Clinical and Microbiological Characterization of Recurrent Invasive Methicillin Resistant *Staphylococcus aureus* (MRSA) Infections

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1 Background

Staphylococcus aureus is the leading cause of bacteremia and is associated with increased morbidity and mortality, higher cost, and limited therapeutic options. Limited data describing patients who present with recurrent invasive MRSA infections exist. This study evaluated patient and treatment-level factors that impact recurrence of invasive MRSA infections.

2 Methods

A retrospective review of patients with recurrent invasive MRSA infections between 2002 and 2014 at a tertiary teaching hospital was performed. Patient data elements included demographics, comorbidities, severity of underlying disease, MRSA risk factors, antibiotic treatment and clinical outcomes. MRSA strains were also collected. Vancomycin (VAN), and Daptomycin (DAP) MICs were determined using Etest. *agr* type and phenotype were determined by real time PCR and β-lysin disk, respectively. USA strain type was determined by PFGE. Descriptive statistics were used to describe the population.

3 Results

Of the 104 patients with recurrent MRSA infection during the study period, 27 patients with ≥ 1 blood strain were included. Twelve patients (44%) had 2 recurrent MRSA infections. The mean age was 51 $\pm$ 12 years, 70.4% were male, and 48.1% were Hispanic. Comorbitities included diabetes (59%), liver disease (37%), and cancer (30%). MRSA infection risk factors included injection drug use (33%), healthcare exposure (41%), and MRSA colonization (30%). Median time to recurrence was 147 days (IQR 69, 746). Change in antibiotic therapy was required for 52% of patients during recurrent infection (VAN to DAP 64%) compared to 30% during initial infection. Patients who experienced cure were less likely to receive VAN than those who experienced failure (81.6% and 94.4%, respectively; p=0.091). For the index case, 96% of strains were susceptible to VAN, 64% were USA300, and 19% had dysfunctional *agr*. Of the recurrent strains, 53% were USA300, 29% had dysfunctional *agr*, 9% had VAN MIC >2 μg/ml and 6% were DAP non-susceptible.

4 Conclusions

VAN is often used to treat recurrent invasive MRSA infections and may lead to increased treatment failure rates. Recurrent invasive MRSA infections were more likely caused by *agr* dysfunctional and antibiotic resistant strains.