Minimal inhibitory concentrations (MICs) of selected antibiotics against A. odontolyticus, including interpretations and breakpoints, as reported by the AMRHAI reference unit, PHE Colindale

Antibiotics	MIC	S/I/R	Breakpoint
Co-amoxiclav	0.125	S	8 and 16
Cefotaxime	0.25	S	8 and 16
Ceftriaxone	0.25	S	8 and 32
Imipenem	0.064	S	2 and 4
Co-trimoxazole	0.125	S	2
Clarithromycin	=0.016	S	2 and 4
Linezolid	0.25	S	4
Ciprofloxacin	4	R	1 and 2
Moxifloxacin	2	I	1 and 2
Doxycycline	0.064	S	1 and 4
Minocycline	=0.016	S	1 and 4

Conclusion. Clinicians of all specialties need to be aware of the rising number of reports of Actinomyces species bacteraemia due to widespread availability of molecular identification techniques, including MALTI-TOF. 3 Furthermore, more studies are needed to determine guidelines for treating these resilient microbes

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219. Outcomes with Low- vs. High-bioavailability Oral Antibiotics in Treatment of Uncomplicated Gram-Negative Bacteremia

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Session: P-10. Bacteremia

Background. High-bioavailability (HIGH-BIO) oral agents (i.e. trimethoprim-sulfamethoxazole, fluoroquinolones) are increasingly utilized for definitive treatment of uncomplicated gram-negative (UGN) bloodstream infections (BSI). Literature supports use of HIGH-BIO agents as step-down therapy, but few studies have assessed use of low-bioavailability (LOW-BIO) agents (i.e. beta-lactams). Increased recurrence of BSI has been associated with LOW-BIO agents; suboptimal dosing of beta-lactam agents may have impacted outcomes. Trials have not assessed whether high-dose beta-lactams (HD-BL) improve clinical outcomes over low-dose beta-lactams (LD-BL) for UGN BSI.

Methods. This retrospective cohort study conducted between December 2016 and December 2020 included adults with UGN BSI administered oral step-down therapy for at least 1/3rd the total antibiotic duration. The primary outcome was incidence of treatment failure of HIGH-BIO compared to LOW-BIO agents within 90 days of completing oral therapy. Treatment failure was a composite of all-cause mortality, recurrent BSI, reinfection of the primary site, or transition to IV antibiotics after initiating oral therapy. Secondary outcomes were incidence of treatment failure of HIGH-BIO compared to HD-BL agents, and of HD-BL compared to LD-BL agents.

Results. Of 225 patients, 67 (29.8%) received a HIGH-BIO and 158 (70.2%) a LOW-BIO agent; of those in the LOW-BIO arm 126 (79.7%) received a HD-BL. The most common source of BSI was urinary (202 [89.8%]); transition to oral therapy occurred after a mean of 5 ± 2.39 days. No difference in treatment failure was observed (8 [11.9%] HIGH-BIO vs. 25 [15.8%] LOW-BIO, P = 0.45). A numerically higher number of patients in the LOW-BIO arm had recurrent BSI (4 [2.5%] LOW-BIO vs. 0 [0%] HIGH-BIO, P = 0.18). No difference in treatment failure was observed between HIGH-BIO and HD-BL agents (8 [11.9%] vs. 20 [15.9%], P = 0.46), or HD-BL and LD-BL agents (20 [15.9%] vs. 5 [15.6%], P = 0.97).

Conclusion. No difference in treatment failure was observed between groups; further study is needed due to failure to reach statistical power. A numerical trend towards increased recurrence of BSI was observed with LOW-BIO agents. Beta-lactams may be reasonable for step-down therapy of UGN BSI if HIGH-BIO agents are contraindicated.

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220. The Treatment of *Enterococcus* Blood Stream Infections in Patients Receiving Extracorporeal Membrane Oxygenation

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Session: P-10. Bacteremia

Background. **Background:** Extracorporeal membrane oxygenation (ECMO) is a growing modality of life support that is subject to a high rate of nosocomial infections. There is a paucity of data to guide treatment for infections on ECMO, which can lead to vastly different practice patterns at different centers. This case series describes the outcomes of patients with Enterococcus bacteremia at a single center.

Methods. A retrospective chart review was performed on all patients who received ECMO support at a tertiary academic medical center with ECMO capabilities between October 2012 and May 2020 with positive blood cultures for Enterococcus species.

Results. A total of 10 patients had Enterococcus bacteremia during the study period with *E. faecalis* (n=7, 70%) more commonly than *E. faecium* (n=3, 30%). Infections occurred more often in men (n=6, 60%) than women (n=4, 40%) with median age 36 (IQR: 31-42). Infections occured late in the hospitalization (median: 33 days (IQR: 26-59)) and after several weeks on the ECMO circuit (median: 24 days (22-52)). Infections were often polymicrobial (n=5, 50%). There were no cases of infective endocarditis. Infections were treated with 7-14 days of therapy with ampicillin being the most common antibiotic prescribed (n=5, 50%). Four (40%) patients were decannulated before completion of therapy. No patients had cannulas removed due to bacteremia. There were no cases of recurrence. Mortality was 20% in this cohort.

Clinical Characteristics of Patients with Enterococcus Bacteremia

Patient	Age	Sex	Diagnosis	Species	Co-Infection?	Antibiotic	Days of Therapy	Days until clearance	Days on ECMO after clearance	Survival to Discharge
1	37	F	Toxic Epidermal Necrolysis	*E. faecium*	No	Meropenem	14	1	19	Yes
2	20	M	Chemotherapy Toxicity	*E. faecium*	Yes-*P. aeruginosa*	Daptomycin	5	N/A	N/A-Died before clearance	No
3	35	M	Respiratory Distress Syndrome	*E. faecium*	Yes-*S. epidermidis*	Vancomycin Ceftaroline Daptomycin	3 4 14	7	N/A-Decannulated before clearance	Yes
4	39	M	Pulmonary Hemorrhage	*E. faecalis*	Yes-*A. baumannii*	Vancomycin	14	2	2	Yes
5	32	F	Influenza	*E. faecalis*	No	Ampicillin	14	2	50	Yes
6	43	F	Aspiration pneumonitis	*E. faecalis*	No	Ampicillin	14	3	31	Yes
7	21	M	Coccidioidomycosis	*E. faecalis*	Yes-*S. epidermidis*	Vancomycin	7	4	13	Yes
8	43	M	Influenza	*E. faecalis*	No	Ampicillin	7	6	N/A-Decannulated before clearance	Yes
9	30	M	Cavitary pneumonia	*E. faecalis*	Yes-*K. aerogenes*	Ceftriaxone/ Ampicillin	19/19	2	19	No
10	48	F	ANCA-associated vasculitis	*E. faecalis*	No	Ampicillin	14	4	49	Yes

Conclusion. Enterococcus is a common cause of blood stream infections in patients with prolonged courses on ECMO circuit. In this cohort of patients, Enterococcus did not cause any metastatic infections and was generally treated with 7-14 days of antibiotics without recurrence, despite many patients remaining on ECMO for extended periods after clearance. As ECMO use continues to expand, there will need to be more data on treatment outcomes of infections to establish best practices.

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221. Evaluation of Rates of Culture Positive Blood Stream Pathogens Prior to and During the SARS-CoV-2 Pandemic: A Multicenter Evaluation

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Session: P-10. Bacteremia

Background. Bacterial co-infections or super-infections are well-characterized complications of viral infections, further increasing morbidity and mortality of global viral pandemics. We evaluated trends in the incidence of culture positive gram-negative (GN), gram-positive (GP), and fungal/yeast pathogens from a blood source in hospitalized patients at US hospitals before and during the SARS-CoV-2 pandemic.

Table: Incidence and rate of blood pathogens in the pre and post SARS-CoV-2 period.

Blood Pathogen	Pre-SARS-CoV-2 (7/2019-2/2020; Total Admissions = 2,001,793)		During -SARS-CoV-2 (3/1/2020-5/19/2020)							
			SARS-CoV-2 Positive (Total Admissions = 125,303)		SARS-CoV-2 Negative (Total Admissions = 1,294,437)		SARS-CoV-2 Not Tested (Total Admissions = 1,455,483)		Total (Total Admissions = 2,875,219)	
	Organism N	Rate/1000 Adm	Organism N	Rate/1000 Adm	Organism N	Rate/1000 Adm	Organism N	Rate/1000 Adm	Organism N	Rate/1000 Adm
Gram-negative										
E. coli	17,748	8.9	359	2.9	6,156	4.8	2,599	1.8	9,114	3.2
K. pneumoniae	3,690	1.8	175	1.4	1,958	1.5	753	0.5	2,886	1.0
P. aeruginosa	1,364	0.7	94	0.8	833	0.6	343	0.2	1,270	0.4
P. mirabilis	1,590	0.8	75	0.6	771	0.6	275	0.2	1,121	0.4
E. cloacae	753	0.4	45	0.4	419	0.3	185	0.1	649	0.2
B. fragilis	357	0.2	26	0.2	378	0.3	152	0.1	556	0.2
S. marcescens	406	0.2	44	0.4	287	0.2	120	0.1	451	0.2
K. oxytoca	343	0.2	14	0.1	233	0.2	90	0.1	337	0.1
E. aerogenes	273	0.1	37	0.3	155	0.1	64	< 0.1	256	0.1
A. baumannii spp.	353	0.2	21	0.2	159	0.1	60	< 0.1	240	0.1
M. morganii	255	0.1	12	0.1	134	0.1	55	< 0.1	201	0.1
S. maltophilia	180	0.1	9	0.1	66	0.1	38	< 0.1	113	< 0.1
C. freundii	102	0.1	4	< 0.1	71	0.1	30	< 0.1	105	< 0.1
P. stuartii	63	< 0.1	10	0.1	59	< 0.1	16	< 0.1	85	< 0.1
Gram-positive										
S. aureus	12,797	6.4	636	5.1	6,050	4.7	2,642	1.8	9,328	3.2
Enterococcus	1,508	0.8	308	2.5	1,812	1.4	725	0.5	2,845	1.0
Grp B Strep	1,524	0.8	110	0.9	1,739	1.3	603	0.4	2,452	0.9
S. pneumoniae	1,703	0.9	70	0.6	659	0.5	372	0.3	1,101	0.4
Grp A Strep	849	0.4	47	0.4	631	0.5	305	0.2	983	0.3
Fungus/Yeast										
Non-C. albicans	1,259	0.6	250	2.0	1,033	0.8	470	0.3	1,753	0.6
C. albicans	762	0.4	251	2.0	660	0.5	293	0.2	1,204	0.4
Other - Candida	37	< 0.1	7	0.1	4	< 0.1	6	< 0.1	17	< 0.1

Gray indicates significantly lower rate compared to pre-pandemic time period, black indicates significantly higher rates compared to pre-pandemic.

Methods: This was a multi-center, retrospective cohort analysis of all hospitalized patients from 267 US acute care facilities with >1-day inpatient admission between 7/1/19-5/19/21 (BD Insights Research Database [Becton, Dickinson and Company, Franklin Lakes, NJ]). SARS-CoV-2 infection was identified by a positive PCR during or ≤7 days prior to hospitalization. All admissions with a non-contaminant culture positive GN, GP, and fungal/yeast pathogen from a blood source were evaluated prior to and during the SARS-CoV-2 pandemic as rates per 1,000 admissions ($p < .05$ for significance).

Results. There were 2,001,793 admissions in the pre-SARS-CoV-2 period (7/2019-2/2020) and 2,875,219 admissions during the SARS-CoV-2 pandemic. Incidence of GN/GP blood stream pathogens was significantly higher prior to the SARS-CoV-2 pandemic than during the pandemic. Higher rates of blood stream pathogens occurred in those who were tested for SARS-CoV-2, but all non-tested patients had significantly lower rates than pre-pandemic. Rates of *Candida spp.*, Enterococcus spp., *Serratia marcescens*, and *Enterobacter cloacae* were higher in SARS-CoV-2 positive patients compared to pre-pandemic patients. Compared to the prior pandemic period, the incidence of *B. fragilis*, *Streptococcus*, Enterococcus and *Candida* were higher among those tested for SARS-CoV-2 but were negative.

Conclusion. In general, rates of positive blood cultures for bacterial pathogens were either lower or similar during the SARS-CoV-2 period compared to the pre-SARS-CoV-2 pandemic period. The patients that were tested for SARS-CoV-2 but were positive who had higher rates of infection than prior may indicate the similarity in viral and bacterial clinical presentation. Further evaluation of higher rates of Enterococcus and Candida in the pandemic period are warranted.

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222. Clinical and Microbiological Characteristics of Common Bacterial Bloodstream Infections in the US Military Health System

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Session: P-10. Bacteremia

Background. Bloodstream infections (BSI) are associated with inpatient morbidity in the United States. We sought to characterize the epidemiology of common bacterial BSIs in individuals receiving care within the US Military Health System (MHS), which actively prospectively captures clinical and microbiological data from both retired and active-duty US Uniformed Service members and their beneficiaries.

Methods. We performed a retrospective cohort study analyzing MHS patients with blood cultures positive for all bacterial pathogens, between January 2010 and December 2019. Microbiological data captured by the Navy and Marine Corpse Public Health Center, excluding cultures isolating contaminants, were retrospectively collated with clinical and demographic data from the MHS Data Repository.

Results. The most frequent nine bacterial pathogens, as well as *Acinetobacter* spp. represented 17,206 episodes of BSI from 14,531 individuals. The cohort was predominantly male (59.4%) and ≥65 years old (48.7%). Most individuals were retired (N=5,249) or active duty (N=1,418) service members and their dependents (N=5,236). Median Updated Charlson Comorbidity Index Score was 2. Chronic pulmonary disease was the most frequent comorbid condition. Hospital admission was associated with 13,733 (79.8%) BSI episodes, including 5,870 admissions to the ICU. Overall, inpatient mortality was 8.3%. *E. coli* (29.7%, N= 5,114) was isolated with the highest frequency, followed by *S. aureus* (22.4%, N=3,853). Further, 9.5% of *E. coli* and 36.9% of *S. aureus* isolates were resistant to ceftriaxone and oxacillin, respectively. Beta-hemolytic streptococci represented the highest percentage (6.3%) of recurrent BSI episodes occurring at least 14 days post-initial BSI. Males or Native American race were most commonly infected with *S. aureus*. *E. coli* BSI was most common in all other demographic categories.

Frequency of Bacterial Blood Stream Infections in the US Military Health System

Bacterial Species	Frequency of All BSI Episodes	Total Patients with BSI Episodes	Patients with Multiple BSI Episodes, ≥14 days after initial BSI (% of Total Patients)
Escherichia coli	5,114	4,866	217 (4.5)
Staphylococcus aureus	3,853	3,581	218 (6.1)
Klebsiella pneumoniae	1,680	1,561	97 (6.2)
Streptococcus Beta-Hemolytic Group	1,356	1,253	79 (6.3)
Streptococcus species	1,193	1,168	23 (2.0)
Streptococcus Viridans Group	1,177	1,160	15 (1.3)
Enterococcus faecalis	1,059	991	60 (6.1)
Streptococcus pneumoniae	770	753	15 (2.0)
Pseudomonas aeruginosa	740	705	30 (4.3)
Acinetobacter species	264	253	6 (2.4)
Total	17,206	14,531*	730*

* not mutually exclusive

The most frequent nine bacterial pathogens, as well as Acinetobacter spp. in the US Military Health System.

Conclusion. We assessed the epidemiologic features of all individuals with BSI receiving care in the MHS over a 10-year period. We noted demographic differences in the occurrence of microbiological causes of BSI including *S. aureus*. Further assessments are underway into BSI-related risk factors for occurrence, antimicrobial resistance and mortality, after controlling for comorbidities and disease severity.

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223. The Value of Neutrophil to Lymphocyte Count Ratio for Predicting the Clinical Outcomes of Patients with Carbapenem-resistant *Klebsiella pneumonia* Blood Stream Infection

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Session: P-10. Bacteremia

Background. The neutrophil to lymphocyte count ratio (NLR) has been recognized as a useful marker of inflammation. But, the prognostic function of NLR in patients with Carbapenem-resistant *Klebsiella pneumonia* (CRKP) blood stream infection is still largely unknown. The aim of this study was to explore the relationship between postoperative NLR and mortality in those patients.

Methods. We performed a retrospective study based on the database from Computerized Patient Record System in Sir Run Run Shaw Hospital from 1/1/2017 to 31/10/2020. Logistic analysis was performed to assess the associations between NLR and 28-day mortality. Multivariate analyses were used to control for confounders.

Results. A total of 134 CRKP blood stream infection inpatients were included in this study, including 54 fatal cases and 80 survival cases on the 28-day after the onset of CRKP BSI, the overall 28-day mortality rate of patients with a CRKP BSI episode was 40.3% (54/134). We conducted a multivariate analysis on these 134 patients and found that APACHE II score on the 4th day (OR 1.379 95% CI 1.065- 1.785, $p = 0.015$), NLR on the 4th day (OR 1.134 95% CI 1.054- 1.221, $p = 0.001$) were significant risk factors for the 28-day mortality of CRKP BSI patients

Conclusion. Elevated NLR was significantly associated with increased 28-day mortality as well as APACHE II score on the 4th day after first positive culture.NLR is promising to be a readily available and independent prognostic biomarker for patients with CRKP blood stream infection.

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224. Evaluating the Epidemiology of Bloodstream Infections: A Population-Based Study

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Session: P-10. Bacteremia

Background. Bloodstream infections (BSI) are a major cause of morbidity, mortality, and health care costs worldwide. Population-based studies are key to assess BSI