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Retrospective review of alternative antibiotic use in patients with a reported penicillin allergy at a community hospital

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BACKGROUND

- Penicillin (PCN) is the most commonly reported beta-lactam (BL) allergy; prevalence among hospitalized patients is ~10%–20%¹
- Less than 10% of these patients are truly allergic, but common side effects of BLs (i.e. fever, nausea, vomiting, diarrhea) are often mistaken for allergic reactions and inaccurately documented as an allergy in the electronic health record (EHR)^{1,2}
- A true PCN allergy may decrease over time; 50% of patients lose sensitivity after 5 years and 80% after 10 years³
- Patients with a reported PCN allergy are often treated with non-BL broad-spectrum antibiotics^{3,4}, which may lead to suboptimal antibiotic therapy, more adverse events, development of multi-drug resistant infections, increased length of stay, ICU admissions, higher mortality and increased treatment costs^{5,6}
- Cross reactivity reported for 1st generation cephalosporins is ~ 1% and negligible for 2nd generation cephalosporins yet all cephalosporins are often avoided in patients with a reported PCN allergy⁷

OBJECTIVES

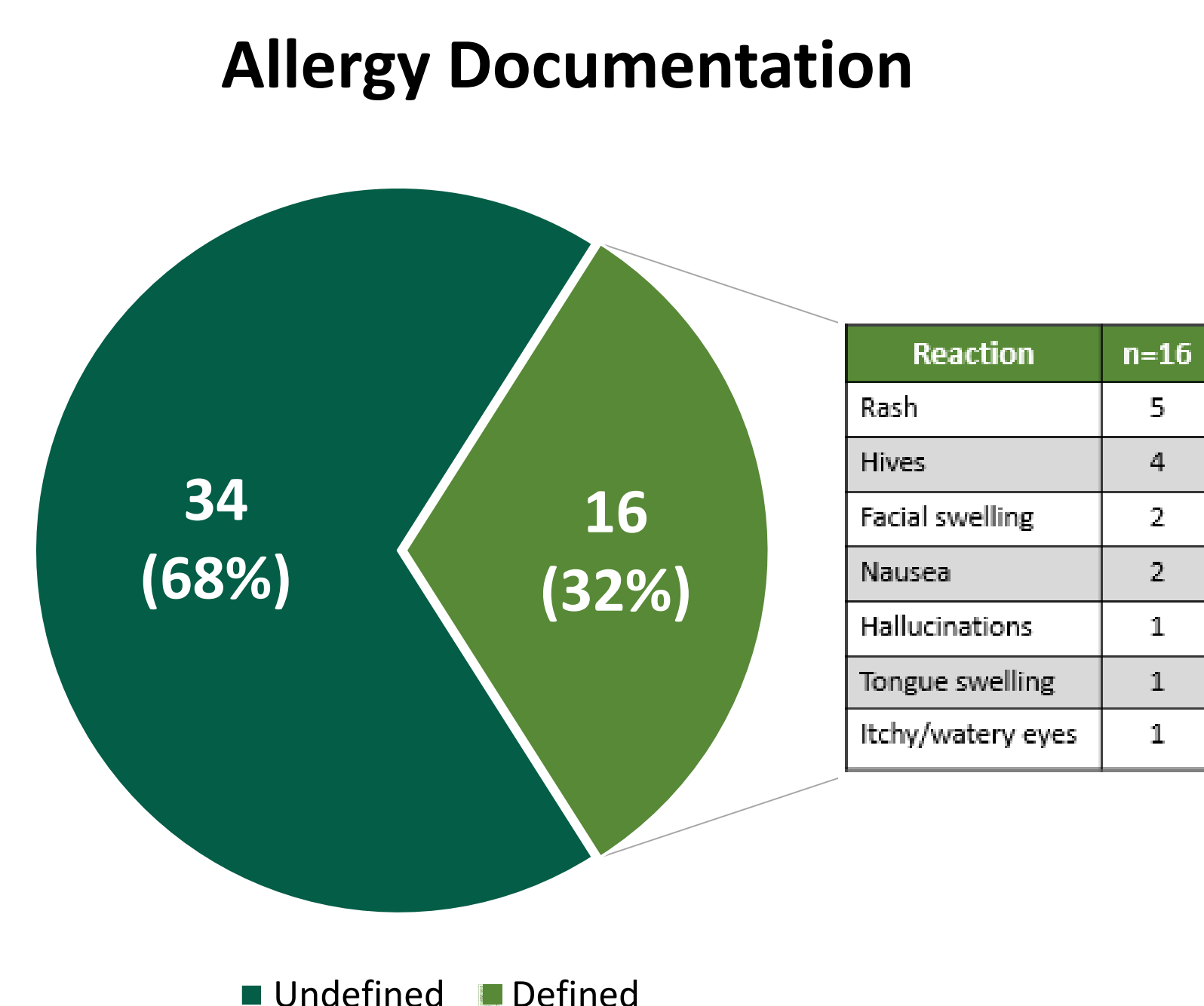
- Determine the incidence, clinical outcomes and costs associated with the use of alternative antibiotic treatment in patients with a reported PCN allergy
- Establish the foundation for a follow-up phase II study evaluating the impact of a pharmacy-driven PCN allergy assessment on allergy clarification and antibiotic selection

METHODS

- Study design:** Single-center, retrospective chart review of patients admitted to Baptist Hospital of Miami with a reported PCN allergy between February 1, 2018 and August 1, 2018
- Inclusion criteria:** Individuals ≥ 18 years old, reported PCN allergy, diagnosis of an infection for which a PCN or a BL antibiotic can be used, received antibiotics for at least one day during hospital stay
- Exclusion criteria*:** Patients receiving antihistamines (AH)- 1st generation AH within 24 hours, or a 2nd generation AH within the 5 days prior to antibiotic administration, severe immunosuppression (i.e. HIV with CD4 count <200 cells/μL, neutropenia, malignancy, transplant patients taking immunosuppressive medications), anaphylactic allergy to PCN within the last 10 years, pregnant/breastfeeding, severe cardiovascular or pulmonary comorbidities
- Primary outcomes:** Type of antibiotic(s) used, costs, adverse effects and allergy documentation
- Secondary outcomes:** Length of stay, duration of therapy, resolution of infection and mortality
- Reported allergies were reviewed and categorized into one of two categories:
 - Defined:** both an allergy to PCN and the associated reaction are documented on the EHR
 - Undefined:** an allergy to PCN is documented on the EHR without an associated reaction

RESULTS

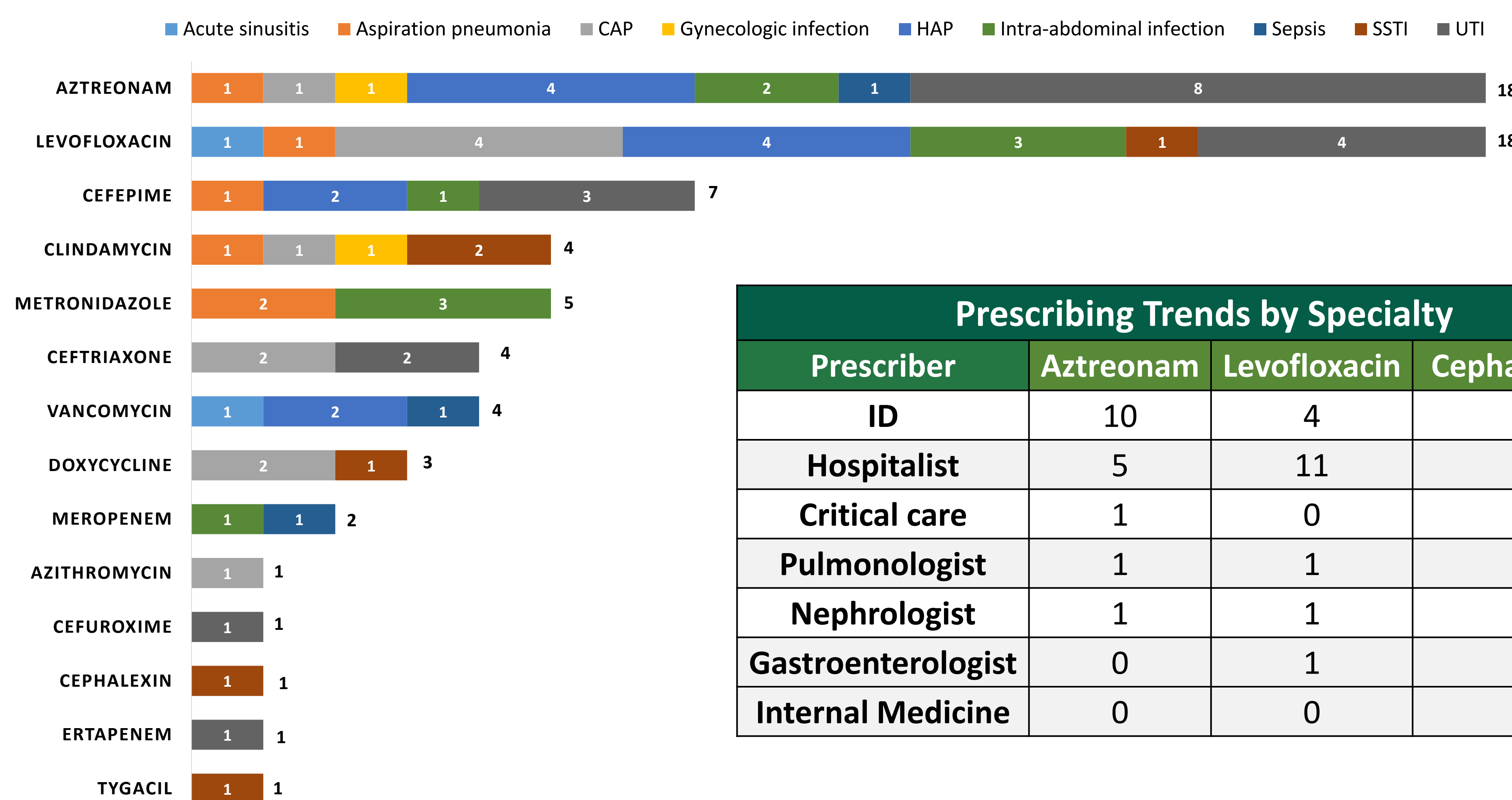
Baseline Characteristics	n=50
Mean age (years)	72
Gender, n (%)	
Female	33 (66%)
Dual antibiotic therapy, n (%)	21 (42%)
Infection Type, n (%):	
UTI	16 (30%)
CAP	9 (18%)
HAP	7 (14%)
SSTI	6 (12%)
Intra-abdominal infection	5 (10%)
Aspiration pneumonia	3 (6%)
Sepsis	2 (4%)
Gynecologic infection	1 (2%)
Acute sinusitis	1 (2%)



Antibiotic	Cost
Aztreonam	\$ 12,080.64
Tigecycline	\$ 2,253.60
Levofloxacin	\$ 2,134.20
Doxycycline	\$ 1,743.20
Ertapenem	\$ 1,543.90
Cefepime	\$ 1,409.36
Clindamycin	\$ 922.72
Vancomycin	\$ 680.70
Meropenem	\$ 633.60
Ceftriaxone	\$ 264.48
Metronidazole	\$ 115.32
Cefuroxime	\$ 48.00
Azithromycin	\$ 28.80
Cephalexin	\$16.56
Total Cost:	\$23,875.08

(All costs calculated using average wholesale price)

ANTIBIOTIC SELECTION PER INFECTION TYPE



Note: Data reflects total number of antibiotics used in 50 patients

Secondary Outcomes	n=50
Mean length of stay (days)	10.5
Mean duration of therapy (days)	5.6
Mortality, n (%)	
Cardiopulmonary arrest	2 (1%)
Resolution of infection, n (%)	
Yes	42 (84%)
No	4 (8%)
Unknown	4 (8%)

Prescribing Trends by Specialty			
Prescriber	Aztreonam	Levofloxacin	Cephalosporins
ID	10	4	8
Hospitalist	5	11	3
Critical care	1	0	0
Pulmonologist	1	1	1
Nephrologist	1	1	0
Gastroenterologist	0	1	0
Internal Medicine	0	0	1

Adverse Effects	n	Antibiotic
Anxiety	1	Levofloxacin
Allergic reaction	1	Clindamycin
Rash	1	Cefepime

CONCLUSION

- Aztreonam and levofloxacin were the most common non-BL antibiotics prescribed for patients with a reported PCN allergy
- Majority (68%) of reported PCN allergies were undefined
- The most common infection types were urinary tract infections (UTI), community-acquired pneumonia (CAP) and hospital-acquired pneumonia (HAP)
- Infectious diseases (ID) physicians were more likely to prescribe cephalosporins
- Hospitalists were more likely to prescribe fluoroquinolones

LIMITATIONS

- Small sample size
- Difficult to draw conclusions based on comparative data between patients with defined and undefined allergies
- Unable to determine cost savings with use of alternative antibiotics
- Documentation in the EHR was not complete/thorough
- Information from outside of hospital stay not easily accessible
 - Time frame for defined allergies (i.e. anaphylaxis)
 - Prior medication use (i.e. AHs)
 - Resolution of infection for patients discharged on outpatient antibiotics

DISCUSSION

- Inaccurate allergy documentation may lead to unnecessary use of non-BL broad-spectrum antibiotics and higher treatment costs
- Accurate allergy documentation by healthcare providers (i.e. nurses, pharmacists) and thorough review of allergy documentation by prescribers can potentially minimize unnecessary antibiotic use and decrease overall treatment costs
- Prospective studies should be conducted to assess the impact of a pharmacy-driven PCN allergy assessment (detailed patient interview) in an attempt to clarify/define allergy history

DISCLOSURES

- All authors of this presentation have nothing to disclose concerning possible financial or personal relationships with commercial entities that may have direct or indirect interest in the subject matter of this presentation

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* Exclusion criteria reflects that which will be used for phase II of this study in which patients may be eligible for PCN skin testing and was designed in an effort to increase patient safety