

Paediatric Collaborative Network on Infections in Canada (PICNIC) Study of the Current Landscape of Gram-Negative Bacteremia

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BACKGROUND

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Children's

Hospital

Antimicrobial resistance is a public health threat. Invasive infection from multi-drug resistant gramnegative (MDRGN) pathogens in particular is associated with significant morbidity and mortality. Unfortunately, while the incidence of MDRGN bacteremia in Canada is on the rise, pediatric data is limited.

METHODS

Retrospective chart review

Patients with gram negative bacteremia (GNB) occurring between 2013 and 2017 were identified in multicentre PICNIC database (7 centres).

Charts were then reviewed, and data were recorded in a secure REDCAP database.

DEFINITIONS

MDRGN pathogens were defined as gram-negative organisms resistant to at least 1 drug in 3 separate drug classes, including pencililins, cephalosporins, beta lactamase inhibitor combinations, fluoroquinolones, aminoglycosides, tetracyclines, trimethoprimsulfamethoxazole, and carbapenems.

CONCLUSIONS

- MDR pathogens were more likely to occur in those with immunodeficiency (excluding malignancy)
- No species or source of infection were significantly related to multi-drug resistance.
- Mean length of stay, time to clearance, or negative patient outcomes were not associated with MDR pathogens.

DEMOGRAPHICS

		Sensitive	MDR	Fisher or Chi Square, P-valu
Total cases (%, n = 212)	212	181 (85.4)	31 (14.6)	
Gender	Totals (% n = 212)	Totals (% n = 181)	Totals (% n = 31)	
Male	123 (58.0)	104 (57.5)	19 (61.3)	0.16, p=0.69
Age				
0 to 1 months	108 (50.9)	94 (51.9)	14 (45.2)	0.49, p=0.49
>1 to 3 months	18 (8.5)	16 (8.8)	2 (6.5)	1, p>0.05
>3 to 12 months	30 (14.2)	25 (13.8)	5 (16.1)	0.15, p=0.70
>12 months to 2 years	8 (3.8)	8 (4.4)	0 (0.0)	
2-5 years old	12 (5.7)	8 (4.4)	4 (12.9)	0.08, p>0.05
>5 years old	35 (16.5)	29 (16.0)	6 (19.4)	0.21, p=0.64
Comorbid conditions				
Malignant	31 (14.6)	25 (13.8)	6 (19.4)	0.65, p=0.42
Non-malignant	138 (65.1)			
Prematurity	72 (34.0)	62 (34.3)	10 (32.3)	0.047, p=0.83
Respiratory	15 (7.1)	12 (6.6)	3 (9.7)	0.47, p>0.05
Cardiac	23 (10.8)	21 (11.6)	2 (6.5)	0.54, p>0.05
Gastrointestinal	53 (25.0)	44 (24.3)	9 (29.0)	0.31, p=0.57
Genitourinary	53 (25.0)	48 (26.5)	5 (16.1)	1.52, p=0.22
Central nervous system	13 (6.1)	9 (5.0)	4 (12.9)	0.10, p>0.05
mmunodeficiency not related to malignancy	8 (3.8)	3 (1.7)	5 (16.1)	0.002, p<0.05
Other	25 (11.8)	19 (10.5)	6 (19.4)	2.0, p=0.16
*Significant				

ISOLATED SPECIES AND PATTERNS OF RESISTANCE

		Sensitive	MDR	Fisher or Chi Square, P-value
Isolated pathogen	Totals (%, n = 212)	Totals (%, n = 181)	Totals (%, n = 31)	
Escherichia coli	126 (59.4)	106	20 (64.5)	0.39, p=0.53
Klebsiella pneumoniae	49 (23.1)	42	7 (22.6)	0.006, p=0.94
Klebsiella oxytoca	19 (9.0)	17	2 (6.5)	1, p>0.05
Raoultella sp.	3 (1.4)	3	0 (0.0)	
Not specified	17 (8.0)	15	2 (6.5)	1, p>0.05

HOSPITAL COURSE DETAILS

		Sensitive	MDR	T-test, Degrees of Freedom (df), P-value
Duration of antibiotic therapy (days)				
Mean (standard deviation)	17.3 (9.9)	17.8 (10.3)	14.8 (6.5)	1.57, df 210, p = 0.12
Median (Q1, Q3)	13.0, 20.0	13.0, 20.8	11.8, 18.3	
Delay to effective therapy initiation (days)				
Mean (standard deviation)	1.4 (0.8)	2.0 (1.0)	1.2 (0.7)	4.27, df 210, p<0.0001
Median (Q1, Q3)	1.0, 1.0	1.0, 3.0	1.0, 1.0	
Final antibiotic choice	Total (%, n = 212)	Total (%, n = 181)	Total (%, n = 31)	Fisher or Chi Square, P-value
Aminoglycoside	17 (8.0)	16 (8.8)	1 (3.2)	
BLI combination	26 (12.3)	26 (14.4)	0 (0.0)	
Cephalosporin	107 (50.5)	98 (54.1)	9 (29.0)	
Carbapenem	31 (14.6)	14 (7.7)	17 (54.8)	
Fluroquinolone	3 (1.4)	1 (0.6)	2 (6.5)	
Penicillin	17 (8.0)	17 (9.4)	0 (0.0)	
Trimethoprim / Sulfamethoxazole	10 (4.7)	10 (5.5)	0 (0.0)	
Other	7 (3.3)	7 (3.9)	0 (0.0)	
Source control				
Surgical	4 (1.9)	3 (1.7)	1(3.2)	0.47, p>0.05
Intravascular catheter removal	21 (9.9)	18 (9.9)	3 (9.7)	<0.00001, p>0.05*
*Significant				

CLINICAL OUTCOMES

Severe outcomes	Total (%, n = 212)	Sensitive Total (%, n = 181)	MDR Total (%, n = 31)	Fisher or Chi Square, P-value
ICU admission for GNB	24 (11.3)	21 (11.6)	3 (9.7)	1, p>0.05
Ventilation required	55 (25.9)	44 (24.3)	11 (35.5)	1.72, p=0.19
Organ dysfunction	41 (19.2)	33 (15.5)	8 (3.8)	0.97, p=0.32
Death	17 (8.0)	16 (8.8)	1 (3.2)	0.48, P >0.05

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