Methicillin-susceptible Staphylococcus aureus bloodstream infections (MSSA BSI) carry a significant disease burden and attributable healthcare cost. The mainstay of treatment for MSSA infections are anti-staphylococcal beta-lactam (BL) antibiotics, but patients with BL allergies may receive suboptimal therapy. BL allergies are reported in about 10% of all patients. In a retrospective study from a university hospital, association of receipt of beta-lactam antibiotics with reported allergies may safely receive a BL. Since optimal treatment of MSSA BSI is directly tied to patient outcomes, barriers to receiving optimal antibiotics are an important target for antimicrobial stewardship interventions.

The objective of this study was to compare optimal antibiotic therapy of patients with MSSA BSI among those with and without a reported BL allergy label in the electronic medical record.

Study Population
The study population included hospitalized patients with MSSA BSI from January 2014 to December 2015. Study Design
This was an IRB approved, matched retrospective cohort conducted at Henry Ford Health-system located throughout southeast Michigan, USA. Matching was performed in a 1:3 ratio of patients with a reported BL allergy to those without a reported allergy, using a nearest neighbor approach with respect to time of index infection and if at least 50% of care was managed in an intensive care unit or general ward setting.

Methods
Inclusion criteria for the study population included:

- ≥ 18 years of age
- Microbiologically confirmed MSSA BSI with culture and susceptibility data
- Hospitalized at time of positive MSSA BSI

Exclusion criteria included:

- Immunocompromise
- Targeted MSSA antibiotics initiated at outside hospital
- Hospice at time of positive MSSA BSI

Data Collection
Data collected included patient characteristics, comorbid conditions, treatment, and outcomes (receipt of optimal intravenous antibiotics). Concomitant infection sites were defined according to a definition of a vegetation on echocardiography or a positive MSSA culture from another anatomical site. All species identification was completed by the Henry Ford Health System Clinical Microbiology Core Laboratory according to Clinical & Laboratory Standards Institute (CLSI) standards. All data were extracted from electronic medical records using a standardized case report form.

Key Definitions:
- Reported BL allergy: An allergy to a penicillin, cephalosporin, monobactam or carbapenem agent documented within the allergy field of the electronic medical record.
- Immune-mediated reactions: Reactions of rash, hives, anaphylaxis, angioedema, or bronchospasm.
- Optimal antibiotics: Receipt of intravenous nafcillin, cefazolin, ceftaroline, ampicillin/subbacitrum for ≥ 24 hrs
- Duration of suboptimal antibiotics: Time (hrs) between the first microbiologically confirmed result of MSSA and the infusion start time of the first optimal antibiotic.

Statistical Analyses:
Descriptive statistics were used to characterize the incidence of patients who received optimal antibiotics. Bi-variate analyses were performed using χ² or Mann-Whitney U tests, as appropriate. Any clinically relevant variable found to have an association with receipt of optimal antibiotics (P<0.05) was considered for inclusion in the multivariable logistic regression model. Variables were manually entered into the model to determine independent associations with the primary outcome while controlling for potential confounders. All analyses were performed using IBM SPSS Statistics Version 23.

Results
The study population included 212 patients: 53% were reported BL allergy. Among patients with reported allergies, 96% received a BL antibiotic. Majorstay of index infection was in the ICU: 53%, Endocarditis: 2.8 (1.7-7.2).

MSSA BSI Sources of Infection
In total, 79% of patients received optimal antibiotics with mortality: 212 patients included:

- 53 BL allergy
- 159 without BL allergy

In the reported BL allergy group compared to the no BL allergy group (P=0.006)

- 36% of the 117 patients eligible for infection source control, it was obtained in 22% of patients who expired, and 52% of survivors

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