1786. Safety, Efficacy, and Clinical Impact of Penicillin Allergy Skin Testing in Immunocompromised Cancer Patients at a Comprehensive Cancer Center

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Background. Patients reporting penicillin (PCN) allergies often receive alternative antibiotic therapy associated with significant health and economic disadvantages. The use of penicillin allergy skin testing (PST) to rule out PCN allergies is safe and effective in immunocompetent patients, yet data in immunocompromised patients are limited.

Methods. A quality improvement process using PST to clarify PCN allergies and guide antibiotic therapy was implemented at MD Anderson Cancer Center (April–October 2017). Patients admitted to Leukemia and Genitourinary Medical Oncology (GUMO) services with a history of Type 1 reactions to PCN were eligible.

Results. A total of 218 consecutive patients with reported PCN allergies were screened; 100 met inclusion criteria, were consented, and underwent PST (67 Leukemia, 33 GUMO). Sixty-one percent of tested patients reported cutaneous reactions, and 79% reported reactions >20 years ago. The most common reported allergy was to penicillin V/G (64%). Forty-eight percent were on steroids and 49% were on immunosuppresive therapy at the time of PST. For leukemia patients the median absolute neutrophil count was 0.78 (0–64.88 K/μL) and absolute lymphocyte count was 0.81 (0–116.71 K/μL). Ninety-five percent patients tested negative for PCN allergy and 4% were positive (three Leukemia, one GUMO). One test was indeterminate (negative histamine control). After PST, 25 of 67 (37%) patients receiving antibiotic therapy were changed to PCN-based antibiotics (PBA) (Figure 1). During the follow-up period (median: 177; range: 3–316 days), 65 patients who tested negative were readmitted (total 185 readmissions) and PBAs were prescribed in 58 of those readmissions (Figure 2). The most common indications for PBAs included neutropenic fever, pneumonia, and bacteremia. No patients given PBAs after negative PST experienced allergic reactions.

Conclusion. PST is safe and effective to rule out PCN allergies in immunocompromised patients, with 95% of patients testing negative for PCN allergy, suggesting that patient-reported allergy is unreliable. The rate of negative tests is comparable to data in immunocompetent patients. The use of PST in cancer patients allows for optimization of antimicrobial therapy and stewardship, which is vital in this patient population at increased risk for infections and infectious complications.

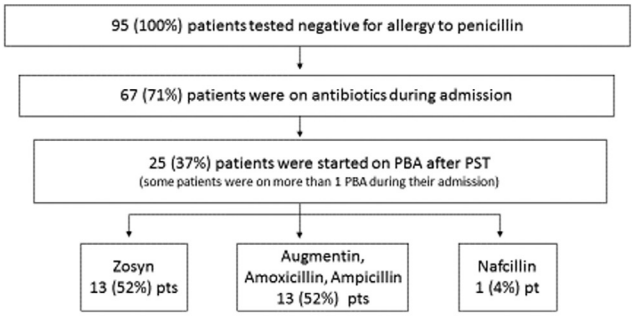

FIG. 1 PST admission: Antibiotic changes after PST. Abbreviations: PBA, penicillin-based antibiotics; PST, penicillin skin testing.

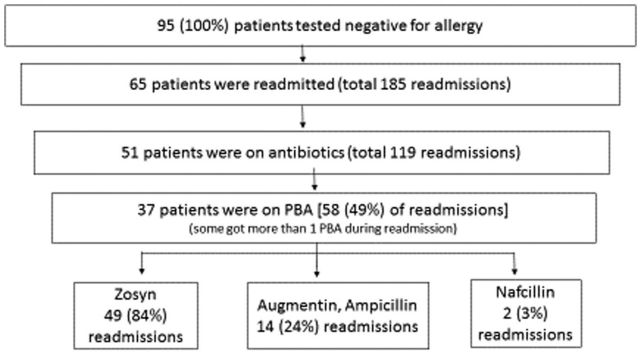

FIG. 2 PST readmissions: PBA prescribed on readmissions.

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1787. The Safety and Efficacy of an Oral Penicillin Rechallenge Program in Cancer Patients: A Pilot Multicenter Study

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Background. Patient-reported antibiotic allergies (so-called antibiotic allergy labels [AALs]) are found in one in four cancer patients and significantly impact patient outcomes. Whilst 85% of AALs can be removed by skin testing, the role of simple point-of-care oral penicillin rechallenge in this cohort remains unknown. We report on a novel penicillin rechallenge program in cancer patients.

Methods. An oral penicillin rechallenge program was implemented at Austin Health (Melb, Aus) and Peter MacCallum Cancer Centre (Melb, Aus) on May 31, 2017. Patients were prospectively identified by Infectious Diseases and antimicrobial stewardship (AMS) services at both sites and reviewed by the conjoint Antibiotic Allergy Service for suitability as per the criteria outlined in Figure 1. Patients underwent supervised challenge with oral penicillin VK 250 mg or amoxicillin 250 mg, dependent on reported index allergy, and observed for 2-hours post. Patients were followed for up to 12 months post for adverse events and antibiotic usage.

Results. Twenty-nine patients underwent penicillin oral challenge between May 31, 2017 to April 30, 2018, 15 with cancer. Of those with cancer, 8 (53%) were male, median age 56 years (IQR 44, 67), 15 (100%) avoiding penicillin, and 7 (47%) penicillins and cephalosporins. The penicillin–amoxicillin AAL phenotypes were "rash" in 73% (11/15) and "unknown" in 27% (4/15). Patients were challenged with penicillin VK or amoxicillin, based on their reported penicillin allergy with no positive challenges or adverse events noted in those with (n = 15) and without (n = 14) cancer. In the follow-up period, 88% (14/16) patients that were prescribed antibiotics received a narrow-spectrum β-lactam.

Conclusion. A pilot penicillin oral rechallenge program was safe in cancer patients. This program serves as a future model for active "de-labelling" in carefully selected cancer patients, without formal allergy services, aiding AMS programs.

Figure 1. Selection algorithm for oral penicillin rechallenge program.

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1788. Cost-Effectiveness of Penicillin Skin Testing Among Patients With Methicillin-Sensitive *Staphylococcus aureus* Bacteremia and Reported Penicillin Allergy

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Background. Methicillin sensitive *Staphylococcus aureus* (MSSA) bacteremia is a highly lethal infection; first-line therapy with a β-lactam, commonly cefazolin, provides a significant mortality benefit over the second-line therapy, vancomycin, which is often used in patients reporting β-lactam allergy.

Methods. We designed a simulation model of inpatients aged 55–75 years with MSSA bacteremia and a self-reported history of β-lactam allergy. The model adopted a US health-system perspective, a lifetime horizon, and a willingness-to-pay threshold of $100,000 per quality-adjusted life year (QALY). We compared routine care (vancomycin), history screening (questionnaire assessing anaphylaxis history), and bedside penicillin skin testing. Incremental cost-effectiveness ratio (ICER) was measured using 2017 US dollars per QALY. Baseline co-morbid states (diabetes, malignancy, and end-stage renal disease [ESRD] requiring dialysis) were also modeled. Future costs and benefits were discounted at 3% per year.

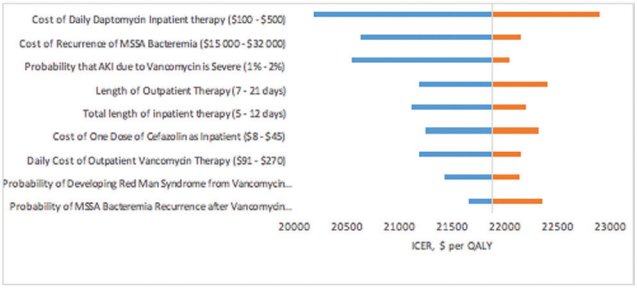
Results. Among patients with MSSA bacteremia and a self-reported penicillin allergy, skin testing produced the best clinical outcomes and was cost-effective relative to history screening, generating 0.51 additional QALYs at an ICER of $22,062 per QALY gained. Among patients with diabetes, malignancy, or ESRD, the ICER for skin testing relative to history screening increased to $30,830–$127,182, reflecting the overall lower life expectancy and high annual survivor healthcare cost in these higher risk groups. Results were robust to wide variations in the cost and diagnostic performance of skin testing: in sensitivity analyses, skin testing remained the optimal strategy when cost was <$5600, specificity >60%, and sensitivity >10%.

Conclusion. Among adults with MSSA bacteremia and a self-reported β-lactam allergy, skin testing is cost-effective relative to history screening and routine care at conventional willingness-to-pay thresholds and should be widely adopted given the mortality benefit of β-lactams over alternate antibiotics in MSSA bacteremia.

Figure 1: Costs and Effectiveness of Three Strategies by Baseline and Co-Morbid States

Co-morbid State/Strategy	Cost, $	Incremental Cost, $	QALYs	Incremental QALYs	ICER, $ per QALY
No co-morbidities					
Routine Care	302 036	NA	10.5	NA	NA
In-depth History	320 928	26 473	11.37	0.87	21 710
Skin Testing	332 227	11 300	11.89	0.51	22 062
Diabetes					
Routine Care	337 847	NA	8.90	NA	NA
In-depth History	359 706	21 858	9.64	0.74	29 633
Skin Testing	364 350	4643	9.79	0.15	30 830
ESRD					
Routine Care	352 978	NA	3.16	NA	NA
In-depth History	376 091	23 112	3.42	0.26	88 321
Skin Testing	380 990	4900	3.47	0.05	91 693
Malignancy					
Routine Care	1 154 344	NA	8.58	NA	NA
In-depth History	1 243 840	89 495	9.29	0.71	125 940
Skin Testing	1 262 292	18 452	9.43	0.15	127 182

Figure 2. Tornado Diagram of the Incremental Cost-effectiveness Ratio (ICER) of Skin Testing Strategy in Base Case Scenario



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1789. Inpatient Penicillin Skin Testing: Outcomes From a Propensity-Matched Case–Control Study

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Background. Nearly 10% of patients report an allergy to penicillin, yet fewer than 10% are confirmed to have a true allergy. Reported allergy frequently leads to the use of costly, broad-spectrum or less-effective antibiotics. We launched a penicillin skin testing (PST) service offering real-time skin testing for inpatients. Here we present clinical outcomes for the first 80 consecutively tested cases compared with propensity-matched controls.

Methods. PST was performed on 80 adults with a reported penicillin allergy admitted to Duke University Hospital between November 2016 and March 2018. A logistic regression model predicting PST receipt was developed using a cohort of penicillin-allergic, untested adults. Covariates included age, gender, diagnosis, and Charlson co-morbidity index. Using this model, the PST cases were propensity-matched 1:1 with untested, penicillin-allergic controls admitted in the preceding year (October 2015–October 2016). Rates of first-line antibiotic receipt were compared between PST cases and their propensity-matched controls.

Results. PST cases and controls had similar demographics, reported allergies, diagnoses, and co-morbidities. Cases were more likely to receive a first-line antibiotic (83% vs. 57%, P = 0.003, Table 1). Rates of clinical cure were similar between groups. Ninety-day recurrence and *C. difficile* infection were numerically higher in the untested group but did not reach statistical significance. A single allergic reaction (rash upon receipt of a cephalosporin) occurred in the PST group.

Conclusion. Penicillin skin-testing significantly increased the proportion of patients receiving first-line antibiotics. While rates of recurrence and *C. difficile* infection were lower for skin-tested patients, these differences did not reach statistical significance. As this study was not expressly powered to detect such differences, we plan to reassess these outcomes once we have accrued a sufficiently large cohort of tested patients.

Table 1: Outcomes.

	PCN Skin Tested, N = 80 (%)	Untested, N = 80 (%)	P-value
Clinical outcomes			
First-line antibiotics	53 (82.8)	31 (57.4)	0.003
Clinical cure	58 (95.1)	57 (91.9)	0.48
90-day recurrence	3 (5.2)	8 (13.3)	0.13
C. difficile infection	2 (3.1)	4 (6.3)	0.40
Allergic reaction	1 (1.5)	0 (0)	0.32

Disclosures. **All authors:** No reported disclosures.

1790. Clinical and Economic Outcome Evaluation with Penicillin Skin Testing as an Antimicrobial Stewardship Initiative in a Not-for-Profit Community Health System

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Background. Penicillin skin testing (PST) is a novel way to reduce the use of broad-spectrum agents, potentially resulting in unnecessary overuse and cost savings. This study evaluated clinical and economic outcomes of antimicrobials prescribed with and without PST in a community health system.

Methods. This quasi-experimental study compared an experimental group of 100 adult patients who completed PST for a self-reported penicillin allergy over an open enrollment period beginning January 2016 to a matched control group of 100 patients over the same time frame that had a listed penicillin allergy as well as consultation with infectious diseases. Patients in the control group were matched to the infection diagnosis codes of the members of experimental group and then randomly selected and matched on a 1:1 basis. The primary outcome was β-lactam days of therapy (DOT) defined as either a penicillin or cephalosporin (not carbapenem). The secondary outcome assessed the average cost of antimicrobial therapy before and after PST.

Results. The control group consisted of 436 patients who met inclusion criteria with 100 patients from that group matched to the 100 patients in the PST group by diagnosis code. The most common self-reported allergy consisted of IgE-mediated (52%) and unknown (30%) in the PST group and IgE-mediated (33%), unknown (20%), and rash (32%) in the control group. Ninety-eight of 100 patients who underwent PST tested negative, with 71 out of 98 (73%) having changes directly made to their antimicrobial regimens immediately after PST. B-lactam DOT for the PST group were 666 out of 1,094 (60.88%, with 34.82% being a penicillin specifically). B-lactam DOT for the control group consisted of 386 out of 984 (39.64%, with 6.4% being a penicillin specifically). Chi-square test of homogeneity for β-lactam DOT between the two groups was significant (P < 0.00001). Changes to the antimicrobial regimen after PST saved the average patient $353.03 compared with no change in pre-PST regimen (P = 0.045).

Conclusion. PST led to immediate antimicrobial de-escalation in the majority of patients who tested negative. This led to a significant increase in β-lactam usage, specifically penicillins. These benefits were also associated with significant cost savings to patients, justifying the cost of performing PST.

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1791. The Impact of a β-lactam Allergy Assessment on Aztreonam Utilization Within a Healthcare System

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