Table 2. Clinically significant *S. lugdunensis* bacteremia by criteria				
	N (%)			
	Total (N=36)	Single set + (N=24)	≥2 set + (N=12)	p-value
SIRS[a] criteria	26 (72)	20 (83)	6 (50)	0.05
Souvenir criteria	31 (86)	20 (83)	11 (92)	0.65
Clinical criteria	12 (33)	7 (29)	5 (42)	0.48
Infection on imaging	8 (22)	6 (25)	2 (17)	0.69
2nd culture site positive	6 (17)	2 (8)	4 (33)	0.15
Intervention applied[b]	28 (78)	17 (71)	11 (92)	0.22
P values were calculated using the Fisher Exact Test for categorical variables [a] Systemic inflammatory response syndrome [b] Antimicrobial therapy and/or central line removal				

Table 3. Outcomes of those with treated *S. lugdunensis* in blood cultures				
	N (%)			
	Total (N=36)	Single set + (N=24)	≥2 set + (N=12)	p-value
Antimicrobial Therapy	26 (72)	17 (71)	10 (83)	0.67
Duration of therapy >2 weeks	11 (31)	4	7	0.02
LOS[1] (days) (mean/IQR[2])	11 days (6.5)	13 days (8.3)	6 days (3.8)	0.29
Disposition				
Discharged from hospital	33 (92)	21 (88)	12 (100)	0.54
In hospital mortality	3 (8)	3 (13)	0	0.54
[1] Length of stay [2] Interquartile range				

Conclusion: SLB was rare and occurred more frequently as a single set of positive blood cultures. Though limited by sample size, this study found similar patient characteristics, clinical significance and outcomes between patients with one set and those with ≥2 sets of blood cultures positive for *S. lugdunensis*. Given the potential severity of SLB, it seems prudent to treat *S. lugdunensis* in a single blood culture, but larger studies are needed.

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299. Paediatric Collaborative Network on Infections in Canada (PICNIC) Study of the Current Landscape of Gram Negative Bacteremias

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Pediatric Investigators Collaborative Network on Infections in Canada (PICNIC)

Session: P-9. Bacteremia

Background: Antimicrobial resistance is a public health threat, invasive infection from multi-drug resistant gram-negative (MDRGN) pathogens is associated with significant morbidity and mortality. The incidence of MDRGN bacteremia in Canada is rising, and pediatric data is limited.

Methods: This retrospective chart review of paediatric patients with gram negative bacteremia in a multicenter PICNIC database (n=7 centers) from 2013 to 2017. MDRGN was defined as *enterobacteriaceae* that were resistant to third generation cephalosporins (including ESBL, CPE). Ethics approval was obtained at all sites, and data was entered into a secure REDCAP database, descriptive statistics are described herein.

Results: Of the 676 bacteremia patients in the database, 214 (31.7%) were gram negative pathogens. *E. coli* was the most frequent pathogen (59.8%, of which 22 of 128 were MDR), followed by *Klebsiella* (31.8%, of which 9 of 68 were MDR). Of the 31 MDRGNs, 19 were ESBL, 1 was a CPE, and 11 were nonspecific mechanisms of resistance. There were no multidrug resistant *Pseudomonas, Stenotrophomonas,* or *Acinetobacter.* The majority of patient were less than 3 months of age (59.3%) and were male (58.8%). The majority had an underlying comorbid condition; hematoncologic diagnosis accounting for 14.5%. Length of stay varied from 1 to 742 days (mean 72, standard deviation 88). 11% required admission to ICU, 10% required removal of a intravascular catheter, 7% required a change in ventilation status, 2% requiring procedural source control, and there was an 8% mortality rate. Treatment duration greater than 14 days occurred in 123 patients (61% of patients).

Table 1. Demographic and clinical data of cases.

	Number (%)
Total number of patients	214
Gender	
Male	126 (58.9)
Female	88 (41.1)
Median age	
Age group	
<12 months	147 (68.7)
>12 months	66 (30.8)
0-28 days	89 (41.6)
29 days to 3 months	38 (17.8)
3 months to 2 years	39 (18.2)
3 to 5 years	12 (5.6)
>5 years	35 (16.4)
Missing data	1 (0.5)
Underlying disease	
Hematology/oncology	31 (14.5)
Other	118 (55.1)
None	70 (33.7)
Total number of hospital days	10791
Mean length of stay	52
Standard deviation of length of stay	88
Range of length of stay	1 to 742
Community vs nosocomial onset	
Community onset	118 (57.3)
*Hospital acquired**	88 (42.7) (8 cases with missing data)
Antibiotic Treatment Duration	
Antibiotic treatment >14 days	123 (61.2) (13 cases with missing data)

*Hospital acquired: first positive blood culture occurred after 72 hours into admission

Table 2. Isolated species and patterns of resistance.

Pathogen	Total Number (% of total cases, n=214)	MDR* (% of total of each species)	ESBL** (% of total of each species)	Carbapenem Resistance (% of total of each species)
Escherichia coli	128 (59.8)	22 (17.1, n=128)	12 (9.4, n=128)	1 (0.8)
Klebsiella pneumoniae	49 (22.9)	7 (14.3, n=49)	5 (10.2, n=49)	/
Klebsiella oxytoca	19 (8.9)	2 (10.5, n=19)	2 (10.5, n=19)	/
Raoultella sp.	3 (1.4)	/	/	/
Not specified	17 (7.9)	/	/	/

***Multidrug resistance (MDR)** defined as having one of the following characteristics: ceftriaxone-resistant Enterobacteriaceae (indicative of ESBL producer); carbapenem-resistant Enterobacteriaceae (indicative of carbapenamase-producer); Enterobacteriaceae resistant to at least 2 of fluoroquinolones, aminoglycosides or trimethoprim.*

***Extended-spectrum beta-lactamase (ESBL)** defined as ceftriaxone-resistant Enterobacteriaceae.*

Table 3. Complications in treatment due to infection.

Characteristics	Number (% of total cases, n=214) (% of complex, n=165)
ICU admission due to infection	24 (11.2) (14.5)
Removal of intravascular catheter due to infection	22 (10.3) (13.3)
Change in ventilation requirements due to infection	15 (7.0) (9.1)
Infectious complication requiring surgical drainage	4 (1.9) (2.4)
Death	18 (8.4) (1.1)
Other complications due to infection	31 (14.5) (18.8)

Conclusion: This preliminary analysis of a multicenter review of pediatric gram negative bacteremias demonstrates a higher risk in neonates with comorbid conditions. A surprisingly prolonged treatment duration of greater than 14 days occurred in the majority of patients. Further analysis to assess factors associated with prolonged treatment durations, MDR infection, and complications is required. Gram negative bacteremia remains a significant cause of morbidity and mortality in pediatric patients.

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300. Pediatric Center Evaluation of the BioFire® Blood Culture Identification 2 Panel Versus the Original BioFire®FilmArray® Blood Culture Identification Panel for the Detection of Microorganisms and Resistance Markers in Positive Blood Cultures

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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.

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

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Session: P-9. Bacteremia

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

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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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Session: P-9. Bacteremia

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 blood 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