Methods. A retrospective review was conducted on 400 randomly selected patients with SAB, 200 pre- and 200 post-implementation of a four-part management checklist. The primary outcome was overall adherence to the checklist, which included: repeat blood cultures, echocardiography, correct antibiotic/route selection, and appropriate antibiotic duration. Secondary outcomes included adherence when an ID physician was not consulted, adherence to the four components individually, and appropriate imaging.

Results. Adherence to the four part bundle remained stable from 2015 to 2017, with overall adherence rates of 80% and 79%, respectively. From 2015 to 2017, patients without repeat blood cultures (7% vs. 2%, respectively) and inappropriate inpatient antibiotic selection (6% vs. 3%, respectively) improved. Outpatient prescribing (11% vs. 11%), lack of imaging (11% vs. 9%), and antibiotic duration (15% vs. 15%) were consistent from 2015 to 2017, respectively. In 2017, 13 patients were discharged on oral antibiotics and were deemed inappropriate per the study criteria, although 12 of these patients were on appropriate antibiotics while inpatient. Infectious diseases providers were consulted on 96% of cases in 2017, an increase from 90% in 2015.

Conclusion. Adherence to an evidence based treatment bundle remains consistent with a previous analysis, despite an increase in cases with an ID provider consulted. Repeating blood cultures and inpatient prescribing improved over the interval. Focus areas for improvement include imaging, outpatient prescribing, and duration of therapy.

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1066. Adjuvant β-Lactam Therapy Combined with Vancomycin for Methicillin-Resistant *Staphylococcus aureus* (MRSA) Bacteremia: Does β-Lactam class Matter?

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Background. Vancomycin (VAN) combined with a β-lactam (COMBO) expedites MRSA bacteremia clearance compared with VAN alone. However, the impact of COMBO on persistent MRSA bacteremia (PB) using a contemporary definition of ≥5 days is unknown. There is also no consensus on which β-lactam (BL) should be combined with VAN. We sought to assess PB rates among adults who received COMBO or VAN and the impact of BL class on PB.

Methods. This was an analysis of pooled data from two published studies of adults with MRSA bacteremia (Dilworth et al., *Antimicrob Agents Chemother.* 2014;58(1):102–109; Casapao et al., *Pharmacotherapy.* 2017;37(11):1347–1356). All patients received intravenous VAN for ≥72 hours. COMBO patients received an intravenous BL for ≥48 hours with VAN, started within 24 hours of VAN. The remaining patients comprised the VAN group. The primary outcome was PB (≥5 days). The impact of BL class on PB was assessed. Acute kidney injury (AKI, serum creatinine increase from baseline by 0.5 mg/dL or 50%) was examined as a secondary outcome. Demographics were compared between groups. Multivariable logistic regression models compared PB between COMBO and VAN.

Results. In total, 156 patients were included (VAN = 66; COMBO = 90). The groups were similar except COMBO patients were more likely to have a pulmonary bacteremia source (12.2% vs. 1.5%, $P = 0.014$) and a higher median (IQR) vancomycin serum level (mg/L, 17.8 (13.9, 23.6) vs. 15.7 (11.3, 20.6); $P = 0.039$). PB was less common in COMBO (26.7% vs. 43.9%, $P = 0.027$). In a multivariable model COMBO was inversely associated with PB (adjusted odds ratio [aOR], 95% confidence intervals [CI], 0.48, 0.24–0.95). AKI was more common in COMBO (18.9% vs. 7.6%, $P = 0.062$). PB and AKI rates by BL class are shown in the table below, with VAN listed for reference.

Variable, *n* (%)	Carbapenem, *n* = 8	Cephalosporin, *n* = 25	Penicillin, *n* = 56	*P*-value	VAN, *n* = 66
PB	0 (0)	8 (32)	15 (26.8)	0.191	29 (43.9)
AKI	1 (12.5)	4 (16)	12 (21.4)	0.749	5 (7.6)

Conclusion. COMBO reduced the likelihood of PB but had a higher AKI rate. There were no significant differences in PB by BL class. Clinically, COMBO may reduce PB rates and prevent overuse of salvage antibiotic therapy. BL choice for COMBO warrants further investigation.

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

1067. Comparative Effectiveness of Nafcillin or Oxacillin, Cefazolin, and Piperacillin/Tazobactam in Methicillin-Sensitive *Staphylococcus aureus* Bacteremia

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Background. β-Lactam antibiotics are recommended as first line for treatment of methicillin-sensitive *Staphylococcus aureus* (MSSA) bacteremia. The objective of this study was to compare effectiveness among β-lactam therapies in MSSA bacteremia patients that were exclusively treated with one antibiotic.

Methods. This was a retrospective cohort study of patients hospitalized at Veterans Affairs (VA) medical centers with MSSA bacteremia from January 1, 2002 to October 1, 2015. Patients were included if they were treated exclusively with nafcillin, oxacillin, cefazolin, or piperacillin/tazobactam (i.e., monotherapy with no changes in therapy). The primary outcome was 30-day mortality, and secondary outcomes were time to discharge, inpatient mortality, 30-day readmission, and 30-day *S. aureus* reinfection. Hazard ratios (HRs) and 95% confidence intervals (CI) were calculated using unadjusted, quintile adjusted, and propensity-score (PS) matched (nearest neighbor, 0.05 caliper) Cox proportional hazards regression.

Results. A total of 326 patients were included in the final analysis. When comparing nafcillin ($n = 75$)/oxacillin ($n = 30$) with cefazolin ($n = 108$), 30-day mortality was similar between groups (PS matched $n = 40$, HR 4.0, 95% CI 0.45–35.79), as were rates of the other outcomes assessed. When combining nafcillin/oxacillin with cefazolin, and comparing to piperacillin/tazobactam ($n = 113$), 30-day mortality was significantly lower in the nafcillin/oxacillin/cefazolin group (PS matched $n = 66$, HR 0.29, 95% CI 0.09–0.87). Inpatient mortality and 30-day mortality were significantly lower with nafcillin/oxacillin/cefazolin in PS-adjusted analyses (HR 0.29, 95% CI 0.11–0.73 and HR 0.23, 95% CI 0.10–0.50, respectively).

Conclusion. In hospitalized patients with MSSA bacteremia, no difference in mortality was observed between nafcillin/oxacillin and cefazolin in patients that were exclusively treated with these monotherapies. However, higher mortality was observed with piperacillin/tazobactam as compared with nafcillin/oxacillin/cefazolin, suggesting that it may not be as effective as other monotherapies for MSSA bacteremia.

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1068. Evaluation of Cefazolin vs. Anti-Staphylococcal Penicillins for the Treatment of Methicillin-Susceptible *Staphylococcus aureus* Bloodstream Infections in Acutely-Ill Adult Patients: Results of a Systematic Review and Meta-Analysis

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Background. Anti-staphylococcal penicillins (ASPs) have been regarded as first-line in the treatment of serious MSSA bloodstream infections (BSI) with cefazolin considered an alternative. Recent studies have suggested that infection outcomes between cefazolin and ASPs may be similar. The objective of this study was to compare the clinical efficacy and tolerability of cefazolin to ASPs for MSSA BSI.

Methods. A systematic review and meta-analysis was conducted. Articles were identified via PubMed, Web of Science, and the Cochrane Library. Studies written in English comparing cefazolin to ASPs for MSSA BSI in adult patients were included. Study quality was assessed using the Cochrane Risk of Bias Assessment Tool and the Newcastle-Ottawa Scale for prospective and retrospective studies, respectively. All review stages were independently conducted by two reviewers, with a third reviewer adjudicating any discrepancies. The fixed- or random-effects model was utilized, as appropriate. A planned subgroup analysis was conducted between high (>15%) vs. low (<14.9%) mortality probability as defined by logit functions applied at the study level.

Results. Nine studies were identified. Pooled data extracted from 1,726 cefazolin- and 2,716 ASP-patients indicated that cefazolin was associated with a significant reduction in treatment failure (OR: 0.70; 95% CI: 0.61–0.82; $P < 0.001$; $I^2 = 14\%$) and crude, all-cause mortality (OR: 0.69; 95% CI: 0.59–0.81; $P < 0.001$; $I^2 = 18\%$) compared with ASPs. Within a subset of studies ($n = 6$) demonstrating low mortality probability (<14.9%), cefazolin therapy remained protective against failure (OR: 0.70; $P < 0.001$; $I^2 = 39\%$) and mortality (OR: 0.70; $P < 0.001$; $I^2 = 35\%$). Within the high mortality probability (>15%) subset, no significant differences for failure or mortality were noted. The risk of adverse events was higher with ASPs (OR: 2.58; 95% CI: 1.00–6.64; $P = 0.05$).

Conclusion. Cefazolin was associated with significantly lower rates of failure, mortality, and treatment-related adverse events when compared with ASPs among less

severely ill patients. Prospective, randomized controlled trials are needed to establish the role of these agents in serious MSSA BSI.

Figure 1: Forest plot for treatment failure

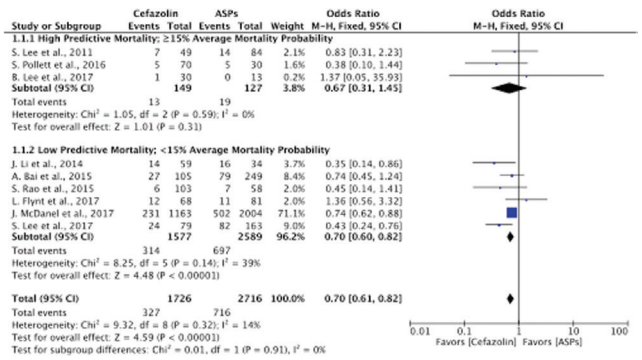
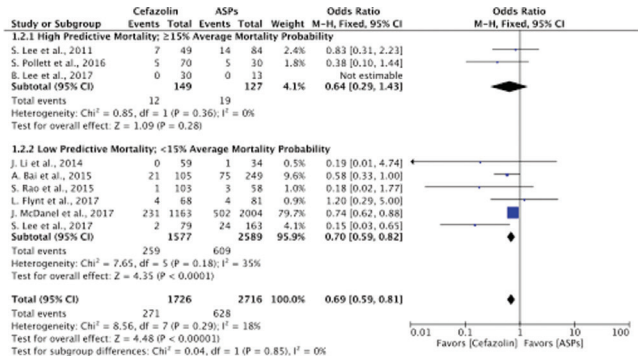


Figure 2: Forest plot for all-cause mortality



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1069. Predictive Factors for Metastatic Infection in Patients With Bacteremia Caused by *Staphylococcus aureus*

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Background. Metastatic infections, such as infective endocarditis and pyogenic spondylitis, are very serious complications of *Staphylococcus aureus* bacteremia (SAB), because failure to identify metastatic infections may cause poor prognosis. The aim of the present study is to determine the predictive factors for metastatic infections of SAB.

Methods. This retrospective cohort study was conducted among patients with bacteremia due to *S. aureus* (including both methicillin-sensitive *S. aureus* and methicillin-resistant *S. aureus*: MSSA and MRSA) in The Jikei University Kashiwa Hospital. The study population comprised 125 adult patients with SAB between January 2014 and December 2017. Patients, that died or transferred within 3 months after the initial positive blood culture, were excluded, because metastatic infection was defined as deep-seated infection detected within 3 months after the initial positive blood culture. We analyzed several factors, including demographics, comorbidities, community acquisition, primary site of infection, persistent fever and laboratory data such as c-reactive protein (CRP) levels after treatment.

Results. Seventy-four patients met inclusion criteria of this study. The most common primary site of bacteremia was catheter-related [24 (32.4%) of 74]. Metastatic infection occurred in 22 (29.7%) of 74 patients, and spondylitis was most common, following psoas abscess. Of these, 11 infections (50% of 22) were community acquired. We did not find any significant differences in demographics and comorbidities, except central venous catheter-associated bloodstream infection, which was associated with low rate of metastatic infection. By multivariate analysis, the predictive factors associated with the development of metastatic infection were community onset of infection (OR 11.6; 95% CI 2.98–45.1; $P < 0.001$), persistent fever over 72 hours (OR 6.7; 95% CI 2.12–21.8; $P = 0.001$), and higher CRP levels (>3 mg/dL) lasting 2 weeks after the administration of appropriate antibiotics (OR 7.47; 95% CI 2.39–23.3; $P < 0.001$).

Conclusion. This study demonstrated that additional diagnostic tests to identify metastatic infection should be performed, especially in the patients with community-acquired SAB, persistent fever or persistently high CRP levels after the administration of appropriate antibiotics.

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1070. Epidemiological and Clinical Features of Panton–Valenton Leukocidin-Positive *Staphylococcus aureus* Bacteremia: A Case–Control Study

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Background. The presence of the binary Panton-Valentine Leukocidin (PVL) toxin in *Staphylococcus aureus* has been associated with both severe pneumonia and skin and soft-tissue infections. However, there is only limited data on how this virulence factor impacts *S. aureus* bacteremia and whether it might affect the clinical course or complications of bacteremic infections.

Methods. Between September 2016 and March 2018, a convenience sample of *S. aureus* isolates from clinical cultures obtained in inpatient units and the Emergency Departments of UMass Memorial Medical Center underwent comprehensive genomic sequencing. Four hundred sixty-nine (29%) of 1,681 *S. aureus* sequenced isolates were identified as containing the *LukF* and *LukSPV* genes that encode for PVL. Case patients with one or more positive blood cultures for *LukF/LukSPV* + strains were randomly matched with control patients having positive blood cultures for *LukF/LukSPV*– strains for a retrospective chart review.

Results. The 55 case and 56 control patients were comparable in age and gender; case patients were more likely to have a history of injection drug use, while controls more likely to undergo hemodialysis or have had indwelling IV catheters. Case patients more commonly had chest pain and more prolonged fever; but had the same incidence of sepsis and septic shock. Isolates from 42 (76%) of case patients were methicillin resistant as compared with 16 (29%) from control patients. Elevations in serum creatinine and alkaline phosphatase were more common in control patients. Case patients had a higher incidence of pneumonia, with no differences seen in the incidence of endocarditis, osteomyelitis, or septic arthritis. The percentage of patients who were clinically cured or expired were comparable.

Conclusion. These results are consistent with prior observations associating the PVL toxin with community-acquired MRSA strains as well as severe staphylococcal pneumonia. However, it does not appear to otherwise influence the natural history of bacteremic *S. aureus* disease other than in prolonging the duration of fever.

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1071. Impact of Standard vs. Prolonged Courses of Antibiotics for the Treatment of Uncomplicated *Staphylococcus aureus* Bacteremia (SAB) in Patients With Hematologic Malignancies

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Background. The optimal treatment duration for uncomplicated SAB (U-SAB) is unknown in patients with hematologic malignancies. The goal of this study was to evaluate the impact of antibiotic duration on outcomes in patients with hematologic malignancies and U-SAB.

Methods. This was a multicenter, retrospective cohort study of adult patients with hematologic malignancies and U-SAB treated with standard (2 weeks) or prolonged (>2 weeks) antibiotic therapy. U-SAB was defined as defervescence and culture clearance within 96 hours of index culture and the absence of: endocarditis, implanted prostheses, metastatic sites of infection, and bone/joint involvement. Patients with SAB therapy <10 days and those with inadequate source control were excluded. The primary outcome was a composite global clinical cure: absence of relapse SAB, absence of SAB progression, and survival at 60 days following index SAB.

Results. Of 89 included patients, 51% received a standard antibiotic duration for U-SAB. The median age of the entire cohort was 56 and majority was male (60%). Neutropenia was present at index culture in 53% of patients, and acute leukemia (48%) and lymphoma (26%) were the most common underlying malignancies. Other baseline characteristics were similar between the two groups except more patients in the standard duration group had relapsed/refractory malignancy (51% vs. 25%, $P = 0.016$), central-line source (71% vs. 48%, $P = 0.032$), and antibiotic prophylaxis prior to index SAB (42% vs. 18%, $P = 0.021$). Median duration of treatment in the standard group was 15 days vs. 28 days in the prolonged duration group. No differences in global clinical cure and other clinical outcomes were seen between groups (Figure 1).