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Impact of a Documented Penicillin Allergy on Pre-Operative Antibiotic Prophylaxis Selection at Lehigh Valley Health Network

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BACKGROUND
- Penicillin allergy is reported by approximately 10% of patients, although it is estimated that 0.02-0.04% of the population actually have a true life-threatening allergy. Instead, the vast majority have experienced low severity or non-allergic adverse effects.
- Patients who report penicillin allergies are often treated with broad-spectrum antibiotics, specifically non-beta-lactam antibiotics, as an alternative to penicillin that can result in increased cost and increased risk for multidrug resistant infections and *C. difficile* colitis.
- This is a concern for pre-operative patients because a reported penicillin allergy is associated with a 50% increase in the risk of developing a surgical site infection.
- Purpose: Review LVHN’s current practice regarding pre-operative prophylaxis in the penicillin-allergic patient.

OBJECTIVES
1. Identify rates of penicillin allergy in the pre-operative patient population and how often these patients receive a beta-lactam antibiotic (cefazolin) as prophylaxis.
2. Identify the types of reactions in the pre-operative penicillin-allergic patients and determine if the reaction severity is associated with the pre-operative antibiotic administered.
3. Identify if certain providers are more likely to avoid beta-lactam pre-operative antibiotics more frequently.

METHODS
33,060 surgical procedures were performed at LVHN from October 1, 2017 to March 31, 2018
1,200 surgical procedures on penicillin-allergic patients with prophylactic antibiotic

RESULTS

Type of Penicillin Reactions
- Unknown Reaction
- Rash
- Hives
- Shortness of Breath
- Loss of Consciousness
- Fever
- Pruritis
- Palpitations
- Convulsions
- Cough/Wheezing
- Rash
- Loss of Consciousness
- Hives
- Pruritis
- Shortness of Breath
- Respiratory Distress
- GI issues
- Dizziness
- Swelling
- Allergic
- Unknown
- Misc

Penicillin Reaction Severity
- Low
- High
- Unknown

Comparison of Pre-Operative Antibiotic Administered based on the Severity of the Penicillin-associated Reactions

- Beta-lactam
  - Documented Penicillin Reaction: 540 (45%)
  - Low Severity Reaction: 227 (53%)
  - High Severity Reaction: 180 (36%)
  - Unknown Severity Reaction: 133 (49%)

- Non-beta-lactam
  - Only
  - Documented Penicillin Reaction: 660 (55%)
  - Low Severity Reaction: 200 (47%)
  - High Severity Reaction: 320 (64%)
  - Unknown Severity Reaction: 140 (51%)

Table 1: Penicillin-allergic patients were separated based on severity of reaction based on usage of a beta-lactam or non-beta-lactam antibiotic prophylaxis.

Aviodance of Beta-lactams by Individual Providers in Penicillin-Allergic Pre-Operative Patients

- High Severity Reaction
- Low Severity Reaction

DISCUSSION
- Reported penicillin allergies for surgical patients at LVHN was lower than the reported average in the general population (6% vs. 10%).
- There were many different types of adverse reactions documented. Forty-two percent of the reactions were high severity, 35% were low severity, and 23% were unknown (Figure 1).
- There is an increase in the usage of pre-operative beta-lactam antibiotics for low severity compared to high severity reactions (53% vs. 36%), although there is an opportunity for improvement as 47% of the patients with low severity reactions are not receiving appropriate pre-operative prophylaxis.
- There is an inconsistency with beta-lactam use among providers. This could be due to lack of education on the advantages of using beta-lactams, lack of knowledge regarding when it is appropriate to challenge patients with a penicillin allergy, and lack of knowledge regarding the availability of outpatient penicillin skin testing.

CONCLUSIONS
- This study reveals an opportunity for improvement in the pre-operative prophylactic antibiotic choice in penicillin-allergic patients. Only 53% of penicillin allergic patients with a low-severity reaction are receiving appropriate antibiotics.
- This study reveals a need for education regarding penicillin allergies, appropriate choice of pre-operative antibiotics, the risks of avoiding beta-lactam antibiotics, and opportunities for outpatient penicillin skin testing.
- We suggest the following to improve the usage of beta-lactams in the pre-operative patient population by:
  - Standardization of guidance for how to proceed in patients with a low severity or non-allergic penicillin allergy
  - Maintain an accurate record regarding the patient’s antibiotic allergy
  - Consider large-scale implementation of pre-operative penicillin skin testing when the reaction type or severity is unknown

REFERENCES