

A penicillin skin testing initiative in an outpatient allergy office

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Clinical Implications

- The feasibility of offering a penicillin allergy evaluation to allergy outpatients regardless of chief complaint is demonstrated. The safety of a 30-minute observation period after penicillin testing is supported. This study illustrates an important antimicrobial stewardship role for allergists.

TO THE EDITOR:

Penicillin allergy is the most commonly reported drug allergy, with a prevalence of 10% in the United States.¹ The penicillin allergy label has significant individual and public health implications, including increased cost of care, adverse reactions associated with second-line antibiotics, and risk of antimicrobial resistance.² In addition, 90% of patients reporting an allergy will tolerate a penicillin-based antibiotic.¹ Despite the risks of a penicillin allergy label, and the benefits of delabeling, less than 0.1% of 25 million penicillin-allergic patients undergo penicillin skin testing (PST) annually.³ There have been excellent publications regarding inpatient initiatives for penicillin allergy delabeling,⁴ but less data exist for the outpatient setting. We sought to characterize the clinical characteristics of pediatric and adult patients with penicillin allergy presenting to an outpatient allergy office and to offer PST and/or challenge to all patients if clinically appropriate.

Data were collected by 2 allergy/immunology physicians at an outpatient practice from April 2017 through June 2017. Regardless of presenting chief complaint, a penicillin allergy history was obtained and skin testing and/or challenge were offered to patients on the basis of history. Prick and intradermal testing were performed using the major determinant of penicillin, penicilloyl polylysine, (Pre-Pen, ALK, Round Rock, Texas) and penicillin G 10,000 U/mL, histamine (6 mg/mL for prick and 0.02 mg/mL for intradermal), and a saline negative control. Patients with negative PST result were given a 400 mg oral amoxicillin challenge and monitored for 30 minutes. PST and challenge were timed. Reasons for patients not undergoing PST were detailed. Patients were explicitly asked to call the office with any symptoms suggestive of a reaction occurring after the 30-minute monitoring period.

There were a total of 143 half-day sessions (average 6 half-day sessions per provider per week). Nine hundred eighty-seven patients were screened. One hundred fifty-five (15.7%) patients (average age, 32.4 ± 23.6 years) reported penicillin allergy. The most common chief complaints were penicillin or drug allergy in 24.5% of patients, asthma (22.6%), chronic rhinitis (20.6%), food allergy (16.8%), and urticaria (11%) (Table 1).

Forty-six patients (49%) reported that more than 10 years had elapsed since their reactions, followed by more than 5 to 10 years in 19 patients (12.3%), more than 1 to 5 years in 33 (21.3%)

patients, and 1 year or less in 16 (10.3%) patients. Eleven patients did not recall when their reaction occurred. Reaction histories included rash in 82 (52.9%) patients, hives in 45 (29%) patients, dyspnea in 3 (1.9%), angioedema in 3 (1.9%), anaphylaxis in 2 (1.3%), and itching in 2 (1.3%) patients. Four (2.3%) patients reported a history consistent with an immunologic, non-IgE-mediated reaction. Nine (5.8%) patients did not recall their reaction histories. Six (3.9%) patients were thought to have drug intolerance, and 2 (1.3%) reported a family, but not personal, history of penicillin allergy. Most patients could not recall specific type of penicillin and/or route of administration involved in their reactions, so these data were not tracked.

A total of 66 of 155 (42.6%) patients underwent PST. A total of 58 of 66 (87.9%) were PST negative; all 58 underwent challenge. In the PST-positive patients, all prick test results were negative. Three patients had a positive intradermal test result to penicilloyl polylysine, 2 to penicillin G, and 2 to both. The average penicilloyl polylysine intradermal wheal was 4.8 ± 1.7 mm, and the average PCN G wheal was 4.9 ± 2.7 mm. The average time for PST and challenge was 71.1 ± 12 minutes. A same-day challenge without PST was performed in 2 (1.3%) patients. Six patients (3.9%) were delabeled on the basis of history. One patient experienced repetitive vomiting and diarrhea starting 2 hours after PST and challenge. No additional patients reported immediate or delayed reactions. In summary, 66 of 155 (42.6%) patients reporting penicillin “allergy” were delabeled.

Reasons patients did not undergo PST are listed in Figure 1. Almost 26% of patients did not undergo PST because of interfering medications. Other reasons for not undergoing PST included future scheduling of PST or direct challenge (16%), time constraint (16%), medical comorbidities (13.6%), and anxiety or needle fear (7.4%).

Two allergists in the same practice not participating in the initiative saw 1124 patients over the same time period, and completed PST in a total of 13 patients, compared with 66 patients in the initiative ($P < .001$).

Multiple guidelines and position statements exist advocating the routine use of PST.⁵ Our approach of offering PST to patients regardless of presenting chief complaint is an effective strategy to delabel penicillin allergy in the outpatient allergy office. The same-day testing lessens attrition for patients who may not schedule a future appointment, as has been demonstrated in previous studies.⁶ This approach does not rely on specific referrals for penicillin/drug allergy, as it has been shown that nonallergist provider knowledge surrounding PST is lacking.^{6,7} We acknowledge that specific referral was a common reason for PST in our study; however, this reflects our ongoing effort to raise awareness among the referring medical community. Our study also illustrates that time constraints or testing anxiety was not a major reason patients did not undergo skin testing.

A unique aspect of our study is the 30-minute observation period after the oral amoxicillin challenge. Although shorter than the recommended guidelines of 1 hour,^{1,8} there were no patient-reported reactions that fell within the 30- to 60-minute time frame in the 58 patients undergoing PST and challenge. A

TABLE I. Patients' clinical characteristics

Total no. of patients screened	987
Total no. of patients with PCN allergy, n (%)	155 (15.7)
Female patients, n (%)	96 (61.9)
Age (y), mean $\pm$ SD	32.4 $\pm$ 23.6
New patient visits, n (%)	78 (50.3)
Follow-up visits	77 (49.7)
Chief complaint, n (%)	
Penicillin or multiple drug allergy	38 (24.5)
Asthma	35 (22.6)
Allergic rhinoconjunctivitis/NAR	32 (20.6)
Food Allergy	21 (16.8)
Urticaria	17 (11.0)
Other	19 (12.3)

NAR, Nonallergic rhinitis.

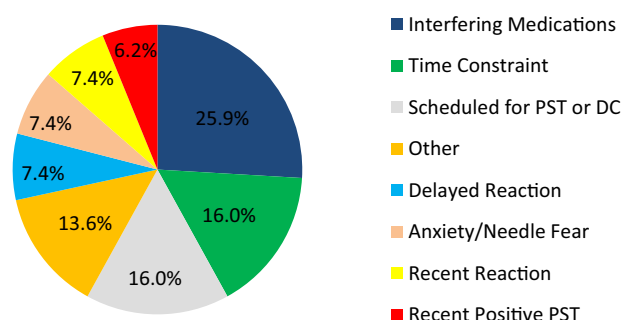


FIGURE 1. Reasons PST not performed. DC, Direct challenge. Note: A recent reaction was defined as less than 6 months before the evaluation.

previous study of 818 children illustrated that only 17 (2%) children experienced an immediate (<1 hour) reaction to penicillin, and 5 of these occurred within 20 minutes.⁹ Other outpatient studies have not detailed the exact timing of reactions following negative PST result.^{8,10} Our study illustrates the safety of the 30-minute observation period in this cohort of patients. This is an area that deserves further study, because a shorter time commitment may encourage more patients to undergo testing.

Limitations of our study include that the workflow of our office may not be generalizable to other practices. Furthermore, there is emerging data regarding the safety of direct oral challenges without PST,^{2,10} and our approach may be tailored in the future to include increased numbers of direct challenges. Other PST initiatives have focused on groups with specific need for

penicillin-based antibiotics^{2,4} and one could argue that healthy outpatients are not “high-yield” targets. However, it is impossible to predict which patients may ultimately be categorized as high risk with changes in future health.

Our study illustrates an effective and safe penicillin allergy delabeling strategy for outpatient allergists, and a shorter observation period for amoxicillin challenge. If even 50% of the 4500 practicing allergists adopted our approach, the number of patients undergoing PST would increase by 10-fold in the outpatient allergy setting alone, thus favorably impacting antibiotic stewardship.

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