - Ertapenem
  - Meropenem
  - Nafcillin
  - Penicillin
  - Piperacillin-tazobactam
  - Vancomycin

Investigator-Derived Regimen Classification System

Broad-spectrum antibiotic (BSA) class 1	Broad-spectrum antibiotic (BSA) class 2	Broad-spectrum antibiotic (BSA) class 3	Narrow-spectrum antibiotic (NSA) class
Daptomycin Meropenem	Ertapenem Piperacillin-tazobactam Vancomycin	Ceftriaxone	Ampicillin Ampicillin-sulbactam Cefazolin Nafcillin Penicillin

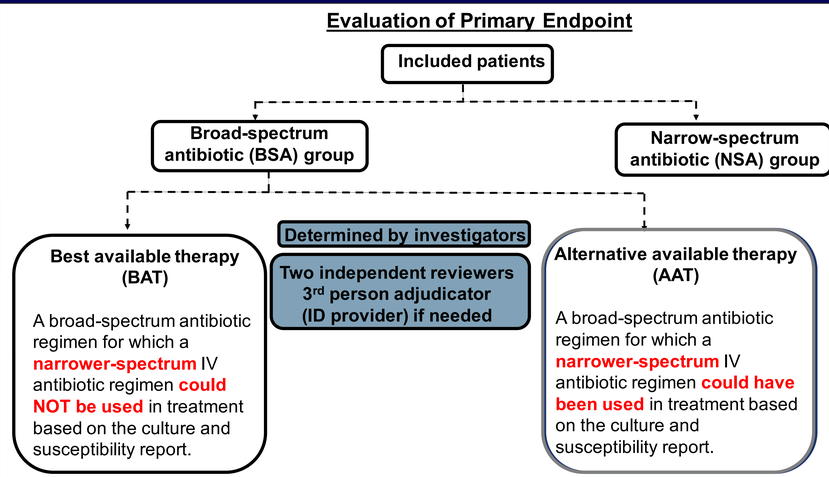
Broadest → Narrowest

- **Exclusion Criteria:** OPAT regimens that included the use of oral antimicrobials *(not including oral rifampin or oral metronidazole)*

OBJECTIVES

- **Primary Endpoint:**
  - To determine the rate of select IV broad-spectrum OPAT regimens that could have been further narrowed (AAT = alternative available therapy group)
- **Secondary Endpoints:**
  - To assess baseline characteristic differences and compare 30-day readmission rates between:
    1. Patients who had been discharged on a broad-spectrum IV antibiotic regimen that could have been further narrowed (AAT group)
    2. Patients who had been discharged on a narrow-spectrum IV antibiotic regimen (NSA group)
  - To identify the documented reasons for selection of broad-spectrum IV antibiotic regimens that could have been narrower (AAT group)

METHODS



RESULTS

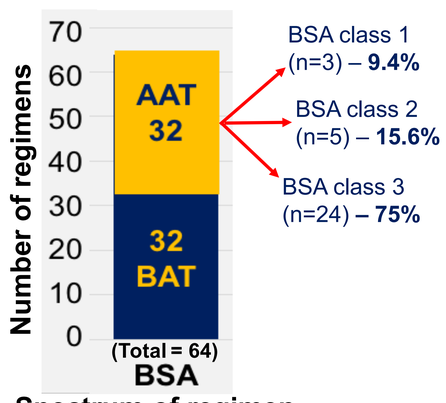
Baseline Characteristics:

- The median age of patients included in this study was 60 years (IQR, 51-70)
- The majority of patients received OPAT at home (93%) vs an extended-care facility (6%)
- Bone and joint infection was the most common indication for therapy (45%)
- Characteristics such as race, employment, insurance provider, comorbidities, and discharge location were similar between the BSA and NSA groups

Refer to QR code for full baseline characteristics

Primary Endpoint:

Rate of AAT patients



50% (n=32) of select IV BSA regimens had the potential to be further narrowed (AAT group)

- **94%** (n=30) of AAT regimens could have been narrower-spectrum
- **75%** (n=24) of the AAT regimens contained ceftriaxone
- **54.2%** (n=13) of those regimens were used to treat monomicrobial *Streptococcus* spp. infections
- **46%** (n=6) of those infections were bone & joint infections

RESULTS

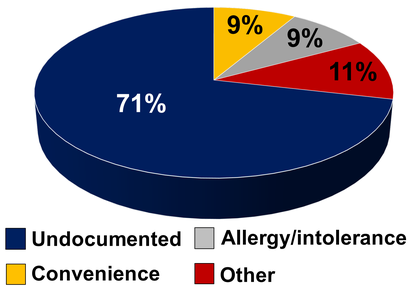
Secondary Endpoints:

Sub-analysis of baseline characteristics for AAT group vs NSA group

Characteristic	AAT (n=32)	NSA (n= 49)	p-value
Indications for antibiotics			
Bloodstream infection	7 (19.4)	21 (38.9)	**0.041**
Organisms			
Staphylococcus aureus	11 (20.4)	30 (56.6)	**<0.001**
Streptococcus spp.	15 (27.8)	7 (13.2)	**0.051**
Enterobacterales	13 (24.1)	1 (1.9)	**<0.001**
Number of organisms			
1	23 (71.9)	45 (91.8)	**0.019**
≥2	9 (28.1)	4 (8.2)	**-**
Hospital LOS, median [IQR]	11 [6-14]	7 [5-9]	**0.005**
Antibiotics prescribed on discharge			
Cefazolin	0 (0.0)	33 (67.3)	**<0.001**
Ceftriaxone	24 (75.0)	0 (0.0)	**<0.001**
Penicillin	0 (0.0)	12 (24.5)	**<0.001**
Daptomycin	3 (9.4)	0 (0.0)	**0.058**
Piperacillin-tazobactam	3 (9.4)	0 (0.0)	**0.058**

*All statistics are expressed as n (%) unless otherwise stated; IQR= interquartile range; LOS= length of stay

Documented reasons for AAT regimen selection



30-day readmission rates:

AAT group vs NSA group

- **5%** readmission rate in the AAT group
- **9%** readmission rate in the NSA group

NO statistically significant difference in readmission rates (p=0.55)

LIMITATIONS

- Primary investigator bias
- Retrospective and descriptive
- Regimen classifications based on investigators' opinions
- Reasons for regimen selections not stated or investigated in majority of cases
- Unable to assess confounders attributing to longer inpatient LOS in AAT group

CONCLUSIONS

- **50%** of select broad-spectrum IV OPAT regimens had the potential to be further narrowed (AAT)
- Ceftriaxone-containing OPAT regimens may be identified as a specific target for OPAT antimicrobial stewardship intervention
- Active review in tandem with implementation of a "Regimen Reason" field in OPAT order-sets will be important to further identify barriers to narrower-spectrum antibiotic prescribing faced by providers
- Role for antimicrobial stewardship in the OPAT setting continues to be defined, but the results of this study indicate that there is clearly a need and identifies current and future areas of focus moving forward