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PII: S1081-1206(21)01115-7
DOI: <https://doi.org/10.1016/j.anai.2021.09.018>
Reference: ANAI 3720



To appear in: *Annals of Allergy, Asthma Immunology*

Received date: 15 July 2021
Revised date: 14 September 2021
Accepted date: 21 September 2021

Please cite this article as: Jessica K. Graham MD , Cheryl Yang MD , David Vyles DO, MS , Jan Leonard MSPH , Rakesh D. Mistry MD, MS , Barriers to Penicillin Allergy Delabeling in a Pediatric Emergency Department, *Annals of Allergy, Asthma Immunology* (2021), doi: <https://doi.org/10.1016/j.anai.2021.09.018>

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Barriers to Penicillin Allergy Delabeling in a Pediatric Emergency Department

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Conflict of Interest Statement: Jessica Graham, Cheryl Yang, David Vyles, Jan Leonard, and Rakesh Mistry all attest that they have nothing to disclose.

Funding Source: This study was supported by the Clinical, Operational Effectiveness, and Patient Safety (COEPS) Small Grant Program at the University of Colorado.

Clinical Trial Registration: Not applicable

Keywords :

Penicillin

Allergy

Stewardship

Pediatric

Emergency

Delabel

Abbreviations:

ED: Emergency Department

IgE: Immunoglobulin E

PCN: penicillin

Word count: 962

Figures: None

Table:

1. Risk Associated with Parent-Reported Allergy Symptoms

It is estimated that more than 90% of children presenting to the emergency department (ED) with a parent-reported penicillin (PCN) allergy do not have true allergy;¹ however, non-immunoglobulin E (IgE) mediated side effects often cannot be differentiated from true allergic reaction.^{1,2} “Delabeling” methods have been proposed to address misclassified PCN allergies and promote antimicrobial stewardship, optimize outcomes, and reduce costs.³ An oral PCN challenge with a single or graded two-dose is the gold standard and most rapid method for delabeling low-risk patients.⁴

Recently, Vyles et al developed a novel questionnaire to stratify children with reported PCN allergy into low-risk and high-risk for severe IgE- or T-cell allergies.⁵ A further study demonstrated the safety of single dose oral challenge and delabeling low-risk children in a pediatric ED,⁶ an approach that can be readily applied to children without critical illness or conditions consistent with allergy. There are advantages to performing delabeling in the ED, where medication allergies are routinely reviewed, patients can be safely observed, and antibiotic treatment plans can immediately be impacted. Provider acceptance is essential for implementation of ED-based delabeling. To identify pediatric ED-specific barriers to delabeling, we assessed pediatric ED providers' PCN allergy knowledge and treatment approach as well as their willingness to oral challenge and delabel in the ED.

We conducted a cross-sectional survey of ED providers from a single pediatric health system consisting of an academic, tertiary-care ED, three community-based EDs, and three urgent cares, which receives approximately 165,000 annual visits. Subjects included pediatric emergency medicine attendings and fellows, emergency pediatricians, and advanced practice providers. The survey was pilot tested, iteratively revised, and organized into three domains of PCN allergy: general knowledge, current management, and provider comfort with delabeling. The 22-item survey was distributed via our institutional Research Electronic Data Capture.

There were 93 responses from 168 eligible providers (response rate= 55%). Most respondents (73%) reported they prescribe non-PCN antibiotics (e.g. cephalosporins) when treating PCN allergic children, though some (24%) routinely prescribe PCNs if a patient is low-risk. Most providers (88%) stated they were comfortable with oral challenges for low-risk patients, but varied in preferences for observation time: 13% would observe for <30 minutes, 65% for 31-60 min, 21% for 61-90 minutes. Reasons for

discomfort among the remaining providers were: fear of allergic reaction (4/7), time constraints (4/7), ability to use alternative antibiotics (3/7), and uncertainty regarding observation duration (2/7). Most providers (90%) were comfortable discharging patients with a PCN antibiotic prescription if they pass an oral challenge in the ED; those not comfortable cited fear of allergic reaction after discharge as their reason. Most providers (69%) were comfortable removing a PCN allergy label from the medical record after passing an oral challenge. There were 25 (27%) that reported they were uncomfortable removing PCN allergy labels: 13 felt removal was the primary care provider's responsibility, 11 were concerned about future reactions, and four felt it was "too time consuming." Two providers stated they felt passing one oral challenge was not sufficient to remove a PCN allergy label, and one reported legal concerns over taking this action.

Many respondents incorrectly answered knowledge questions regarding PCN allergies. Most (51%) incorrectly believed PCN allergies will persist for life; 41% incorrectly responded that true PCN and cephalosporin allergy cross-reactivity was 10%. Over one-in-four respondents (28%) incorrectly identified the prevalence of true IgE-mediated PCN allergy, and 27% incorrectly answered skin testing as the sole method to deem a patient low-risk.

Our findings have implications for children with reported PCN allergies. We determined that most pediatric ED providers are willing to oral challenge/delabel low-risk children, but are not doing so in clinical practice. We also identified provider-specific barriers and concerns regarding implementation of PCN allergy delabeling, as well as important knowledge gaps regarding PCN allergy among ED providers. Though efforts for ED-based PCN allergy delabeling will need to focus on these practice and knowledge barriers, ED-provider led PCN allergy delabeling appears feasible and potentially acceptable.

Implementation of delabeling procedures can be facilitated using several methods. Risk stratifying questionnaires,¹ electronic medical record-based clinical decision support tools, and delabeling pathways may allay providers' fears and facilitate identification of candidates for oral challenge/delabeling in the ED. Additionally, parent perusal of decision aids/handouts detailing risks and benefits of delabeling can expedite shared decision making.

Perceived time constraints contributed to discomfort with oral challenging/delabeling. The procedure of delabeling itself may be longer than necessary, as observation periods of 1-2 hours are common after oral challenges.³ However, observing for 30 minutes has been proven safe⁷ and has potential to minimize impact on ED flow. Limiting oral challenges to those already committed to a longer ED stay or those awaiting hospital admission may also be beneficial.

Another barrier was the unclear role of the ED in formal removal of PCN allergy documentation. Collaboration between primary care, ED providers, allergists, and pharmacists is necessary for implementing delabeling approaches.⁸ Creation of an institutional delabeling guideline by these professionals is a potentially effective method to establish consensus. Further, using a delabeling alert and/or note template could facilitate communication among care providers.

Lastly, pediatric ED providers exhibited gaps in PCN allergy knowledge. Increasing provider knowledge of PCN allergy using multiple formats, including didactics and web-based modules, can improve delabeling success and prescribing practices for children with PCN allergy. Existing but underutilized online education tools include the American Academy of Pediatrics toolbox,⁹ practice parameters,⁴ and

PCN allergy literature.¹⁰ At point of care, visual decision aids are a method to reinforce provider knowledge and deliver accurate PCN allergy facts to patients and families.

Our study findings are important to promote successful execution of delabeling efforts in pediatric EDs. Engagement of providers and additional stakeholders to create collaborative approaches to delabeling and antibiotic prescribing are feasible; our data can inform and guide approaches to implement effective PCN allergy delabeling.

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Table: Risk Associated with Parent-Reported Allergy Symptoms

Low-Risk Symptoms	High-Risk Symptoms
Headache	Rash within 6 hours of first dose
Isolated itching (with no rash)	Itching with rash within 6 hours of first dose
Nausea and/or vomiting (single episode)	Vomiting (more than once) within 6 hours of first dose
Diarrhea	Abdominal pain within 6 hours of first dose
Cough	Difficulty breathing
Rhinorrhea	Lip swelling
Family history of penicillin allergy	Throat swelling
Dizziness	Facial swelling
	Wheezing
	Skin peeling
	Mouth blisters
	Seizures
	Syncope
	Hypotension