

Breaking the Mold: Safely Delabeling Penicillin Allergies in Hospitalized Children

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Children are often reported to have antibiotics allergies, with up to 35 million people, or 10% of the US population, labeled as allergic to an antibiotic.¹ In fact, 75% of children with reported antibiotic allergies are identified before the age of 3 years.² Recent studies have revealed that the majority of symptoms reported as an allergy by parents are non-immunoglobulin E-mediated adverse reactions or symptoms of a viral illness, such as rash, abdominal pain, vomiting, diarrhea, or other benign symptoms.^{3,4} Additionally, >90% of patients with a reported penicillin allergy have negative skin testing results.^{1,5,6} Several studies in adults and children reveal risk-stratified management, wherein those at low risk for a true allergy skip skin testing in favor of direct oral challenge, is safe and effective.⁷ Delabeling penicillin allergies in children without true allergies is critical because penicillin allergy labels are associated with worse clinical outcomes, increased adverse drug events, more multidrug-resistant infections, and increased health care costs.⁷⁻⁹ Although risk-stratified management of drug allergies is now standard of care,^{7,8} implementation of this best practice in the hospital setting is lacking.

In this issue of *Hospital Pediatrics*, researchers report a single-center, hospital-based quality improvement (QI) project aimed at performing risk stratification of penicillin allergies, with subsequent delabeling of children who do not have a true allergy. They used a multidisciplinary clinical care pathway, with several important interventions, including provider incentives, education initiatives, electronic health record (EHR) support, and oversight team encouragement of allergy evaluation at the provider level. The QI project achieved their preset goal, and the proportion of penicillin-allergy delabeling increased almost fivefold.

In addition to the overall increased proportion of penicillin-allergy delabeling, the authors present several interesting findings. First, of those deemed low risk for true allergy, >50% received a penicillin antibiotic before discharge. Although this is likely due to the prioritization of delabeling efforts by providers in patients with immediate antibiotic selection needs, the high rate of penicillin prescribing in those admitted with a penicillin allergy is striking and emphasizes the short-term benefits of allergy delabeling programs. Second, 38% of delabeling occurred without an oral challenge. Many children are unnecessarily deemed “allergic” due to

www.hospitalpediatrics.org

DOI: <https://doi.org/10.1542/hpeds.2020-005280>

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HOSPITAL PEDIATRICS (ISSN Numbers: Print, 2154-1663; Online, 2154-1671).

FINANCIAL DISCLOSURE: The authors have indicated they have no financial relationships relevant to this article to disclose.

FUNDING: Dr Antoon received support from the National Heart, Lung, and Blood Institute of the National Institutes of Health (grant K12HL1379430) and Dr Stone received support from the Agency for Healthcare Research and Quality (grant 1K12HS026395). Funded by the National Institutes of Health (NIH).

POTENTIAL CONFLICT OF INTEREST: Dr Stone is the primary investigator on 2 active clinical trials of risk-stratified penicillin-allergy management in adults (NCT03702270 and NCT03702283); Dr Antoon is the primary investigator on 1 active clinical trial of risk-stratified penicillin-allergy management in children (NCT04441021); and Ms Grisso has indicated they have no potential conflicts of interest to disclose.

Opinions expressed in these commentaries are those of the authors and not necessarily those of the American Academy of Pediatrics or its Committees.

COMPANION PAPER: A companion to this article can be found online at www.hospeds.org/cgi/doi/10.1542/hpeds.2020-001636



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family history of penicillin allergy or noted to not truly be allergic by tolerating a penicillin while carrying the allergy label. These children can be safely delabeled by history alone, as evidenced by this project. Third, only 1 of 82 children had their allergy relabeled after 1 month. One of the main difficulties of removing an allergy label is keeping it removed because the allergy label can survive outside of the delabeled environment (eg, primary care office, pharmacy, specialty offices, other family member perceptions, etc). In data from adult delabeling programs, much higher relabeling rates have been noted, with up to 40% of delabeled patients reporting an allergy.¹⁰ The relatively small proportion of relabeling in this study is remarkable. There are several potential reasons for this disparity. It is unclear how many of the 82 patients had medical homes or pharmacies accessible for follow-up in the electronic medical record, and relabeling may not have been fully captured. Additionally, it is feasible that 1 month is an insufficient period of time for labels to re-emerge. However, it is also possible that either the inpatient environment or low-risk nature of reported reactions may affect how families understand their child's allergy risk after discharge. Further study is needed to determine the barriers and facilitators of risk-stratified drug allergy evaluations among parents and adolescents to better understand patient perceptions of the delabeling process.

The authors should be commended for their work, in which they highlight that risk stratification of penicillin allergies can be successfully performed in the pediatric hospital setting. The presented work also reveals how implementing a simple evaluation can be exceptionally challenging. In hospital-based studies, researchers have found ~75% of children are low risk and 80% are willing to undergo an oral challenge.^{11,12} In the current study, 619 of 701 (88.3%) patients admitted to the pediatric hospital medicine team with a penicillin allergy were not delabeled, indicating a large majority of children who could be safely delabeled were not. So how can we, as hospital providers, improve on this important work?

First, the authors criteria for low-risk stratification is conservative, which is often necessary to obtain buy-in from the frontline stakeholders when initially implementing an allergy evaluation program. However, future iterations need not be so restrictive. For example, antihistamines do not prevent anaphylaxis and are not necessarily a contraindication to an oral challenge,⁸ and an isolated urticarial reaction after 6 hours of receiving a medication can be considered a low-risk symptom.^{12,13} Second, broadening the hospital environment beyond the pediatric floors will increase access to low-risk patients. The ICU,¹³ preoperative and perioperative settings,^{14,15} and emergency department¹² are areas of high benefit in which patients can be safely evaluated. Third, the authors note that a “nudge” from their oversight team was an effective intervention. Finding team members who are able to sustainably prioritize penicillin allergy evaluations is key to promoting a culture of safe allergy evaluation. For example, incorporating pharmacists into the delabeling workflow can be extremely valuable.^{12,13} Fourth, one effective intervention in this study was EHR identification of the allergy, ordering of oral challenge, and documentation support. Validated pediatric-based allergy assessments incorporate the allergy reaction alone or, for certain reactions such as urticaria, timing of symptoms relative to medication exposure.^{11,12} Therefore, existing allergy information in the EHR can be leveraged to assist in the identification of children at low risk for a true allergy. Future endeavors, by means of EHR-led risk stratification and clinical decision support tools targeted at providers, will likely aid in scaling up efforts beyond a resident- or service-based approach. Finally, taking these efforts back to the outpatient setting in the form of formal primary care and pharmacy notifications of allergy status change as well as continued engagement and education of parents after discharge will minimize the rate of relabeling, which has traditionally been difficult to avoid.^{10,16} Implementing a risk-stratified approach to penicillin allergies is important to both the patient and society as a whole. Efforts such

as the presented QI project can have immediate benefits to the patient and change antibiotic management before discharge. In the study published in this issue of *Hospital Pediatrics*, the researchers take us one step closer to overcoming the challenge of inaccurate penicillin allergies in the hospital.

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Hospital Pediatrics 2021;11:e70

DOI: 10.1542/hpeds.2020-005280 originally published online April 13, 2021;

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DOI: 10.1542/hpeds.2020-005280 originally published online April 13, 2021;

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