Inpatient Penicillin Skin Testing: Outcomes from a Propensity-matched Case-control Study

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Abstract
Background: Nearly 10% of patients report an allergy to penicillin, yet fewer than 10% are confirmed to have a true allergy. Reported allergy frequency may reflect confusion between a penicillin allergy and a true or false antibiotic allergy. We launched a penicillin skin testing (PST) service at Duke University Hospital to improve the safety of patients. We present clinical outcomes for the first 80 consecutive tested cases compared to propensity-matched controls.

Methods: PST was performed on 66 adults with a reported penicillin allergy admitted to Duke Hospital between 11/2016 and 3/2018. A logistic regression model predicting receipt of PST was developed using a cohort of penicillin-allergic, untested adults. Propensity control variables included age, gender, diagnosis, and Charlson co-morbidity index. Using this model, penicillin skin test results were matched 1:2 with untested, penicillin-tested vs propensity-matched controls. Rates of first-line antibiotic use were compared between PST cases and their propensity-matched controls.

Results: Cases and controls had similar demographics, reported allergies, diagnoses and comorbidities. Cases were more likely to receive a first-line antibiotic (OR = 2.98). Rates of clinical cure, 90 day readmission, C. difficile infection and allergic reaction did not significantly differ between skin tested and untested patients. A single allergic reaction (deposit of epinephrine) occurred in the PST group.

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

Odds Ratios for Outcomes in Penicillin skin-tested vs untested controls

Table 2: Outcomes in penicillin skin-tested patients vs propensity-matched controls.

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\text{Outcome} & \text{Untested} & \text{Penicillin skin tested} & \text{Odds Ratio} (95\% CI) \\
\hline
\text{C. difficile infection} & 1.5(1.0) & 1.0(0.6) & 1.2 (0.7, 2.0) \text{ (0.9)} \\
\text{Allergic reaction} & 2.0(0.4) & 1.0(0.1) & 1.0 (0.2, 4.9) \\
\text{Adverse drug event} & 2.0(0.8) & 0.0 (0.0) & 0.0 (0.0, 4.0) \\
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Conclusion
Penicillin skin testing was associated with significantly increased odds of receiving a first-line antibiotic, without any detected increase in risk of allergy or adverse drug reaction. While rates of clinical cure and 90-day C. difficile infection were not significantly different, this study was not adequately powered to detect such differences. Accrual of skin-tested patients is ongoing to better assess outcomes such as C. difficile rates, clinical cure rates, and infection recurrence rates in a larger cohort.

References

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