No Device, But Still A Problem: A Five-Year Review of Healthcare Associated Bloodstream and Urinary Tract Infections in a Children's Hospital

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Background

Central line-associated bloodstream infection (CLABSI) and catheter-associated urinary tract infection (CAUTI) continue to be the focus of external reporting of healthcare associated infections based on CDC-NHSN criteria. As facilities decrease CLABSI and CAUTI, we sought to characterize and understand our non-central line bloodstream infections (NCLABSI) and non-catheter urinary tract infections (NCAUTI).

Methods

We retrospectively reviewed total healthcare associated bloodstream infections (HABSI) (NCLABSI + CLABSI) and healthcare associated urinary tract infections (HAUTI) (NCAUTI + CAUTI) from July 1, 2016 to June 30, 2021 at our 334-bed quaternary care Children's Hospital. CLABSI and CAUTI were both defined using CDC-NHSN criteria. Epidemiologic and microbiologic data, total antibiotic days related to infection, and mortality were analyzed for each subgroup.

Results

In a 5-year period, 255 patients were identified with HABSI and HAUTI; 164 were HABSI (26% NCLABSI, 74% CLABSI) and 91 were HAUTI (79% NCAUTI, 21% CAUTI). While our NCLABSI, CLABSI, and CAUTI infections per fiscal year (FY) have remained relatively stable, our NCAUTIs have increased since FY17 (Figure 1). *Staphylococcus aureus* was the predominant pathogen in all HABSIs (16% CLABSI, 31% NCLABSI). *Pseudomonas aeruginosa* was seen in 15% of CLABSIs but in no NCLABSIs. *P. aeruginosa* was seen in both CAUTI (32%) and NCAUTI (11%). *Escherichia coli* was the predominant pathogen in NCAUTI (39%) (Figure 2). Total antibiotic days for NCLABSI versus CLABSI and for NCAUTI versus CAUTI were similar (Figure 3). There were 2 NCLABSI (5%), 16 CLABSI (13%), 2 NCAUTI (3%) and 2 CAUTI (11%) patient deaths during hospitalization.

Results

Figure 1

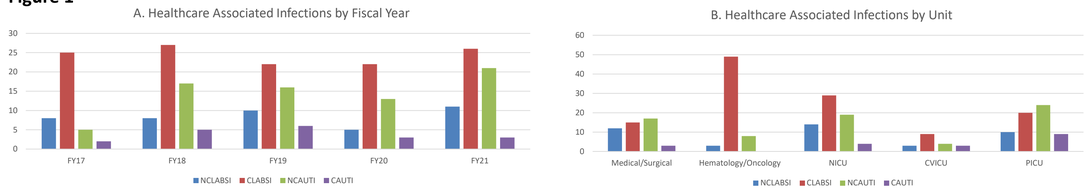
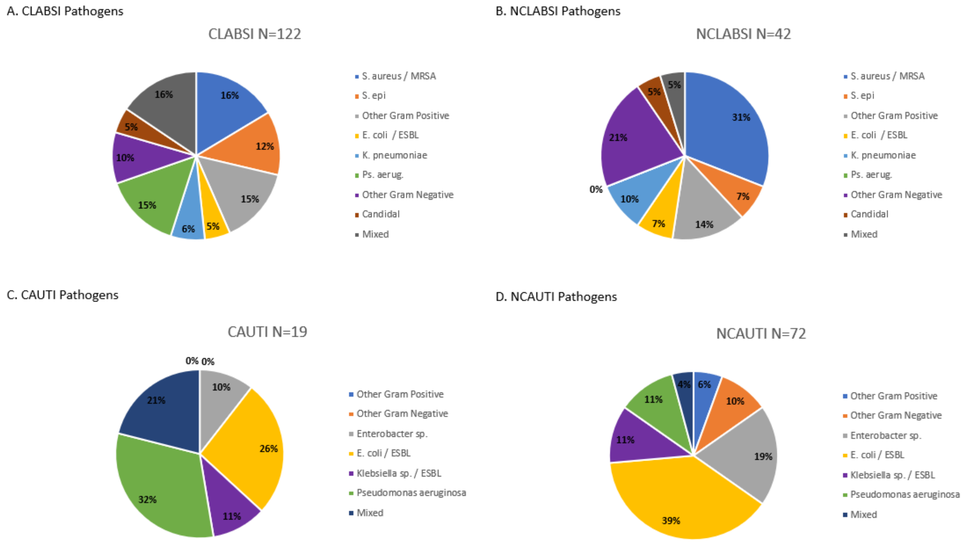


Figure 2: Pathogens for all Healthcare Associated Infections



Results

	NCLABSI (n=42)	CLABSI (n=122)
Line Type:		
No Line	8	0
PIV	26	0
Midline	1	1
PICC	5	45
Tunneled CL (Port, Broviac, Medcomp)	1	55
Tunneled CL (Femoral, Subclavian, IJ)	0	6
Multiple CL	1	6
UVC	0	9
Epidemiology:		
Average Age	3.46 years	5.93 years
Ethnicity:		
White	12	25
Hispanic - White/Other	18	71
Black - African American	2	11
Asian	6	10
Unknown	4	5
Average Antibiotic Days:	12.09 days (n=42)	14.75 days (n=121*)
CL Needed After Infection:	15 (36%)	94 (77%)
CL Removed After Infection:	3 (7%)	58 (48%)

*Patient was transferred without end date of antibiotic set

Figure 3A: Comparison of NCLABSI vs. CLABSI. Eligible central lines to be determined a CLABSI as per CDC-NHSN guidelines include central lines that have been in place for more than 2 consecutive calendar days following first access of central line. The 8 patients with central lines in the NCLABSI group had lines placed within 48 hours of blood culture returning positive.

	NCAUTI (n=72)	CAUTI (n=19)
Type of Catheter:		
No Catheter	61	1
Intermittent Catheterization	9	0
Foley	2	18
Epidemiology:		
Average Age:	6.69 years	3.47 years
Ethnicity:		
White	15	3
Hispanic - White/Other	44	13
Black - African American	2	0
Asian	4	1
Pacific Islander	2	0
Unknown	5	2
Average Antibiotic Days	10.57 days (n=72)	10.89 days (n=18*)
Catheter Removed After Infection	2 (3%)	14 (74%)
CL Needed After Infection	31 (43%)	12 (63%)

Figure 3B: Comparison of NCAUTI vs. CAUTI. Eligible catheters to be determined a CAUTI as per CDC-NHSN guidelines include an indwelling urinary catheter that have been in place for more than 2 consecutive calendar days. The 2 patients with foley catheters in the NCAUTI group had foleys placed within 48 hours of urine culture returning positive.

Discussion

While CLABSI and CAUTI remain significant sources of preventable infection, our awareness may need to shift to include the impact of non-device associated infections. Our NCAUTIs have increased, particularly *P. aeruginosa* NCAUTI, typically an important pathogen with device-associated infections. Broadening our focus to include all healthcare associated infections may give us a better understanding of our potential ability to prevent such infections moving forward. Total HABSI and HAUTI may provide more objective measures to report. Identified epidemiologic factors for all healthcare associated infections will allow us to look for methods and practices that may also decrease non-device associated infections.

References

CDC-NHSN Patient Safety Component Manual. 2016-2021, Chapters 4 and 7.

Gornick, W., Huff, B., Singh, J. 2020. *No Device, No Problem? Healthcare Associated Bloodstream and Urinary Tract Infections in a Children's Hospital*. 6th International Conference on Healthcare Associated Infections. March 26-30, 2020. Atlanta, Georgia.

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