De-labelling self-reported penicillin allergy within the Emergency Department (ED) through the use of skin tests and oral drug provocation testing.

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Introduction

Self reported penicillin allergy is common among patients attending ED, but is a poor predictor of true penicillin allergy.

A label of penicillin allergy is associated with spread of antibiotic resistance, increased treatment costs and poorer clinical outcomes.

This study hypothesized that using a combination of skin testing and oral challenge that the majority of patients with self-labelled penicillin allergy could be safely 'de-labelled'.

Methods

A prospective study of penicillin allergy testing at an urban, academic ED using standardised criteria was performed between 2011-2016.

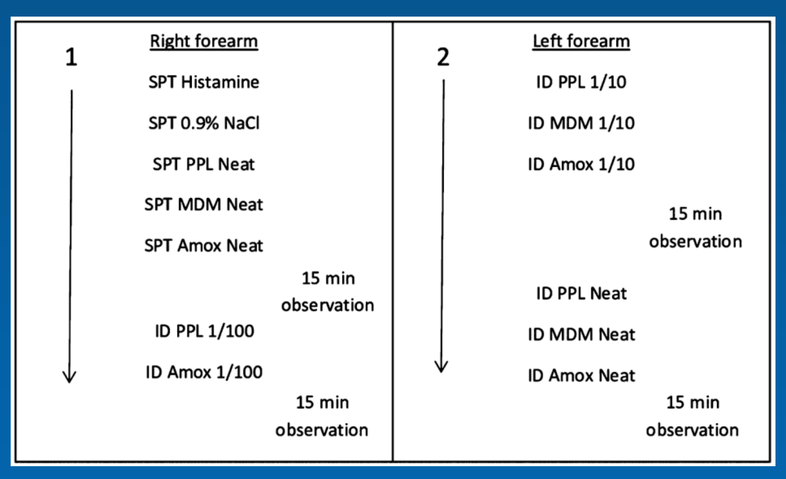
The study was Ethics approved (HREC09/SVH/149) and subjects gave informed consent.

Included: ED patients aged 18-85yrs.
Excluded: clear history of severe anaphylaxis, pregnancy, inability to consent, unstable illness, medications (antihistamines, beta blockers, corticosteroids & cromolyns).

The majority of subjects were recalled for testing in batches. Diater kits (AMSL) provided the reagents for skin-prick testing (SPT) and intradermal (ID) testing.

Reagents: major and minor determinants of penicillin ("PPL" & "MDM"), and amoxicillin 20mg/ml.

The following protocol was used.



If all skin tests were negative, drug provocation testing (DPT) was initiated via a graded amoxicillin challenge: 2.5 to 250mg orally over 9 days.
The first dose was given under supervision.

DPT: drug provocation testing
ID: intradermal tests; SPT: skin prick test

Results

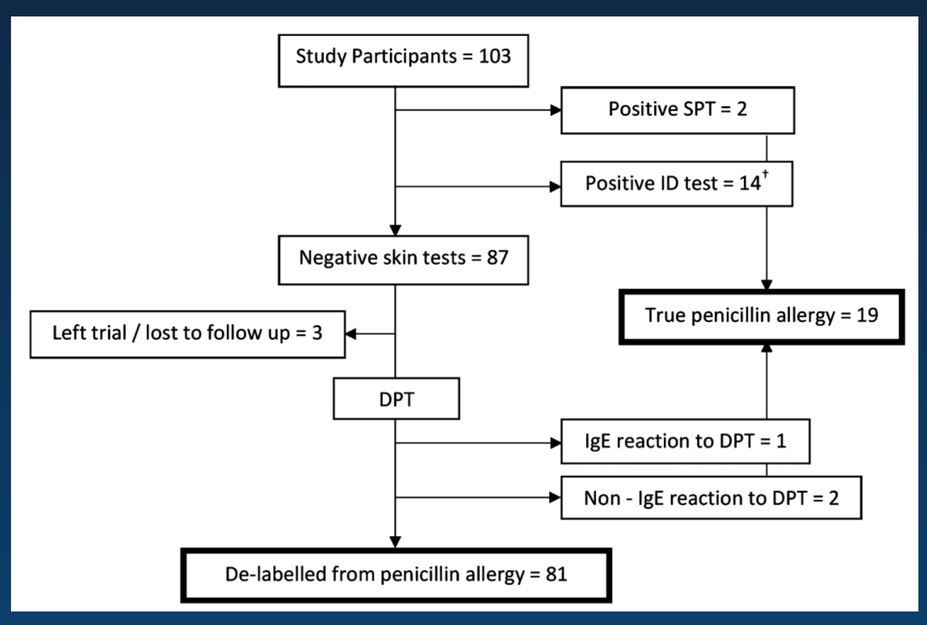


TABLE 1. *Demographic, triage and discharge characteristics*

Characteristic		
All enrolled subjects	N = 103	
Women, *n* (%)	56 (54)	
Median (interquartile range) age (years)	43 (30–55); min = 19, max = 69	
Subjects with outcome data	N = 100	
Women, *n* (%)	54 (54)	
Median (interquartile range) age (years)	42.5 (30–54.5); min = 19, max = 69	
Antibiotics prescribed	N = 100	
Yes	30	
No	70	
Discharge destination	N = 100	
Home	65	
Ward	10	
Emergency Medical Unit†	25	
Australasian Triage Scale	Study patients	ED profile 2011–2016[21]
	N = 100	N = 253 982 N = 100%
Category 1 – Immediate	0	6183 2.4
Category 2 – Emergency	16	30 956 12.2
Category 3 – Urgent	41	118 754 46.8
Category 4 – Semi-urgent	25	86 363 34.0
Category 5 – Non-urgent	18	11 726 4.6

†For emergency medicine admissions <24 h duration.

TABLE 2. *Prevalence of true penicillin allergy and associations between age and sex (logistic regression model)*

Grouping	*n*/N with true allergy	True prevalence (95% confidence interval)	Odds ratio (95% confidence interval)	*P*-value
All subjects	19/100 (19%)	19 (11.8–28.1)%		
Sex				
Male	4/46 (8.7%)	8.7 (0.0–20.8)%	1.0 (reference)	0.02
Female	15/54 (27.8%)	27.8 (16.5–41.6)%	4.0 (1.23–13.2)	
Age group (years)				
≤30	7/28 (25.0%)	25.0 (10.7–44.9)%	1.0 (reference)	0.44
31–43	2/24 (8.3%)	4.2 (0.1–26.9)%	0.27 (0.05–1.47)	
44–55	5/24 (20.8%)	20.8 (7.1–42.2)%	0.79 (0.21–2.91)	
≥56	5/24 (20.8%)	20.8 (7.1–42.2)%	0.79 (0.21–2.91)	

TABLE 3. *Reported reactions during drug provocation testing*

Reported reactions during drug provocation testing	De-labelled	N = 6
Urticarial rash and tingling lips†	No	1
Delayed rash	No	2
Pruritus	Yes	1
Diarrhoea	Yes	1
Nausea	Yes	1

†Likely IgE mediated.

Discussion

This study demonstrated a significant reduction in apparent prevalence of penicillin allergy, with 81% of the tested subjects able to safely tolerate an oral challenge of 250mg of amoxicillin.

A total of 17 patients had evidence of IgE hypersensitivity and 2 developed a delayed rash probably due to non-IgE mechanisms. Of the 84 subjects who had negative skin testing only 3 reacted during the amoxicillin challenge.

Women were more likely to have a true penicillin allergy (OR 4.0), previously shown in other studies.

The whole testing process took 2 hrs in ED and 9 days of self medication - it seems likely that the both skin-testing and drug provocation procedures could be shortened whilst maintaining safety.

The process of de-labelling is important to facilitate better patient outcomes, reduced costs to the health care system and reduced antibiotic resistance, and should be more widely accessible. ED testing successfully provides a way to achieve this.

With a suitably expedited testing protocol, patients reporting penicillin allergy and requiring antibiotic therapy might be treated with penicillin during their index presentation to the ED.

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