

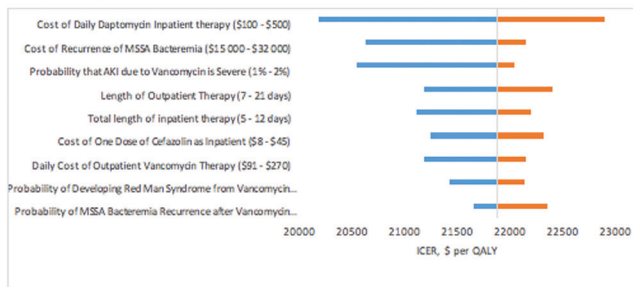
**Results.** Among patients with MSSA bacteremia and a self-reported penicillin allergy, skin testing produced the best clinical outcomes and was cost-effective relative to history screening, generating 0.51 additional QALYs at an ICER of \$22,062 per QALY gained. Among patients with diabetes, malignancy, 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  $\beta$ -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  $\beta$ -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
<b>No co-morbidities</b>					
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
<b>Diabetes</b>					
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
<b>ESRD</b>					
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
<b>Malignancy</b>					
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**



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

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

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**Session:** 217. Antimicrobial Stewardship: Impact of Allergy  
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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
<b>Clinical outcomes</b>			
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
<i>C. difficile</i> 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  $\beta$ -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  $\beta$ -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  $\beta$ -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  $\beta$ -lactam Allergy Assessment on Aztreonam Utilization Within a Healthcare System**

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**Background.** Penicillin allergies are the most commonly reported drug allergies and are documented in up to 17% of patients. Incomplete reaction histories and exaggerated concerns regarding the risk of cross-reactivity often leads to unnecessary avoidance of  $\beta$ -lactams in patients with reported allergies. Utilization of alternative non- $\beta$ -lactam therapy in patients with reported allergies has been associated with increased incidence of multidrug-resistant organisms, including *C. difficile* infection. Per the Infectious Diseases Society of America guidelines for implementing an antibiotic stewardship program (ASP), ASPs should promote allergy assessments and penicillin skin testing in patients with a history of a  $\beta$ -lactam allergy. Implementation of penicillin skin testing in the acute care setting is often limited by the education, skill, and time required in administering and interpreting the result. Investigators sought to assess the impact of a  $\beta$ -lactam allergy assessment on aztreonam utilization within a healthcare system.

**Methods.** This is a multicenter, retrospective study comparing aztreonam utilization in five hospitals within a healthcare system after implementation of a  $\beta$ -lactam allergy assessment. The program included education as well as development of criteria for utilization and a  $\beta$ -lactam allergy assessment algorithm. A  $\beta$ -lactam allergy assessment was performed on any patient with an order for aztreonam. The Mann-Whitney U test was used to assess the impact of the restriction program on aztreonam utilization and expenditure.

**Results.** The hospital system experienced roughly a 50% decrease in aztreonam days of therapy per 1,000 patient-days [ $P < 0.01$ ] and 67% reduction in annual expenditure [ $P < 0.05$ ]. Of the 204 patients with an order for aztreonam, 151 (74%) patients received at least one dose; however, 97 (48%) patients ultimately received and tolerated a  $\beta$ -lactam. Only 112 (55%) patients had a prior reported reaction with 68 (61%) of those having a history of a Type I reaction.

**Conclusion.** Implementation of a  $\beta$ -lactam allergy assessment for patients with reported allergies can enhance appropriate use of  $\beta$ -lactams and result in reduced aztreonam utilization and expenditure.

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#### 1792. Assessing Outcomes of Antimicrobial Stewardship Interventions Along With a Hospital-Wide $\beta$ -Lactam Allergy Guideline Through Aztreonam Use: A 5-Year Observation

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**Background.** Aztreonam (AZT) is an alternative antibiotic for Gram-negative infections requiring IV therapy and anti-pseudomonal coverage in patients with an IgE mediated penicillin allergy. However, many reported allergic reactions to penicillins are either unknown or mis-categorized. In 2012, significant use of AZT was observed at our institution coupled with a 29% resistance rate for *Pseudomonas aeruginosa* (PA) to AZT. The aim of this study was to track and assess AZT use during a 5-year period during which antimicrobial stewardship interventions along with a hospital-wide allergy guideline were implemented to optimize antibiotic use.

**Methods.** A retrospective review of AZT use was conducted at RUSH University Medical Center from January 2012 to December 2017. September of 2012, AZT was restricted for use in patients with an immediate type-1 hypersensitivity reaction to a  $\beta$ -lactam (BL) with approval from the infectious diseases (ID) consult service. January 2015, a hospital-wide BL allergy guideline, including a clinical pathway for BL graded challenges, was implemented. November 2015 and April 2017, computerized order-sets for BL graded challenges and in-patient penicillin skin tests were executed, respectively. AZT usage was tracked yearly and stratified by the number of patient cases, total number of doses and average days of therapy (DOT) to assess for differences. AZT cost, PA susceptibility, BL graded challenges and ID consultations for approval were also tracked for assessment.

**Results.** Patient cases using AZT decreased by 76% in 2017. The total number of doses decreased by 84%. The mean DOT for AZT declined from 5.5 days in 2012 to 3.4 days in 2017. The expenditure of AZT reduced by 86%. Hospital-wide resistance rates for PA to AZT declined to 22% in 2017. Compliance with the BL allergy guideline improved post implementation as the number of BL graded challenges rose to a mean of 30 orders with an 82% decrease in ID consults in 2017.

	2012	2017	% Decrease	P value
Patient cases (n)	259	62	76	<0.0001
Doses (n)	3,112	497	84	<0.0001
DOT (mean days)	5.5	3.4	38	<0.0001
AZT expenditure (\$)	157,354	21,550	86	<0.0001
ID consults (n)	171	30	82	<0.0001

**Conclusion.** Multiple stewardship interventions, including restrictions and guidelines, can significantly decrease use of AZT and improve susceptibility of PA to AZT.

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#### 1793. Description of a Pharmacist-Managed Penicillin Allergy Skin Testing (PAST) Service at a Community Teaching Hospital

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**Background.** Penicillin allergies routinely result in the use of alternative antibiotics, which has shown to increase healthcare cost, length of stay, and the incidence of multi-drug-resistant organisms. The goal of this study was to describe how a pharmacist-managed PAST service could be incorporated into an antimicrobial stewardship program to optimize antimicrobial therapy in patients who report a penicillin allergy and require a penicillin antibiotic.

**Methods.** The core members trained to conduct a PAST were an Infectious Diseases (ID) physician, ID pharmacist, PGY2 ID pharmacy resident, and five PGY1 pharmacy practice residents. Patients were identified through ID physician consult and/or antimicrobial stewardship team rounds. Patients greater than 18 years old were considered for PAST if they had a history of a type 1, or unknown, allergic reaction to penicillin that occurred greater than 5 years ago and a  $\beta$ -lactam antibiotic was indicated. Patients were excluded for the following reasons: pregnancy, non-type 1 allergic reaction, and recent use of anti-histamines. The primary objective was to reduce the use of alternative antimicrobials such as carbapenems, vancomycin, and fluoroquinolones. Secondary objectives included tolerability of the PAST and  $\beta$ -lactam therapy, and days of alternative antibiotics avoided.

**Results.** Fifty-eight PASTs were initiated from October 2015 to April 2018. Fifty-six out of 58 (97%) patients completed a PAST. Of the 56 patients that completed a PAST, the negative predictive value was 100%. The most common antibiotics prior to PAST were vancomycin, cefepime, and fluoroquinolones. The most common antibiotics after PAST were penicillin, piperacillin/tazobactam, and amoxicillin/clavulanate. Bacteremia and skin and soft-tissue infection were the most common indication and *Enterococcus* and *Streptococcus* sp. were most frequently isolated. Of the 50 patients that were transitioned to a preferred  $\beta$ -lactam, the number of days of alternative antibiotics avoided ranged from 2 to 180, with a mean of 22.2 days and median of 11 days.

**Conclusion.** Incorporating a pharmacist-managed PAST service into a community hospital's antimicrobial stewardship program can improve the utilization of preferred antimicrobial therapy and avoid toxic, more costly antimicrobials.

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#### 1794. Impact of a Pharmacist-Driven Detailed Penicillin Allergy Interview

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**Background.** In the United States, 10% of patients report a penicillin (PCN) allergy. These self-reported allergies may be outdated or inaccurate, which may lead to usage of alternate antimicrobials that may be less effective, more toxic, and/or more expensive. While PCN skin tests (PST) can provide an accurate assessment and de-labeling of PCN allergies, they are not feasible at all institutions. An alternative solution is to conduct a detailed penicillin allergy interview (DPAI), which can potentially lead to de-escalation and/or optimization of antimicrobial therapy.

**Methods.** Pharmacist-driven DPAIs were conducted between December 26, 2017 and March 26, 2018. Adult patients admitted with a documented PCN allergy were interviewed according to a standardized questionnaire. The allergy profile within the EHR was updated and a recommendation to switch to non-carbapenem  $\beta$ -lactam therapy was made to the prescriber based on a decision algorithm. Objectives of this study include characterization of changes made to the allergy profile within the EHR after DPAI and measuring the number of patients successfully switched to  $\beta$ -lactam therapy.

**Results.** A total of 466 patients were admitted with a documented PCN allergy, of which 175 (37.5%) received DPAI. Of these patients, 133 (76%) required a change to their allergy profile (Table 1). One-hundred thirty-five (77.1%) patients interviewed were on an antimicrobial agent (Figure 1). Forty-two patients (31.1%) met criteria to switch to non-carbapenem  $\beta$ -lactam therapy, and 31 (73.8%) patients were successfully switched with no adverse events noted.

**Conclusion.** A large number of admitted patients with a documented PCN allergy received a DPAI. Implementation of pharmacist-driven DPAIs led to updated, more accurate allergy information within the EHR, as well as de-escalation and/or optimization of antimicrobial therapy. Provider acceptance rate to switch to non-carbapenem  $\beta$ -lactam therapy was high.

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