

Presentation Type:

Poster Presentation - Top Poster Abstract

Subject Category: Antibiotic Stewardship

Capitalizing on Implementation Science to Advance Antimicrobial Stewardship and Health Equity in Treating Pediatric UTI's

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Background: Pediatric urinary tract infections represent the most common pediatric infection with increasing gram-negative antibiotic resistance. Overutilization of antimicrobials including third generation cephalosporins are known drivers of this resistance. Antimicrobial stewardship (AS) efforts have recently shown that antibiotic selection may be influenced by patient race. Implementation science (IS) can provide frameworks and strategies to improve antimicrobial utilization and equity. **Methods:** This was a pre/post study of 2 geographically different children's hospitals general pediatric floors assessing the impact of a set of implementation strategies developed to improve provider knowledge of best practice antimicrobials (based on local susceptibilities for treatment of UTI's) and influence uptake of best practice prescribing. IS strategies included provider education, local clinical champion and opinion leader involvement, leadership involvement, local policy changes, and stakeholder co-design of decision support tools (a clinical pathway, a specific ITI antibiogram, and a dynamic order set). No education was provided regarding racial differences in prescribing habits. Outcomes were measured utilizing a portion of the RE-AIM Framework of assessing adoption of "Right" antibiotic, order set adoption, and equitable reach (racial differences in prescribing). **Results:** Hospital A and B had a first-generation cephalosporin prescription rate of 29.7% (n=441) and 20.6% (n=557) pre implementation and 44.6% (n=84) and 47.5% (n=118) post (p < 0.001). Both hospitals also saw a significant reduction in third-generation cephalosporins. In Hospital A, APRN's were more likely to prescribe a first generation cephalosporin (52.4%) than a DO (42.1%) or MD (26.4%) pre-implementation (p=0.004). In Hospital B, APRN's were less likely to prescribe first generation cephalosporins (5.4%) than a DO (28.9%) or MD (19.4%) pre-implementation (p=0.004). No statistical significance was seen post implementation for antimicrobial selection by provider type for either hospital. Based on race, both hospitals had Black and Other patients receiving more first-generation cephalosporins while white patients were more likely to receive third-generation cephalosporins (p=0.033) pre implementation. No statistical significance was seen post implementation for antimicrobial selection based on race. No improvement was seen in order set utilization. **Conclusion:** With order set utilization not improving with implementation of new dynamic order set, other strategies such as education, clinical champion and opinion leader involvement, and provision of a local UTI antibiogram were likely contributors to the improvement in best antimicrobial for treatment of UTI's. Further mixed method research is warranted to improve understanding of the relative performance of our strategies, especially the lack of provider adoption of the novel dynamic order set.

Disclosure: Jessica Snowden: Advisory board - Pfizer

Antimicrobial Stewardship & Healthcare Epidemiology 2024;4(Suppl. S1):s10

doi:10.1017/ash.2024.107

Presentation Type:

Poster Presentation - Top Poster Abstract

Subject Category: C. difficile

Molecular and Epidemiological Characterization of Pediatric and Adult C. difficile Infection in Canadian Hospitals, 2015-2022

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Background: The molecular and epidemiological landscape of C. difficile infection (CDI) has evolved markedly in the last decade; however, limited information is available contrasting differences between adult and pediatric populations. We describe a multicenter study evaluating healthcare-associated (HA) and community-associated (CA) adult and pediatric-CDI identified in the Canadian Nosocomial Infection Surveillance Program (CNISP) network from 2015 to 2022. **Methods:** Hospitalized patients with CDI were identified from up to 84 hospitals between 2015-2022 using standardized case definitions. Cases were confirmed by PCR, cultured, and further characterized using ribotyping and E-test. We used two-tailed tests for significance (p<0.05). **Results:** Of 30,817 cases reported, 29,245 were adult cases [HA-CDI (73.2%), CA-CDI (26.8%)] and 1,572 were pediatric cases [HA-CDI (77.7%), CA-CDI (22.3%)]. From 2015 to 2022, HA-CDI rates decreased 19.7% (p=0.007) and 29.4% (p=0.004) in adult and pediatric populations, respectively (Figure 1). CA-CDI rates remained relatively stable in the adult population (p=0.797), while decreasing 60.7% in the pediatric population (p=0.013). Median ages of adult and pediatric patients were 70 (interquartile range (IQR), 58-80) and seven (IQR, 3-13) years, respectively. Thirty-day all-cause mortality was significantly higher among adult vs. Pediatric CDI patients (11.0% vs 1.4%, p < 0.0001). No significant differences in other severe outcomes were found. Ribotyping and



susceptibility data were available for 4,620 samples: 3,558 adult (77.0%) and 1,062 pediatric (23.0%). The predominant adult and pediatric ribotypes (RT) were 106 (12.2/16.2%), 027 (11.4/3.2%), and 014 (8.8/8.2%). Overall, RT027 prevalence significantly decreased from 17.9% in 2015 to 3.2% in 2022 (p=0.003), while RT106 increased from 8.5% to 14.4%. Resistance rates among adult and pediatric isolates were similar for all antimicrobials tested except moxifloxacin (16.2% vs. 6.2%, p < 0.0001, respectively). Adult moxifloxacin resistance decreased from 30% to 6.3% from 2015 to 2022 (p=0.006). Adults with moxifloxacin-resistant CDI were older (median: 74 vs. 69 years, p < 0.001) and had higher thirty-day all-cause mortality (13% vs. 9.8%, p=0.041) and recurrence (10% vs. 5.7%, p < 0.001) compared to those with moxifloxacin non-resistant CDI, while these trends were not observed in pediatric patients. Among RT027 strains, moxifloxacin resistance decreased from 91.0% in 2015 to 7.1% in 2022. There was one metronidazole-resistant pediatric sample in 2018 and no resistance to vancomycin or tigecycline in either population. **Conclusion:** We have found differences in the epidemiological and molecular characteristics of adult and pediatric CDI, with higher thirty-day all-cause mortality among adults. Overall, RT106 has replaced RT027 as the predominant ribotype with a concomitant decrease in fluoroquinolone resistance.

Antimicrobial Stewardship & Healthcare Epidemiology 2024;4(Suppl. S1):s10-s11
doi:10.1017/ash.2024.108

Presentation Type:

Poster Presentation - Top Poster Abstract

Subject Category: CLABSI

Impact of Vascular Access Teams on Central Line Associated Bloodstream Infections

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Background: During the COVID-19 pandemic, rates of central line bloodstream infections (CLABSI) increased nationally. Studies pre-pandemic showed improved CLABSI rates with implementation of a standardized vascular access team (VAT).[PL1] [PL2] [mi3] Varying VAT resources and coverage existed in our 10 acute care facilities (ACF) prior to and during the pandemic. VAT scope also varied in 1) process for line selection during initial placement, 2) ability to place a peripherally inserted central catheter (PICC), midline or ultrasound-guided peripheral IV in patients with difficult vascular access, 3) ownership of daily assessment of central line (CL) necessity, and 4) routine CL dressing changes. We aimed to define and implement the ideal VAT structure and evaluate the impact on CLABSI standardized infection ratios (SIR) and rates prior to and during the pandemic. **Methods:** A multidisciplinary workgroup including representatives from nursing, infection prevention, and vascular access was formed to understand the current state of VAT responsibilities across all ACFs. The group identified key responsibilities a VAT should conduct to aid in CLABSI prevention. Complete VAT coverage[mi4] was defined as the ability to conduct the identified responsibilities daily. We compared the SIR and CLABSI rates between hospitals who had complete VAT (CVAT) coverage to hospitals with incomplete VAT (IVAT) coverage. Given this work occurred during the pandemic, we further stratified our analysis based on a time frame prior to the pandemic (1/2015 – 12/2019) and intra-pandemic (1/2020 - 12/2022). **Results:** The multidisciplinary team identified 6 key components of complete VAT coverage: Assessment for appropriate line selection prior to insertion, ability to insert PICC and midlines, daily CL and midline care and maintenance assessments, daily assessment of necessity for CL, and weekly dressing changes for CL and midlines[NA5] . A cross walk of VAT scope (Figure 1) was performed in October 2022 which revealed two facilities (A and E) which met CVAT criteria. Pre-pandemic, while IVAT CLABSI rates and SIR were

Vascular Access Team Crosswalk

	A	B	C	D	E	F	G	H	I	J
Licensed Beds	457	658	207	282	101	100	59	241	142	109
Assess line appropriateness prior to insertion	Green	Red	Red	Green	Green	Green	Green	Green	Red	Red
PICC insertion	Green	Red	Red	Green	Green	Red	Green	Green	Red	Red
Midline insertion	Green	Red	Red	Green	Green	Green	Green	Green	Red	Red
Daily CL/midline assessment	Green	Red	Red	Green	Green	Green	Green	Green	Red	Red
Daily CL assessment of need	Green	Red	Red	Green	Green	Green	Green	Green	Red	Red
Dressing changes CL/Midline	Green	Red	Red	Green	Green	Green	Green	Green	Red	Red

■ VAT performing
■ VAT not performing

Table 1: Comparison of Central Line Utilization Ratios, CLABSI Standardized Infection Ratios and CLABSI Rates prior to and during the COVID-19 Pandemic Stratified by Vascular Access Team Coverage

	CL Standardized Utilization Ratio (SUR)				CLABSI Rate per 1000 CL Days				CLABSI Standardized Infection Ratio (SIR)			
	CVAT	IVAT	Rate Ratio IVAT compared to CVAT (95% CI)	P Value	CVAT	IVAT	Rate Ratio IVAT compared to CVAT (95% CI)	P Value	CVAT	IVAT	Relative Ratio IVAT compared to CVAT (95% CI)	P Value
Pre-pandemic	0.63	1.15	1.8 (1.0, 3.4)	<0.001	0.95	1.03	1.1 (0.7, 1.7)	0.7	1.05	1.22	1.2 (0.8, 1.7)	0.5
Intra-pandemic	0.65	0.81	1.26 (1.25, 1.27)	<0.001	0.95	1.38	1.5 (1.1-2.0)	0.01	1.05	1.48	1.4 (1.1-1.9)	0.02

CL Central Line, CVAT Complete Vascular Access Team Facility, IVAT Incomplete Vascular Access Team Facility, 95% CI 95% Confidence Interval, p value considered significant if p < 0.05

higher than in CVAT units, the difference was not statistically significant. During the pandemic, however, CLABSI rates and SIR were 40-50% higher in IVAT compared to CVAT facilities (Incident Rate Ratio 1.5, 95% CI 1.1-2.0 and SIR Relative Ratio 1.4, 95% CI 1.1-1.9 respectively) (Table 1). **Conclusions:** CLABSI rates were lower in facilities with complete VAT coverage prior to and during the COVID-19 pandemic suggesting a highly functioning VAT can aid in preventing CLABSIs, especially when a healthcare system is stressed and resources are limited.

Antimicrobial Stewardship & Healthcare Epidemiology 2024;4(Suppl. S1):s11
doi:10.1017/ash.2024.109

Presentation Type:

Poster Presentation - Top Poster Abstract

Subject Category: COVID-19

The Impact of COVID-19 on Healthcare-Associated Infections: A Survey of Acute Care Hospitals

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Background: The COVID-19 pandemic has placed an enormous strain on the healthcare system, including infection prevention and control. The response to the COVID-19 pandemic required extraordinary resources, which were often diverted from routine infection prevention and control activities and may have contributed to increased rates of HAI in the acute care setting. However, the impact of the COVID-19 pandemic on infection prevention and control departments, including staffing and resources, and on routine infection prevention and control activities is not well-described. The objective of this study was to describe the impact of the COVID-19 pandemic on IPC departments and department response to the pandemic. **Methods:** Between August and December of 2023, we conducted an electronic survey of all acute care facilities participating in the National Healthcare Safety Network. Survey data were analyzed using descriptive statistics. **Results:** Over 594 infection control departments participated in the survey, representing 1,400 NHSN facilities (20% response rate based on number of eligible NHSN facilities). Half of the respondents reported that their hospital experienced increases in the following HAI rates during the first two years of the pandemic: central-line associated bloodstream