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Session: P-9. Bacteremia

Background: Studies show a rising annual incidence of severe sepsis, with bloodstream infections continuing to impact children. Rapid identification of causative agents and timely administration of targeted therapy can positively impact patient outcomes and improve antibiotic stewardship.

The BioFire® Blood Culture Identification 2 (BCID2) Panel (BioFire Diagnostics, LLC), an updated version of the FDA-cleared BioFire® FilmArray® Blood Culture Identification (BCID) Panel, designed for use on positive blood cultures (PBCs), assesses 43 analytes, including 17 novel analytes (8 bacterial, 2 fungal, and 7 antimicrobial resistance genes), with a similar turnaround time.

Methods: De-identified residual PBCs for which clinician-ordered testing per standard of care (SoC) had been performed were enrolled and tested with an Investigation-Use-Only version of the BCID2 Panel. Only one positive bottle per patient was enrolled. Results of BCID2 and BCID were compared.

Results: 116 PBCs (48 aerobic and 68 anaerobic) were evaluated using the BioFire BCID2 Panel and results were compared to the BioFire BCID Panel. Of the 116 cases, 103 were positive on both the BioFire BCID2 Panel and the BioFire BCID Panel. Ten cases were negative on both tests. While the two panels showed 97% agreement, three cases were discrepant. Using culture (SoC) as the tiebreaker, two cases were false positive and one case was false negative on the BioFire BCID Panel. In all three cases, results from culture and the BioFire BCID2 Panel were in agreement. As expected, no organisms were detected on the BioFire BCID2 Panel in PBCs from 10% (12/116) of PBC bottles where culture identified only organisms that are not part of the panel menu. With the BioFire BCID2 Panel's expanded platform, two cases identified as *Enterobacteriaceae* on the BioFire BCID Panel were identified to the genus level on the BioFire BCID2 Panel; 31 cases detected to the genus level on the BioFire BCID Panel were identified to the species level on the BioFire BCID2 Panel.

Conclusion: Overall, the BioFire BCID2 Panel performed well against the BioFire BCID Panel for identification of bloodstream pathogens and provided additional discrimination of some pathogens to the genus or species level.

Data presented are from assays that have not been cleared or approved for diagnostic use.

Disclosures: **All Authors**: No reported disclosures

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301. Penicillin Versus Cefazolin or Anti-staphylococcal Penicillins for Penicillin-Susceptible *Staphylococcus aureus* Bacteremia

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Mohammed Aldhaeefi, Jeffrey C. Pearson, Sanjat Kanjilal, Brandon Dionne

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Background: *Staphylococcus aureus* bacteremia is a significant cause of mortality. Penicillin (PCN) may have a role in the treatment of penicillin-susceptible *Staphylococcus aureus* (PSSA) bacteremia as it has a narrower spectrum of activity than cefazolin and is better tolerated than antistaphylococcal penicillins (ASPs). The aim of this study is to evaluate the safety and effectiveness of PCN versus cefazolin or ASPs in the treatment of PSSA bacteremia.

Methods: This is a single-center, retrospective study at a tertiary academic medical center. All patients with a PSSA blood culture from January 1, 2012 to September 1, 2019 were screened. Patients were excluded if they were treated with a definitive antibiotic (defined as antimicrobial therapy received 72 hours after positive blood culture) other than the study comparators, or if they received combination antibiotic therapy >72 hours from the initial positive blood culture result. The primary outcome was 60-day clinical failure, which was a composite endpoint of change in antibiotic after 72 hours of definitive therapy, recurrence of PSSA bacteremia, infection-related readmission, or all-cause mortality.

Results: Of 277 patients with PSSA bacteremia, 101 patients were included in the study; 62 (61%) were male and 11 (11%) had a β-lactam allergy. At baseline, 40 patients (40%) had hardware, 25 (25%) had an intravenous line, 6 (6%) were on dialysis, and 4 (4%) had active IV drug use, with similar distribution across antibiotic groups. Penicillin was the most common antibiotic used (Table 1). There was a significant difference among groups with respect to the 60-day clinical failure (log-rank p=0.019). In terms of unadjusted 60-day clinical failure, penicillin had similar outcomes to cefazolin (95% CI -0.29 to 0.104, p=0.376), however, it had statistically significant better outcomes in comparison to the ASPs, nafcillin or oxacillin (95% CI 0.023 to 0.482, p=0.031) (Table 1).

Table 1. 60-day outcomes of PSSA bacteremia

	Penicillin n=49	Cefazolin n=26	Nafcillin/Oxacillin n=26
Unadjusted 60-day clinical failure:, n (%)	14 (28.5)	5 (19.2)	14 (53.8)
Change in antibiotic	11 (22.4)	4 (15.3)	11 (42.3)
Recurrence of bacteremia	2 (4)	0 (0)	1 (3.8)
Infection-related readmission	2 (4)	1 (3.8)	3 (11.5)
All-cause mortality	1 (2)	0 (0)	3 (11.5)

Conclusion: Penicillin is effective and safe in the treatment of PSSA bacteremia and may be preferable to antistaphylococcal penicillins

Disclosures: **All Authors**: No reported disclosures

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302. Peripheral IV catheters, a common source of healthcare-associated *Staphylococcus aureus* bacteremia

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Session: P-9. Bacteremia

Background: Healthcare-associated S. aureus bacteremia (HA-SAB) has traditionally been attributed to surgical site infections (SSI) or central line-associated bloodstream infections. However, peripheral IV catheters (pIV) are increasingly recognized as cause of HA-SAB. This study evaluates risk factors for HA-SAB due to pIV.

Methods: This is a retrospective, case-control study of adult patients hospitalized at Denver Health Medical Center with HA-SAB (SAB presenting with hospital-onset [≥3 days after hospitalization] or community-onset attributed to recent hospitalization [discharge ≤7 days prior]). The time period ranged from Jan 1, 2016 to Nov 30, 2019. Cases were reviewed by an infectious diseases physician to determine the source of SAB. PIV-related SAB was defined as phlebitis, cellulitis, and/or drainage at the site of a previous pIV AND no other source or another less likely source based on progress notes and microbiology results. Three controls were matched to each pIV-related SAB case based on the age of the patient (±5 years) and the date the pIV was placed (±3 days). Patients who were admitted for elective procedures, to psychiatry, to obstetrics, and those who died within 2 days of pIV placement were excluded.

Results: There were 376 episodes of SAB during the study period; 313 were community-onset while 63 were HA-SAB (50 hospital-onset and 13 community-onset attributed to hospitalization). PIV was the most common cause of HA-SAB (n=20, 29.4%); other common causes were SSI (n=10, 15.9%), source present at admission (n=8, 12.7%), and pneumonia (n=7, 11.1%). The median age of patients with pIV-related SAB was 53 years (SD 15.6), and 85% were male. The median duration of pIV was 5 days (SD 2.8). Twenty percent was MRSA.

As compared to controls, pIV in immunocompromised individuals and those placed by emergency medical services (EMS) were more likely to develop SAB (OR 11.8, 95% CI 2.5–56.5 and OR 6.9, 95% CI 6.9–24.0, respectively). Age, gender, pIV location, and duration of pIV were not associated with development of SAB.

Conclusion: PIV placed by EMS are more likely to cause SAB than those placed in the hospital. Facilities should consider changing these pIV promptly upon admission to the hospital and work with EMS to improve pIV placement technique.

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303. Physiological Changes Due to Bloodstream Infection in Intensive Care Unit Patients Differ According to Transplant Status

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*Background:* Transplant recipients are at increased risk of bloodstream infection (BSI), which often leads to critical illness. Due to immunosuppression, BSI in these patients may manifest with different pathophysiology compared to non-transplant recipients. We aimed to identify different trends in the pathophysiology of critically ill patients with BSI based on transplant status.

Methods: We reviewed data from patients admitted to the medical and surgical/trauma intensive care units (ICUs) at the University of Virginia Medical Center from 2011 to 2015. We included both solid organ and hematopoietic stem cell transplant recipients. We performed univariate logistic regression modeling to evaluate trends in different physiological features in both transplant and non-transplant recipients in the 96 hours surrounding a positive blood culture. We then performed multivariate logistic regression modeling to identify features independently associated with a positive blood culture in the next 24 hours in transplant recipients.

Results: We analyzed 9,954 ICU patient-admissions (including 505 transplant recipients), with a total of 144 patient-years of physiological data, 1.3 million hourly measurements, and 15,577 blood culture instances. Of the 1,068 culture instances in transplant recipients, 125 (12%) were positive, compared to 1,051 of 14,509 (7%) blood culture instances in non-transplant recipients. Critically ill transplant recipients with BSI had greater abnormalities in vital signs, oxygen requirement, markers of organ damage, APACHE score, and Charlson Comorbidity Index (CCI) compared to non-transplant recipients (Figure 1). Trends in many of these features also differed based on transplant status. The multivariable logistic regression model of BSI in transplant recipients included, in decreasing strength of association: total bilirubin, systolic blood pressure, fraction of inspired oxygen, number of intravenous lines, and CCI. This model had an AUC of 0.75.

Figure 1. Trends in pathophysiological abnormalities in 9,954 critically ill patients with BSI based on transplant status, 2011–2015. Each graph demonstrates the average value of the physiological variable over time relative to the acquisition of a positive blood culture. Blue curves depict trends in transplant recipients, while red curves

depict trends in non-transplant recipients. We assessed 108 physiological features and show the 24 features with the greatest change around the time of blood culture.
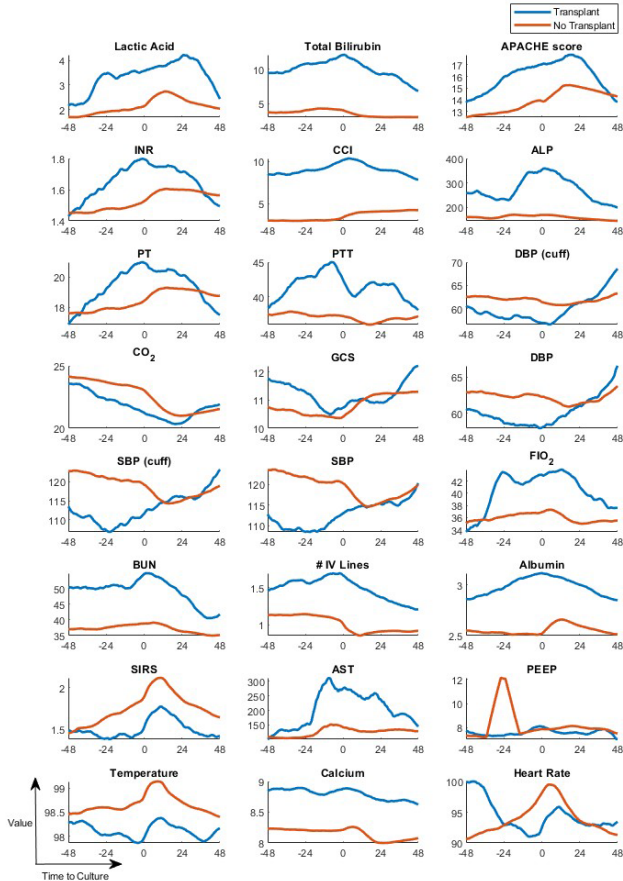
Conclusion: Critically ill transplant recipients have a higher prevalence of BSI and different pathophysiological manifestations of BSI compared to non-transplant recipients. This may have implications regarding early detection and treatment of BSI in these patients.

Disclosures: Randall Moorman, MD, Advanced Medical Predictive Devices, Diagnostics, and Displays (Board Member, Shareholder)

304. Predictors of mortality in carbapenem-resistant *Enterobacteriales* bacteremia

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Background: Carbapenem-Resistant *Enterobacteriales* (CRE) bacteremia is associated with significant morbidity and mortality. CRE were assigned a threat level of "urgent" in the 2019 CDC report on antibiotic resistance in the United States. We attempted to identify predictors of 30-day mortality in patients with CRE bacteremia.

Methods: We performed a chart review of 146 patients with CRE bacteremia from January 2010 - July 2019. CRE was defined using the current CDC definition. Electronic medical records were reviewed to obtain clinical characteristics and outcomes including prior antibiotic use, comorbidities, prior location, treatment, hospital course, microbiological data and outcomes including in-hospital mortality.

Results: Of 146 patients included for analysis, the overall 30-day mortality rate was 36.3%. Patients admitted from a healthcare facility including outside hospitals, rehab, nursing homes, and LTACs had a 49.1% (29/59) 30-day mortality rate compared to 27.5% (24/87) for those admitted from home (RR=1.78, 95% CI 1.16–2.73, p=.0082). Patients with a Pitt bacteremia score ≥ 4 had a greater 30-day mortality rate (42.6%, 26/61) compared to those with a Pitt bacteremia score < 4 (17.6%, 15/85) (RR=2.92, 95% CI 1.40–4.16, p=.0015). Patients that received inactive empiric therapy had a 30-day mortality rate of 36% (36/100) compared to 36.9% (17/46) in those that received active empiric therapy (RR=.9741, 95% CI .6155-1.59, p=.9109). Patients with isolates determined to have a meropenem MIC ≥ 4 had a 30-day mortality rate of 40.2% (37/92) while those with an MIC < 4 had a 30-day mortality rate of 30.2% (16/53) (RR=1.33, 95% CI .8250–2.1513, p=.2408). A pulmonary source of bacteremia was associated with an increased risk of 30-day mortality (64.3%, 9/14) compared to all other sources of bacteremia (34.8%, 31/89) (RR=1.85, 95% CI 1.39–2.99, p=.0129). No other infection source was associated with an increased 30-day mortality rate.

Conclusion: Admission from a healthcare facility, Pitt bacteremia score ≥ 4, and pulmonary source of bacteremia were associated with increased risk of 30-day

mortality. Interestingly, administration of active empiric therapy was not associated with a decreased mortality risk. Meropenem MIC was not predictive of 30-day mortality.

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305. Prevalence of Ceftriaxone Susceptible, Piperacillin-tazobactam Non-susceptible *Escherichia coli* Bacteremia in Patients with Hematologic Malignancy

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Background: Piperacillin-tazobactam (TZP) is common empiric and targeted therapy for gram-negative bacteremia in patients with hematologic malignancy. Resistance to TZP tends to occur concurrently with ceftriaxone (CRO) resistance; however, the prevalence of TZP nonsusceptibility in CRO susceptible *Escherichia coli* (*E. coli*) in patients with hematologic malignancy is unknown. Therefore, we sought to determine the prevalence of TZP nonsusceptible, CRO susceptible *E. coli* bacteremia at a cancer center.

Methods: This is a retrospective cohort study of adult (age > 18) patients with *E. coli* bacteremia admitted to the Leukemia or Stem Cell Transplant (SCT) services at The University of Texas MD Anderson Cancer Center (MDACC) between 8/2016 and 7/2019. Isolates were categorized according to current CLSI resistance breakpoints. A first isolate was defined as the first positive blood culture and subsequent episodes of bacteremia were defined as any *E. coli* isolate obtained at least 24 hours after the first negative blood culture.

Results: The overall prevalence of TZP resistant CRO susceptible *E. coli* from 404 isolates was 7.7% and varied by service. There was a higher prevalence in the Leukemia service compared to SCT, 9.8% vs 2.5%, respectively (p < 0.01). 46% of isolates were CRO nonsusceptible, of which 91% were extended-spectrum beta-lactamase (ESBL) producers, identified by Vitek 2 or Accelerate Pheno. The TZP MIC_{50} was 4ug/ml, MIC_{90} was 128ug/ml, with an MIC range of 3ug/ml to $\geq$ 256ug/ml. The TZP MIC distribution varied based upon CRO phenotype. In CRO susceptible isolates the MIC_{50} and MIC_{90} were 4ug/ml and 64ug/ml, respectively, compared to 8ug/ml and 128ug/ml in CRO nonsusceptible isolates (p < 0.01). TZP resistance was more common in CRO nonsusceptible isolates (31.6% vs 12.0%, p < 0.01) and was more frequent with subsequent episodes of bacteremia compared to the first (39.5% vs 20.1%, p < 0.01).

Conclusion: In patients with hematologic malignancy and *E. coli* bacteremia, TZP resistance is common with significant variations by CRO phenotype. TZP resistance becomes more common with subsequent episodes of bacteremia compared to the first. The clinical implications and genetic cause of this phenotype is currently unknown and warrants further investigation.

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306. Rapid Detection Of Bloodstream Infections, Including Molecular Characterization, From Whole Blood

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Session: P-9. Bacteremia

Background: Diagnosis of bloodstream infections (BSI) and treatment with appropriate antimicrobials is dependent upon fast and accurate information about the microorganism(s). The long time taken for a blood culture result, microbial identification and antimicrobial susceptibility testing (AST), can lead to poor antimicrobial stewardship. Many antimicrobial change decisions are based on the results of a Gram stain, with this being the first result available. Having results from a rapid test, direct from blood, which can confirm BSI and characterize the causative pathogen(s) would provide an improvement in antimicrobial stewardship and patient care.

Methods: SepsiSTAT* is a rapid molecular test, developed by Momentum Bioscience Ltd, for the detection of BSI, with a time-to-result of < 4 hours. It uses whole blood to detect viable microorganisms whilst also providing molecular characterization. Microorganisms are extracted from the sample using a proprietary process involving capture on magnetic microbeads. This is followed by Enzymatic Template Generation and Amplification (ETGA*) for ultra-sensitive, universal detection of viable bacterial and fungal species, based on detecting microbial DNA polymerase activity. Simultaneously, molecular characterization also provides genus/species identification. The detection limits of SepsiSTAT* were evaluated for a broad panel of microorganisms, representing 80% of BSI reported to Public Health England (2018 report).

Results: These results show a median detection limit (n=5) of < 10 cfu/mL in blood for microorganisms representing 77.4% of reported BSI, including key organisms such as *E. coli, S. epidermidis* and *C. albicans*. Notably, *S. aureus, P. aeruginosa, E. faecalis, P. mirabilis* and *S. marcescens* were all detected at < 1 cfu/mL.

Conclusion: SepsiSTAT* can detect microbes in low numbers, with a turnaround time substantially faster than traditional blood culture. Future development will aim to shorten time-to-results to < 3 hours, further benefiting patient outcomes and antimicrobial stewardship. Future studies in a clinical setting will seek to further demonstrate the efficacy and rapid turnaround time of the SepsiSTAT* test.

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