

ABSTRACT

Background

Penicillin (PCN) allergy is commonly reported among Pediatric Emergency Department (PED) patients. Although antibiotics (ABX) can be a cause of life-threatening immune-mediated drug reaction, studies have shown many reported allergies to be inaccurate, with subsequent testing revealing no true allergy. PCN allergy displaces use of appropriate first-line treatments with broad-spectrum and non-beta-lactam ABX. This exposes patients to increased side effects, adverse events, and cost, and can lead to ABX resistance. Identification and testing of patients with inaccurate PCN allergy present an opportunity to address these issues and improve overall patient care.

Objectives

As part of a quality improvement initiative to address PCN allergy, we sought to define the overall burden of PCN allergy within the PED. With this data we hope to design an intervention to address PCN allergy for PED patients, with emphasis on identifying and testing patients with likely inaccurately-listed allergy.

Methods

We performed an EPIC query of current pediatric patients to determine the overall prevalence of PCN allergy; our needs population. We identified patients with PCN allergy who had a PED visit in the past year, our convenience group, as well as those patients with prior Allergy encounters as a surrogate for potential prior PCN allergy evaluation. We further reviewed listed PCN allergy symptoms to estimate those with likely low-risk symptoms that may be amenable to ED-based testing.

Results

2,239 current pediatric patients with listed PCN allergy were identified. Among these, allergy severity was listed as high in 566 (25.3%), medium in 279 (12.5%), and low in 730 (32.6%). Closer evaluation of reported symptoms demonstrated potentially low-risk symptoms in as many as 1,295 patients (57.8%), with only 213 patients (9.5%) listing anaphylaxis, angioedema, or shortness of breath. Of all patients with listed PCN allergy, only 113 (5.0%) had a prior listed Allergy clinic encounter. 213 (9.5%) had a PED visit within 2018.

Conclusions

A large number of pediatric patients within the MUSC system have a listed PCN allergy. Of these, only a small fraction has established care with the MUSC Allergy department, indicating their PCN allergy has likely not been addressed. The PED saw approximately ten percent of these patients in the past year, and as such could serve a valuable role in closing this differential. Of those patients with PCN allergy, over fifty percent had potentially low-risk symptoms that may be amenable to an ED-based screening and testing initiative.

BACKGROUND

- 1 in 10 patients have penicillin allergy noted in their medical record.
- Even among patients with true penicillin allergy, 8 of 10 will grow out of the allergy within 10 years.
- Having an unverified allergy may result in increased risk of treatment failures, health care-associated bacterial infections, and adverse events from other antibiotics that may have a worse side-effect profile.
- Vyles et al. demonstrated that 73% of patients screened for penicillin allergy testing were found to have low-risk symptoms. Of patients ultimately tested, 100% had a negative result and their penicillin allergy removed from their medical chart.

RESULTS

| Total | 2239 |
|------------------|-------------|
| Age (y) | |
| Mean | 10.75 |
| Median | 11 |
| Min | 0.75 |
| Max | 17 |
| Gender (%) | |
| Male | 1158 (51.7) |
| Female | 1081 (48.3) |
| Race* (%) | |
| Caucasian | 1532 (68.4) |
| African American | 456 (20.4) |
| Other | 205 (9.2) |
| Unknown | 35 (1.6) |
| Asian | 14 (0.6) |
| American Indian | 1 (0.04) |
| Ethnicity (%) | |
| Non-Hispanic | 1918 (85.7) |
| Hispanic | 150 (6.7) |
| Refused/Unknown | 171 (7.6) |

*Some patients with multiple listings for 'Race.'

Table 1. Patient Demographics.

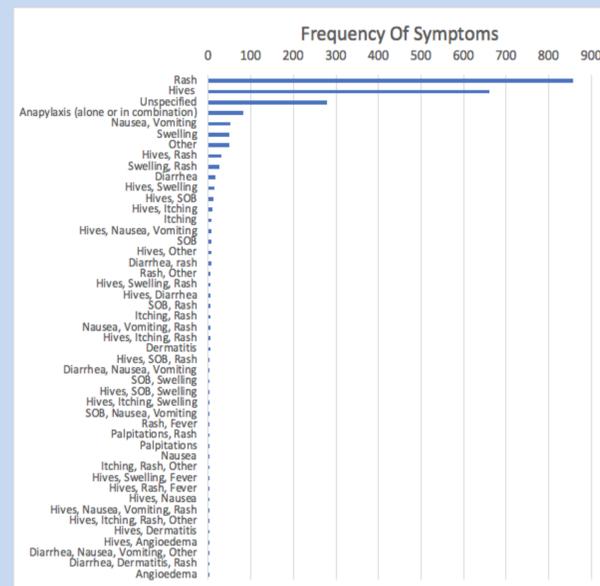


Figure 1. Penicillin Allergic Reaction Symptoms.

When entering an allergy into EPIC, a symptom or reaction is required. Summarized here are the symptoms listed as representing a penicillin allergy in our pediatric patients.

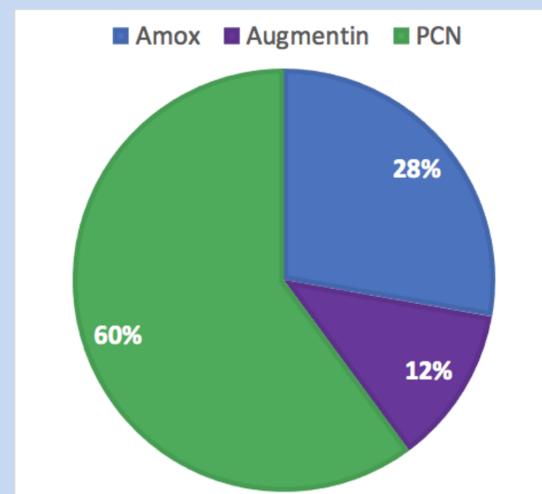


Figure 2. Drug Class Breakdown for Listed Penicillin Allergy. Penicillin allergy was defined as listed allergy to penicillin (PCN), amoxicillin (Amox), or amoxicillin-clavulanic acid (Augmentin).

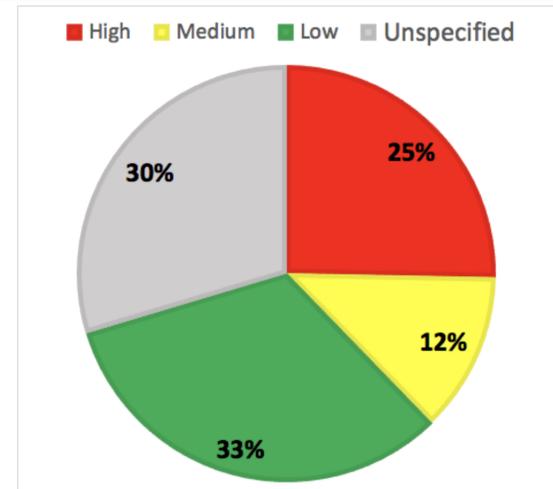


Figure 3. EPIC Allergy Severity Score for Penicillin Allergy. When entering an allergy into EPIC, a severity score is required. This score is subjective and entered by the provider performing review of patient allergies. Summarized here are the severity scores associated with penicillin allergy in our pediatric patients.

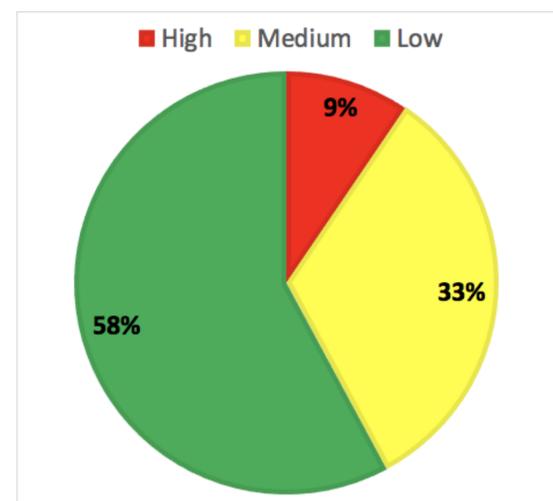


Figure 4. Allergy Severity Based upon Provider Review.

Listed penicillin allergy symptoms as shown in Figure 1 were reviewed and categorized as most likely representing low, medium, or high risk of true IgE mediated allergic reaction.

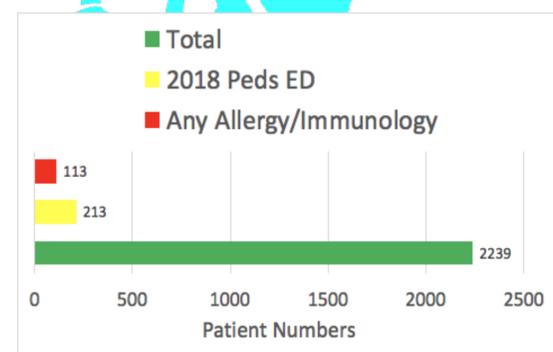


Figure 5. Penicillin Allergy Patient ED and Allergy Clinic Care. Current pediatric patients with PCN allergy were assessed for presence or absence of PED visits within calendar year 2018 as well as any prior encounter within our Allergy/Immunology Department.

DISCUSSION

- There are a significant number of pediatric patients at MUSC who have a listed PCN allergy.
- The majority (58%) of PCN allergic patients list symptoms that are likely low risk for a true IgE-mediated allergic reaction.
- Only 5% of PCN allergic patients have established care with our Allergy department suggesting the vast majority of these patients have likely not had their PCN allergy addressed.
- Approximately 10% of PCN allergic patients had an encounter in the PED in 2018.
- Prior work by Vyles et al has demonstrated the ability to safely screen, identify, and orally challenge pediatric patients with low-risk PCN allergy in the emergency department setting.

CONCLUSIONS

PCN allergy is commonly reported but often inaccurate, with significant potential morbidity due to resultant sub-optimal ABX usage. We identified a significant population of pediatric patients at MUSC who have a listed PCN allergy which has likely not been addressed. A sizeable fraction of these patients visit our PED annually. A quality improvement initiative aimed at addressing PCN allergy within the PED could substantially improve patient care. Similar initiatives are already under way at other institutions and can likely serve as a model in developing our own PED-based screening and testing protocol.

FUTURE DIRECTIONS

- Develop a provider-targeted questionnaire evaluating common practices surrounding PCN allergies.
- Extrapolate data from EPIC regarding our own practices in the PED surrounding PCN allergies and referrals made to pediatric Allergy and Immunology.
- Investigate the ABX prescribing practices for PCN allergic patients within the MUSC system.
- Develop a PCN allergy questionnaire to screen and identify PED patients with low-risk PCN allergy.
- Evaluate the feasibility of an ED-based oral PCN challenge for low-risk PCN allergy patients.

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CONTACT INFORMATION

Contact Zack Dunn for further information. Contact by email at clyde.dunn@lmunet.edu or by phone at 865-567-9573.