# Unplanned Readmission after Hospitalization with Staphylococcus aureus Bacteremia in Children: a Multistate **Population Based Study**

Kengo Inagaki MD<sup>a,b</sup>, Md Abu Yusuf Ansari MS<sup>c</sup>, Charlotte V. Hobbs MD<sup>a</sup> <sup>a</sup>Department of Pediatrics, Division of Infectious Disease, <sup>b</sup>Department of Population Health Science, <sup>c</sup>Department of Data Science University of Mississippi Medical Center, Jackson, Mississippi

### RESULTS Background S. aureus bacteremia is associated with Table. Characteristics of 1240 hospitalized children with S. aureus bacteremia substantial morbidity Readmission is being increasingly used as a quality measure Readmission has been uncharacterized in Character children with *S. aureus* bacteremia Demograp Such data may serve as benchmark for Male sex future studies or quality improvement Age, years 0-1 efforts 2-7 8-14 Objectives 15-18 Primary ir Medicai - To characterize 30-day and 90-**Private** day unplanned readmission Other ( State among children hospitalized **Florida New Yo** with S. aureus bacteremia Washin **Clinical cl** Comorbi METHODS Hemato Solid org **Retrospective study using State Inpatient** Hemato Database from NY, FL, and WA, 2009-2015 Solid org **Primary** ICD-9 codes were used to characterize Autoim records Diabete Chi-squared test and Mann-Whitney U test **End-stag** Coexistin were used for bivariate analysis Skin and **Cox-proportional hazards regression** Musculo was used for multivariable analysis Pneumo Cells with < 10 observations were Cathete included in analysis but omitted from Infective **Other clir** presentation following the **MRSA**

Length of

recommendation by HCUP

	No	30-day		
	readmission	Readmission		
	N = 1017	N = 223	Bivariate Analysis	
stics	N (%)	N (%)	p value <sup>a</sup>	- 30
hic characteristics				re
	622 (61.2%)	132 (59.2%)	0.64	18
			0.33	
	254 (25.0%)	47 (21.1%)		
	233 (22.9%)	62 (27.8%)		re
	261 (25.7%)	60 (26.9%)		28
	269 (26.5%)	54 (24.2%)		
surance			0.058	
	582 (57.2%)	145 (65.0%)		
	368 (36.2%)	62 (27.8%)		
cluding uninsured)	67 (6.6%)	16 (7.2%)		
			0.16	
	292 (28.7%)	76 (34.1%)		
٢	516 (50.7%)	111 (49.8%)		
ton	209 (20.6%)	36 (16.1%)		
aracteristics				
ties				
ogic malignancy	64 (6.3%)	29 (13.0%)	<0.001	
an malignancy	33 (3.2%)	13 (5.8%)	0.098	
oietic stem cell transplant	16 (1.6%)	<10 <sup>c</sup>	0.39	
an transplant	28 (2.8%)	11 (4.9%)	0.14	
mmunodeficiency	20 (2.0%)	<10 <sup>c</sup>	>0.99	
une/inflammatory	37 (3.6%)	<10 <sup>c</sup>	>0.99	
mellitus	23 (2.3%)	<10 <sup>c</sup>	0.89	
e renal disease	37 (3.6%)	15 (6.7%)	0.058	
infectious conditions				
soft tissue infections	188 (18.5%)	17 (7.6%)	< 0.001	
skeletal infections <sup>b</sup>	251 (24.7%)	35 (15.7%)	0.005	
nia	173 (17.0%)	39 (17.5%)	0.94	
related infection	201 (19.8%)	88 (39.5%)	<0.001	
endocarditis <sup>b</sup>	57 (5.6%)	11 (4.9%)	0.81	
cal characteristics				
	367 (36.1%)	76 (34.1%)	0.62	
stay, median days [IQR]	11 [6-21]	16 [9-28]	<0.001	

## **RESULTS (Cont'd)**

### Figure. Multivariable analysis of risk factors for 30-day unplanned readmission

Male Age, years 0-1 2-7 8-14 15-18 Race/Ethnicity Non-Hispanic white Non-Hispanic black Hispanic Others Primary insurance Medicaid Private Other (including uninsured) State Florida New York Washington Comorbidities Hematologic malignancy Brain tumor and solid organ malignancy Hematopoietic stem cell transplant Solid organ transplant Primary immunodeficiency Autoimmune/inflammatory Diabetes mellitus End-stage renal disease Coexisting infectious conditions Skin and soft tissue infections Musculoskeletal infection Pneumonia CLABSI Infective endocarditis Other clinical characteristics MRSA Length of stay 0.12 0.25

<sup>a</sup> obtained using Cox proportional hazards regression, <sup>b</sup> includes those with prosthetic infections

### SUMMARY

- its previously undercharacterized outcome in children
- aureus bacteremia in children

0-day unplanned admission rate: 8% 0-day unplanned admission rate: 8.3%



ΓΥ OF MISSISSIPP



## S. aureus bacteremia is associated with a high rate of unplanned readmission, reflecting - Malignancies and catheter related infections are more likely to be readmitted

- Further research is needed to identify optimal interventions to improve outcomes of S.



Hazard Ratio (95%CI) <sup>ª</sup>	P value
0.91 (0.69-1.20)	0.50
Reference 1.21 (0.80-1.82) 1.41 (0.92-2.17) 1.14 (0.74-1.75)	0.37 0.12 0.56
Reference 1.21 (0.85-1.72) 1.18 (0.80-1.72) 0.96 (0.61-1.51)	0.30 0.40 0.87
1.35 (0.98-1.88) Reference 1.24 (0.68-2.26)	0.068 0.49
1.22 (0.81-1.83) 1.32 (0.85-2.04) Reference	0.34 0.22
1.67 (1.09-2.56)	0.018
1.46 (0.81-2.61)	0.21
1.03 (0.43-2.45)	0.94
1.50 (0.80-2.83)	0.21
0.78 (0.29-2.13)	0.63
0.75 (0.36-1.58)	0.46
0.95 (0.41-2.22)	0.91
1.13 (0.62-2.07)	0.69
0.42 (0.24-0.71)	0.0014
0.69 (0.46-1.04)	0.078
1.05 (0.72-1.52)	0.80
1.79 (1.31-2.45)	<0.001
0.78 (0.42-1.47)	0.45
1.04 (0.77-1.40)	0.80
1.003 (0.999-1.007)	0.10

	No readmission	Readmission
	N = 1017	N = 223
Characteristics	N (%)	N (%)
Demographic characteristics		
Sex		
Male	622 (61.2%)	132 (59.2%)
Female	395 (38.8%)	91 (40.8%)
Age, years		
0-1	254 (25.0%)	47 (21.1%)
2-7	233 (22.9%)	62 (27.8%)
8-14	261 (25.7%)	60 (26.9%)
15-18	269 (26.5%)	54 (24.2%)
Race/Ethnicity		
Non-Hispanic white	467 (47.7%)	89 (40.8%)
Non-Hispanic black	208 (21.2%)	58 (26.6%)
Hispanic	163 (16.6%)	45 (20.6%)
Others	141 (14.4%)	26 (11.9%)
Primary insurance		
Medicaid	582 (57.2%)	145 (65.0%)
Private	368 (36.2%)	62 (27.8%)
Other (including uninsured)	67 (6.6%)	16 (7.2%)
State		
Florida	292 (28.7%)	76 (34.1%)
New York	516 (50.7%)	111 (49.8%)
Washington	209 (20.6%)	36 (16.1%)
Clinical characteristics		
Comorbidities		
Hematologic malignancy	64 (6.3%)	29 (13.0%)
Brain tumor and solid organ malignancy	33 (3.2%)	13 (5.8%)
Hematopoietic stem cell transplant	16 (1.6%)	<10 <sup>c</sup>
Solid organ transplant	28 (2.8%)	11 (4.9%)
Primary immunodeficiency	20 (2.0%)	<10 <sup>c</sup>
Autoimmune/inflammatory	37 (3.6%)	<10 <sup>c</sup>
Diabetes mellitus	23 (2.3%)	<10 <sup>c</sup>
End-stage renal disease	37 (3.6%)	15 (6.7%)
<b>Coexisting infectious conditions</b>		
Skin and soft tissue infections	188 (18.5%)	17 (7.6%)
Musculoskeletal infections <sup>b</sup>	251 (24.7%)	35 (15.7%)
Pneumonia	173 (17.0%)	39 (17.5%)
Catheter related infection	201 (19.8%)	88 (39.5%)
Infective endocarditis <sup>b</sup>	57 (5.6%)	11 (4.9%)
Other clinical characteristics		
MRSA	367 (36.1%)	76 (34.1%)
Length of stay, median days [IQR]	11 [6-21]	16 [9-28]
	• • • •	

Bivariate
Analysis
p value <sup>a</sup>
0.64
0.01
0 33
0.33
0.000
0.088
0.058
0.16
<0.001
0.098
0.39
0.14
>0.99
>0.99
0.89
0.058
<0.001
0.005
0.94
<0.001
0.81
0.62
<0.02
<b>\U.UUT</b>