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Impact of Embedded Cross-Reactivity Alert for Penicillin-Allergic Patients

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Introduction

- Penicillin (PCN) allergies are commonly reported, but only 0.02-0.04% of the population have a true Immunoglobulin E-mediated (IgE), life-threatening allergy
- A true IgE-mediated reaction is characterized by hives, angioedema, anaphylaxis, wheezing, and shortness of breath¹
- Four percent of patients with a true penicillin allergy may have a cross-reactivity to cephalosporin antibiotics
- Epic (our electronic medical record) includes an embedded cross-reactivity alert that fires when a provider prescribes a cephalosporin antibiotic to a patient with a PCN allergy
- This alert does not take into account reaction type nor expected side chain cross-reactivity and is often inappropriate
- Broad spectrum antibiotics are given as an alternative but can increase the likelihood of antibiotic resistance¹ and adverse effects

Methods

- Retrospective chart review using data from Epic
- Inclusion Criteria
 - Patients with allergies to PCN and its derivatives
 - November 1, 2020 – April 30, 2021
 - All sites, inpatient and outpatient
 - Patients were ordered a cephalosporin and received a cross-reactivity alert
- Descriptive statistics used to analyze the data

Results

- The alert fired 14,239 times; 7,371 (52%) times the alert was overridden, and 6,806 (48%) times the order was removed
- The alert fired appropriately 20.8% of the time based on expected side chain cross-reactivity and 39.7% for patients with severe allergic reactions that should preclude challenge
- Overall, 8% of the alerts were appropriate based on both expected side chain reactivity and reaction type

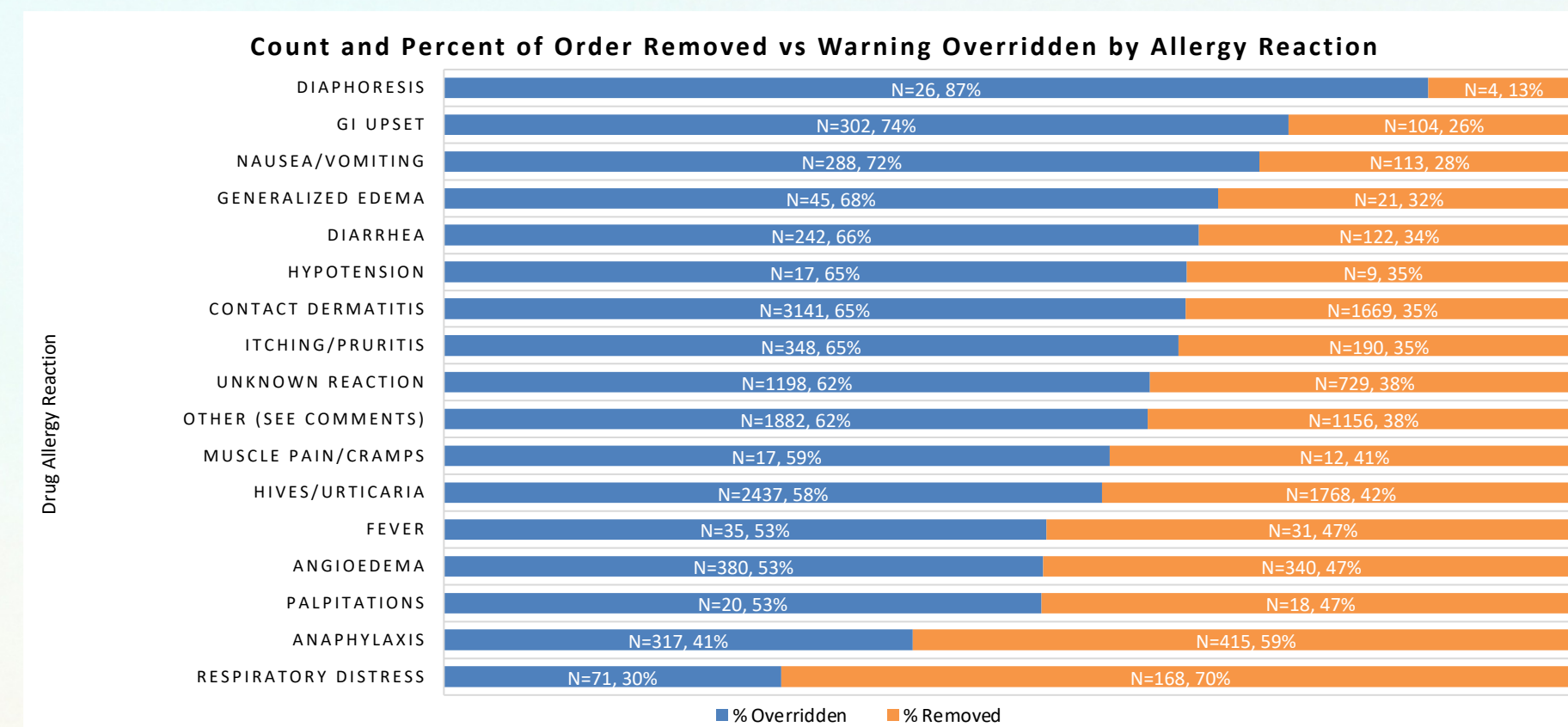


Figure 1. The percent of the time the warning was overridden vs when the order was removed by reaction type. Reactions with N<9 were excluded.

Provider Specialty	Count Overridden	% Overridden	Count Removed	% Removed
Cardiology	N=45	15%	N=263	85%
Surgical Specialties	N=2166	39%	N=3365	61%
OBGyn	N=441	43%	N=590	57%
Pulmonary	N=56	43%	N=73	57%
Emergency Medicine	N=1947	54%	N=1626	46%
All Other Specialties	N=263	58%	N=189	42%
Internal Medicine	N=1870	59%	N=1285	41%
Family Medicine	N=770	60%	N=518	40%
Pediatrics	N=227	84%	N=44	16%
Infectious Disease	N=469	85%	N=82	15%

Table 1. Count and percent of order removed vs warning overridden based on provider specialty. Some specialties were grouped together based on similarity (pediatric subspecialties, surgical specialties).

Conclusions

- The alert fired inappropriately 92% of the time
- Providers changed the antibiotic 48% of the time, despite the alert being appropriate only 8% of the time
- Providers were more likely to override the alert for intolerances or mild reactions (64%) than for severe reactions (55%)
- Certain specialties (infectious disease and pediatrics) are more comfortable with antibiotic allergy assessment and are more likely to override the alerts
- Providers with less experience in antibiotic allergy assessment, such as cardiology and surgical specialties, are more likely to remove the order and change the antibiotic

Future Directions

Adjust the Epic alert to be more specific and targeted based on reaction type and side chain moiety

Provide training to providers on documentation of allergies and intolerances

Configure Epic to more effectively and appropriately document allergies and intolerances

1. Joint Task Force on Practice Parameters representing the American Academy of Allergy, Asthma and Immunology; American College of Allergy, Asthma and Immunology; Joint Council of Allergy, Asthma and Immunology. Drug allergy: an updated practice parameter. Ann Allergy Asthma Immunol. 2010 Oct;105(4):259-273.

2. Macy, E., McCormick, T. A., Adams, J. L., Crawford, W. W., Nguyen, M. T., Hoang, L., Eng, V., Davis, A. C., & McGlynn, E. A. (2021). Association Between Removal of a Warning Against Cephalosporin Use in Patients With Penicillin Allergy and Antibiotic Prescribing. JAMA network open, 4(4), e218367. <https://doi.org/10.1001/jamanetworkopen.2021.8367>