

Table 1. Baseline Demographic and Clinical Characteristics of the Adult Inpatients with Sepsis, 2003–2017 at the CMUH (N = 48,706).

Characteristic	Adult sepsis population	Blood Culture Results		P-value*
		Positive (N=7402)	Negative (N=41304)	
Demographic				
Age, year	66 (53, 78)	67 (55, 77.8)	66 (52, 78)	<0.001
>=65 years old	25861 (53.1)	4133 (55.8)	21728 (52.6)	<0.001
Male	29343 (60.2)	4006 (54.1)	25337 (61.3)	<0.001
Recent hospitalization in 30 days	7132 (14.6)	1134 (15.3)	5998 (14.5)	0.074
Baseline Comorbidities*				
Diabetes mellitus	12544 (25.8)	2173 (29.4)	10371 (25.1)	<0.001
Hypertension	12753 (26.2)	1894 (25.6)	10859 (26.3)	0.205
Cardiovascular disease	14143 (29)	1841 (24.9)	12302 (29.8)	<0.001
CKD stage defined by eGFR				
Stage 1 & 2: >= 60 mL/min/1.73m ²	6261 (12.9)	1149 (15.5)	5112 (12.4)	<0.001
Stage 3a: 45-59 mL/min/1.73m ²	6411 (13.2)	1352 (18.3)	5059 (12.2)	<0.001
Stage 3b: 30-44 mL/min/1.73m ²	6630 (13.6)	1254 (16.9)	5376 (13)	<0.001
Stage 4: 15-29 mL/min/1.73m ²	6401 (13.1)	1090 (14.7)	5311 (12.9)	<0.001
Stage 5: <15 mL/min/1.73m ²	22870 (47)	2539 (34.3)	20331 (49.2)	<0.001
Liver cirrhosis	3690 (7.6)	755 (10.2)	2935 (7.1)	<0.001
Chronic lung disease	5305 (10.9)	822 (11.1)	4483 (10.8)	<0.001
Systemic antibiotic use in 14 days prior	7838 (16.1)	1047 (14.1)	6791 (16.4)	<0.001
Baseline biochemical profiles*				
White blood cell count, x 10 ³ per uL	11.7 (8, 16.4)	11.9 (7.4, 17.4)	11.7 (8, 16.2)	0.317
Procalcitonin, ng/mL	1.8 (0.4, 9.8)	8.9 (2, 34.4)	1.3 (0.3, 6.5)	<0.001
hs-CRP, mg/dL	7.5 (2.3, 17.9)	13.8 (4.9, 24.2)	6.9 (2, 16.6)	<0.001
Serum creatinine, mg/dL	1.2 (0.8, 2)	1.4 (1, 2.4)	1.2 (0.8, 2)	<0.001
Blood urea nitrogen, mg/dL	21.5 (13, 40)	26 (16, 46.5)	21 (13, 38)	<0.001
Platelet, x 10 ³ per uL	179 (116, 253)	145 (88, 216)	185 (122, 258)	<0.001
Total bilirubin, mg/dL	1.1 (0.7, 2.3)	1.5 (0.8, 3.2)	1.1 (0.7, 2.2)	<0.001
Lactate, mmol/L	2.36 (1.62, 3.7)	2.74 (1.8, 43.7)	2.29 (1.56, 35.5)	<0.001
Albumin, g/dL	3 (2.5, 3.5)	2.8 (2.4, 3.3)	3 (2.6, 3.5)	<0.001
Vital signs*				
Ear temperature, °C	37.1 (36.4, 38)	37.8 (36.7, 38.9)	37 (36.3, 37.9)	<0.001
Heart rate, per min	101 (85, 118)	107 (90, 123)	100 (84, 116)	<0.001
Systolic blood pressure, mmHg	126 (107, 147)	122 (103, 144)	126 (108, 147)	<0.001
Diastolic blood pressure, mmHg	73 (62, 85)	70 (59, 83)	74 (62.2, 86)	<0.001
Respiratory rate, per min	20 (19, 22)	20 (20, 22)	20 (19, 22)	<0.001
APACHE II	13 (8, 19)	13 (9, 20)	13 (8, 19)	0.002
qSOFA	1 (0, 1)	1 (0, 1)	1 (0, 1)	0.182
Organ dysfunction criteria				
Viscoperator	19677 (40.4)	3233 (43.7)	16444 (39.8)	<0.001
Invasive mechanical ventilation	21194 (43.5)	2239 (30.2)	18955 (45.9)	<0.001
Doubled Serum creatinine or >=50% decline eGFR	15088 (31)	2397 (32.8)	12691 (30.8)	<0.001
Total bilirubin >= 2 mg/dL and 100% increase	8904 (18.3)	1713 (23.1)	7191 (17.4)	<0.001
Platelet < 100 cells/uL and >= 50% decline	10236 (21)	1987 (26.8)	8249 (20)	<0.001
Serum lactate >= 2 mmol/L	20503 (42.1)	3645 (49.2)	16858 (40.8)	<0.001
Site of infection				
Genitourinary	6954 (20.2)	1984 (31.1)	4970 (17.7)	<0.001
Respiratory	13067 (38.1)	1239 (19.4)	11826 (42.3)	<0.001
Digestive	6041 (17.6)	1445 (22.6)	4596 (16.5)	<0.001
Outcomes				
Length of hospital stay (LOS), day	13 (7, 25)	13 (7, 24)	13 (7, 25)	0.509
ICU admission during index admission	25182 (51.7)	3130 (42.3)	22052 (53.4)	<0.001
Mortality	28769 (59.1)	4362 (58.9)	24407 (59.1)	0.795
In-hospital	9699 (19.9)	1624 (21.9)	8075 (19.8)	<0.001
7-day mortality	2851 (5.9)	529 (7.1)	2322 (5.6)	<0.001
30-day mortality	8386 (17.2)	1398 (18.9)	6988 (16.9)	<0.001
1-year mortality	19116 (39.2)	2961 (40)	16155 (39.1)	0.149

* P-values are calculated by Wilcoxon rank-sum test for continuous variables and chi-square test for categorical variables. P-values for trend are calculated by Spearman's correlation for continuous variables and by Cochran-Armitage trend test for categorical variables.
 * Comorbidities were defined by the ICD diagnosis that were obtained within 1 year prior to the onset time.
 * Biochemical profiles and vitals were measured at the closest time within +/- 2 days of the onset time.
 Abbreviations: CKD, chronic kidney disease; eGFR, estimated glomerular filtration rate; ICU, intensive care unit; IQR, interquartile range; LOS, length of hospital stay; SD, standard deviation.

Table 2. Hazard Ratio (95% Confidence Interval) for Mortality Associated with Culture-Positive Sepsis.

Outcomes	Crude Model		Model 1*		Model 2*	
	Adjusted HR (95% CI)	P-value	Adjusted HR (95% CI)	P-value	Adjusted HR (95% CI)	P-value
Mortality						
In-hospital	1.14 (1.08 - 1.21)	<0.001	1.06 (1.01 - 1.12)	0.032	0.99 (0.93 - 1.06)	0.862
7-day	1.28 (1.17 - 1.41)	<0.001	1.18 (1.07 - 1.30)	0.001	1.21 (1.08 - 1.37)	0.001
30-day	1.13 (1.07 - 1.20)	<0.001	1.06 (1.00 - 1.12)	0.068	0.97 (0.91 - 1.05)	0.475
1-year	1.04 (1.00 - 1.09)	0.028	0.98 (0.94 - 1.02)	0.325	0.93 (0.89 - 0.98)	0.005

* Model 1 was adjusted for age, gender, recent hospitalization status, hospital-acquired, baseline diabetes, cardiovascular disease, chronic kidney disease stage, chronic lung disease, baseline medication. (N = 48,573).
 * Model 2 was further adjusted for hs-CRP, blood urea nitrogen, sodium, heart rate status, organ dysfunction criteria, site of infection. (N = 32,674).
 Abbreviations: CI, confidence interval; HR, hazard ratio.

Conclusion: Sepsis rate increased while the mortality decreased, indicating the improvement of sepsis management in the past 15 years. The clinical characteristics of CN and CP sepsis were comparable, except for the lower inflammatory markers found in CN sepsis. Patients with CP sepsis had 21% higher risk of 7-day mortality. Next, we will link with National Health Insurance Database to examine admission history and antibiotic use in other institutions.

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269. Clinical Characteristics and Outcomes of Persistent *Staphylococcus aureus* Bacteremia

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Background: *Staphylococcus aureus* bacteremia (SAB) is a leading cause of bacteremia and persistent SAB is associated with poor outcomes. We evaluated key clinical characteristics and outcomes associated with persistent SAB.

Methods: We reviewed patients enrolled in a prospective cohort of adult patients with *S. aureus* bacteremia at a tertiary hospital from August 2008 to December 2018. Clinical characteristics, outcomes, and microbiologic characteristics of patients with persistent bacteremia (≥ 3 d) were evaluated.

Results: Of the total 969 patients, 617 (63.7%) patients had persistent bacteremia. The median duration of bacteremia with persistent bacteremia was 5 days. The most common sources of persistent bacteremia were central venous catheter-related infection (33.4%) and bone and joint infection (14.9%). Methicillin resistant *S. aureus* (MRSA) isolates were analyzed in 372 (60.3%) patients and metastatic infections were 217 (35.2%) with persistent bacteremia. In the multivariate analysis, APACHE II score (adjusted odds ratio [aOR], 1.07; 95% confidence interval [CI], 1.03–1.10), Charlson comorbidity index score (aOR, 1.14; 95% CI, 1.04–1.25), liver cirrhosis (aOR, 2.47; 95% CI, 1.44–4.23), and *S. aureus* pneumonia (aOR, 3.04; 95% CI, 1.29–7.18) were independently associated with 30-d mortality. In persistent MRSA bacteremia, ST5-SCCmecII was 59.7% (222/372) and *agr* dysfunction was 64.8% (241/372). After adjusting for confounding factors, APACHE II score (aOR, 1.08; 95% confidence interval [CI], 1.04–1.12), liver cirrhosis (aOR, 3.09; 95% CI, 1.56–6.14), and *S. aureus* pneumonia (aOR, 4.37; 95% CI, 1.40–13.67) were independently associated with 30-d mortality.

Table 1. Demographic and Clinical characteristics of Patients With Persistent Bacteremia

Characteristic	Persistent Bacteremia (n = 617)
Age (yr), median (IQR)	63 (53–71)
Male	382 (61.9)
Place of acquisition	
Community-acquired nonhealthcare-associated	112 (18.2)
Community-acquired healthcare-associated	187 (30.3)
Hospital-acquired	318 (51.5)
Underlying disease	
Diabetes mellitus	208 (33.7)
Solid tumor	212 (34.4)
Liver cirrhosis	93 (15.1)
End state renal disease	82 (13.3)
Cardiovascular disease	56 (9.1)
Hematologic malignancy	49 (7.9)
Prior antibiotic use within 1 mo	
Methicillin-resistant isolate	372 (60.3)
Community-acquired MRSA	22 (3.6)
Charlson comorbidity index, median (IQR)	
APACHE II, median (IQR)	16 (12–20)
Pitt bacteremia score, median (IQR)	
Septic shock	138 (22.4)
Central venous catheter	255 (41.3)
Prosthetic device ^a	133 (21.6)
Characteristics of infection	
CVC-related infection	206 (33.4)
Removal of CVC	198/206 (96.1)
Bone and joint infection	92 (14.9)
Primary bacteremia	71 (11.5)
Skin and soft tissue	48 (7.8)
Infective endocarditis ^b	40 (6.5)
Surgical site infection	30 (4.9)
Pneumonia	26 (4.2)
Peripheral catheter-related infection	24 (3.9)
Metastatic infection	217 (35.2)
Lung (septic pneumonia)	65 (10.5)
Skin and soft tissue	61 (9.9)
Bone and joint	50 (8.1)
Central nervous system	39 (6.3)
Eye (endophthalmitis)	38 (6.2)
Cardiac valve (endocarditis)	20 (3.2)
Eradicable focus	
Removal of eradicable focus	319/351 (90.9)
Time of removal (d), median (IQR)	2 (0–4)
Duration of antibiotic treatment (d), median (IQR)	
Hospital duration after SAB (d), median (IQR)	29 (17–50)
Relapse of bacteremia within 12 wk	31 (5.0)
In-hospital crude mortality	140 (22.7)
30-d mortality	113 (18.3)
12-wk mortality	192 (31.1)
Infection-attributable mortality	124 (20.1)

IQR, interquartile range; APACHE II, acute physiology and chronic health evaluation II; CVC, central venous catheter; SAB, *Staphylococcus aureus* bacteremia
^aProsthetic devices were orthopedic device (32 patients), cardiovascular implantable electronic devices (9 patients), prosthetic valve (23 patients), and vascular graft (64 patients) in the persistent bacteremia group.
^bEchocardiography was performed in 91.9% (567/617) of patients with persistent bacteremia.

Table 2. Microbiologic Characteristics and Genotypes in MRSA Isolates Responsible for Persistent Bacteremia

Characteristic	Persistent Bacteremia (n = 372)
Multi-locus sequence type	
ST5	222 (59.7)
ST72	116 (31.2)
ST239	12 (3.2)
ST8	7 (1.9)
SCC_{mec} type	
I	2 (0.5)
II	228 (61.3)
III	14 (3.8)
IV	125 (33.6)
NID	3 (0.8)
agr Genotype	
I	139 (37.4)
II	221 (59.4)
III	7 (1.9)
IV	1 (1.3)
NID	4 (1.1)
agr Dysfunction	
	241 (64.8)
ST5-SCC_{mec}II	
	222 (59.7)
ST72-SCC_{mec}IV	
	116 (31.2)
Vancomycin MIC by BMD	
≤1.0 mg/L	268 (72.0)
1.5 mg/L	93 (25.0)
≥2.0 mg/L	11 (3.0)
Vancomycin trough level <15mg/L^a	
	157/309 ^b (50.8)
Vancomycin trough level (mg/L), median (IQR)	
	15 (10-21)
Vancomycin trough level/MIC, median (IQR)	
	9.3 (5.5-16)
Appropriate empirical antibiotic treatment^c	
	259 (69.6)
Time to initiation of appropriate antibiotics (d), median (IQR)	
	1 (0-2)

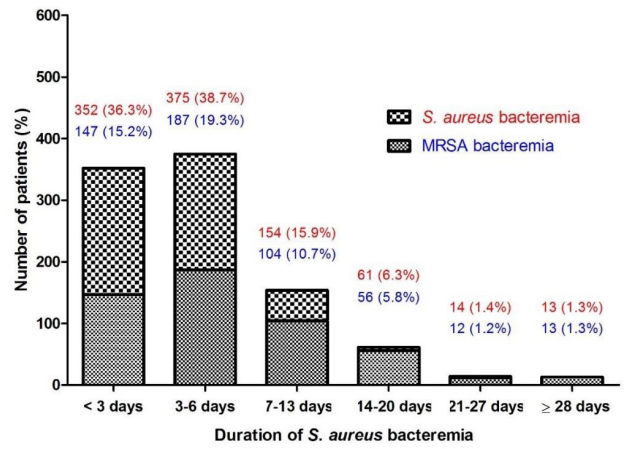
ST, sequence type; SCC, staphylococcal cassette chromosome; NID, not identified; MIC, minimum inhibitory concentration; BMD, broth microdilution method

^a Mean trough level during the first 7 days of vancomycin therapy

^b 309 patients were received initial vancomycin therapy

^c Administration of at least one susceptible antibiotic against the organism within 24 h after the index blood culture was considered as the appropriate empirical treatment.

Fig 1. Duration of Staphylococcus aureus bacteremia



Conclusion: In persistent bacteremia, clinical factors, including APACHE II score, Charlson comorbidity index score, liver cirrhosis, and *S. aureus* pneumonia contribute to 30-d mortality.

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