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A Retrospective Study of Outcomes for Penicillin-Allergic Patients Presenting with *Staphylococcus aureus* Bacteremia at Lehigh Valley Health Network Hospitals

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**Introduction**

Penicillin allergy is reported by approximately 10% of patients but it is estimated that less than 20% of these patients have a true immune-mediated allergy. Additionally, a documented penicillin allergy has been associated with worse outcomes and higher costs, likely because of the administration of broad-spectrum antibiotics in an effort to avoid the penicillin class. *Staphylococcus aureus* septicemia is a serious infection with an estimated mortality of 10-40%. Methicillin-sensitive *S. aureus* (MSSA) septicemia is preferentially treated with ß-lactam antibiotics as they improve mortality compared with non-ß-lactams. ß-lactam antibiotics, such as cefazolin, have a potential cross-reactivity of 10% in penicillin-allergic patients. Thus, patients with a reported penicillin allergy and MSSA septicemia may be treated with inferior therapy to avoid potential allergic reactions. An investigation into the outcomes of patients, who presented to Lehigh Valley Hospital with a reported penicillin allergy and *S. aureus* bacteremia, was conducted to assess outcomes in this population.

**Problem Statement**

The purpose of the study was to determine whether the overall survival, length of stay, and antibiotic regimens differed between patients with or without penicillin allergy who presented to LVHN Cedar Crest and Muhlenberg campuses with *S. aureus* bacteremia.

**Methodology**

A retrospective chart review of 375 patients, who presented with *S. aureus* bacteremia from January 1st, 2013 to December 31st, 2013 and May 12th, 2014 to May 11th, 2015, was conducted to compare outcomes of in-hospital mortality, length of stay and antibiotic regimen among patients who were or were not allergic to penicillin. Regulatory approval was obtained from the LVHN Department of Medicine, NORI, and IRB. Data was collected via inpatient and outpatient records and entered into a database. Demographic and clinical attributes of the sample population were analyzed using descriptive parameters, such as mean, while antibiotic regimen and survival were analyzed using statistical tests such as the Pearson Chi-Square test.

**Results**

A total of 375 charts were reviewed. Fifty-six (15%) patients reported a penicillin allergy. Out of thirty-two penicillin-allergic patients with MSSA, twenty-seven (84%) received ß-lactam antibiotics. Penicillin-allergic patients stayed for a mean of 17.98 days (95% CI 13.00-22.97, p<0.05) while non-allergic patients stayed for a mean of 17.02 days (95% CI 15.18-18.86, p<0.05). Penicillin-allergic patients with MSSA stayed for a mean of 15.09 days (95% CI 10.51-19.68, p<0.05). Penicillin-allergic patients with MSSA and treated with a ß-lactam stayed for a mean of 14.85 days (95% CI 9.54 – 20.16, p<0.05) while penicillin-allergic patients with MSSA and treated with a non-ß-lactam, stayed for a mean of 16.40 days (95% CI 5.48-27.32, p=0.66). Ten (17.9%) patients with and forty-two (13.2%) without penicillin allergy expired (p=0.349). Five (15.6%) penicillin-allergic patients with MSSA and five (20.8%) with MRSA expired (p=0.730). Four (14.8%) penicillin-allergic patients with MSSA, who received a ß-lactam, and one (20%), who received a non ß-lactam, expired (p=1.000).

**Conclusions and Future Implications**

Penicillin-allergic patients had a higher rate of mortality, longer lengths of stay and received non-ß-Lactam antibiotics more often. However, there was no statistically significant association between penicillin allergy and survival, length of stay or antibiotic therapy used.