2020

Evaluation of beta-lactam allergy classification and carbapenem use in patients admitted to the medical-surgical floors of a large, community hospital

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BACKGROUND AND OBJECTIVE

Background[1-4]

- CDC reports half of patients admitted to the hospital received at least 1 dose of antibiotics from 2006-2012
- Approximately 32 million people in the United States have a documented allergy to a beta-lactam (BL) antibiotic
- Approximately 10% of all US patients report having an allergic reaction to a BL in their lifetime
- Fewer than 1% has a true IgE (immunoglobulin E) mediated allergy to a BL
- Over 80% of those patients with an IgE-mediated allergy lose sensitivity after 10 years
- Penicillin-skin testing cost: ~$220
- Per the CDC, carbapenem use increased by 37% from 2006-2012
- Carbapenems are rarely first line antibiotics, but are frequently used when first line agents are excluded due to the patient's drug-allergies
- Carbapenem use is associated with increased healthcare costs and promotion of antibiotic resistance

Objective

- Determine the beta-lactam (BL) allergy-risk stratification for patients at Parkview Regional Medical Center with a documented allergy to a BL

DESIGN AND METHODS

Design

- Observational, retrospective cohort study of patients with BL allergies to evaluate the EMR determined risk level stratification of their BL allergy and the correlations with carbapenem antibiotic use within 24 hours of admission
- Parkview Health IRB approved this quality improvement project

Methods

- Data was collected on any patient admitted to the general medical floors at Parkview Regional Medical Center between August 3rd, 2020 and October 23rd, 2020
- We identified 235 unique documented beta lactam allergies of 197 hospitalized patients
- Data collected included
  - Age
  - BL allergy and reaction type
  - Non-BL antibiotic allergies
  - Allergy-risk stratification (EMR)
  - Allergy-risk stratification (*JAMA* article)
  - BL antibiotics received within 24 hours of current admission
  - BL antibiotics received on previous admissions and in the outpatient setting
  - Sex
  - Duration of BL allergy
  - Skin test with reaction type
  - Non-antibiotic allergies
- At minimum of one attempt for an interview via telephone was made for all patients

RESULTS

Figure 1. Beta-lactam allergy-risk stratification[2]

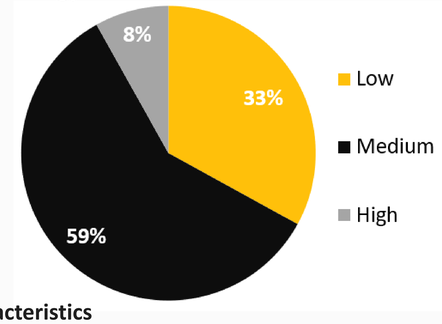
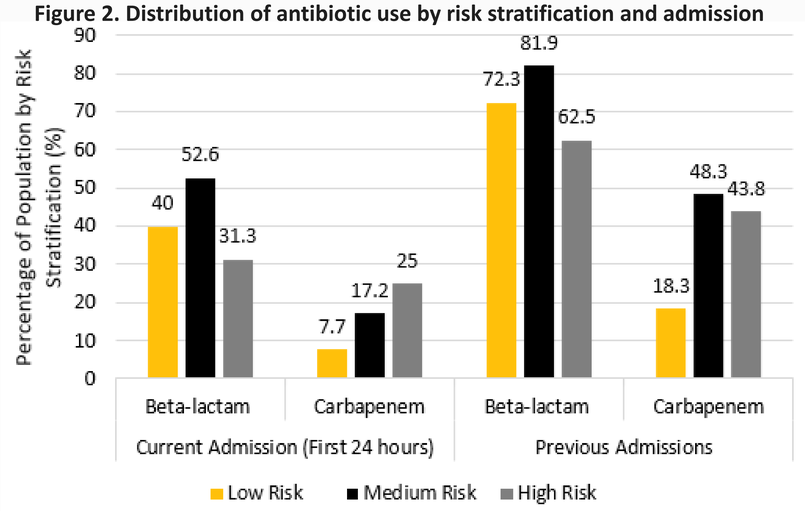


Table 1. Patient characteristics

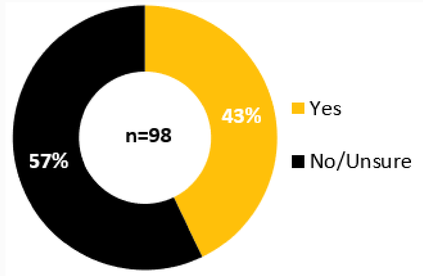
	Overall (n=197)	Low Risk (n=65)	Medium Risk (n=116)	High Risk (n=16)
Mean age – years	67.7	68.2	67.2	67.1
Female – no. (%)	122 (61.9)	39 (60.0)	74 (63.8)	12 (75.0)
Beta-Lactam Allergies – no. (%)				
Total	235 (100)	82 (100)	137 (100)	16 (100)
Penicillin	132 (56.2)	38 (46.3)	81 (59.2)	13 (81.3)
Non-Penicillin Penicillins	40 (17.0)	21 (25.6)	18 (13.1)	1 (6.2)
Cephalosporins	63 (26.8)	23 (28.1)	38 (27.7)	2 (12.5)
Adverse Reactions – no. (%)				
Itching/Rash	72 (30.6)	7 (8.5)	65 (47.4)	0 (0.0)
Hives	59 (25.1)	0 (0.0)	59 (43.1)	0 (0.0)
Anaphylaxis/Oral Swelling	28 (11.9)	0 (0.0)	12 (8.8)	16 (100)
Not Allergy	38 (16.2)	38 (46.3)	0 (0.0)	0 (0.0)
Unknown	38 (16.2)	38 (46.3)	0 (0.0)	0 (0.0)
Non-BL Antibiotic Allergies, Mean (SD)	0.83 (1.17)	0.72 (1.22)	0.86 (1.17)	1.00 (0.79)
Non-Antibiotic Allergies, Mean (SD)	2.86 (4.00)	3.31 (4.25)	2.65 (3.94)	2.65 (3.24)

Figure 2. Distribution of antibiotic use by risk stratification and admission



RESULTS

Figure 3. Percentage of patients aware of outpatient beta-lactam use



DISCUSSION AND CONCLUSION

Discussion

- Out of 235 unique beta lactam allergies identified, 192 (81.7%) of the allergies had severity classifications of “not-specified" in the Parkview EMR
- 38 out of 197 (19.3%) patients had allergies to beta-lactam antibiotics with the reaction type of “unknown,” making it harder to accurately stratify these patients by reaction type
- For patients who received a beta-lactam within the first 24 hours of their current admission, the likelihood the beta-lactam received was a carbapenem are as follows:
  - High risk = 79.9%
  - Medium risk = 32.7%
  - Low risk = 19.3%

Limitations

- Retrospective cohort study
- Data collection via chart review
- No in-person interviewing due to the COVID-19 pandemic, only telephone-based interviewing permitted (67.5% of patients reached via telephone)

Future Directions

- Study results will facilitate change in the Parkview Health System regarding allergy classification, allergy risk stratification, and prescribing habits

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AUTHOR DISCLOSURES

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