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Worldwide Experience with Peritonitis in Children: A Report from the International Pediatric Peritoneal Dialysis Network (IPPN)

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WORLDWIDE EXPERIENCE WITH PERITONITIS IN CHILDREN: A REPORT FROM THE INTERNATIONAL PEDIATRIC PERITONEAL DIALYSIS NETWORK (IPPN)

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Introduction

- Peritonitis is a frequent complication of chronic peritoneal dialysis (CPD) in children and is the most common cause of hospitalization and technique failure.
- Whereas national registries provide peritonitis related data collected over a specific geographic region, the International Pediatric Peritoneal Dialysis Network (IPPN) is the only source of pediatric CPD infection related data obtained on a global basis

Objectives

To describe the global variation of clinical manifestations, antibiotic susceptibility patterns of causative organisms and outcomes of bacterial peritonitis in children undergoing CPD.

Methods

- Review of prospectively collected data submitted to the IPPN registry via an internet-based web platform (www.pedpd.org) between 2007-2018.
- Data pertaining to patient characteristics, dialysis modality, microbiological results and final outcome were submitted prospectively along the course of a peritonitis episode.
- In accordance with ISPD guidelines, the diagnosis of peritonitis require a) cloudy effluent, b) an effluent cell count of at least 100 cell/ μ l, and c) at least 50% polymorphonuclear cells in the differential cell count.

Statistical Analysis

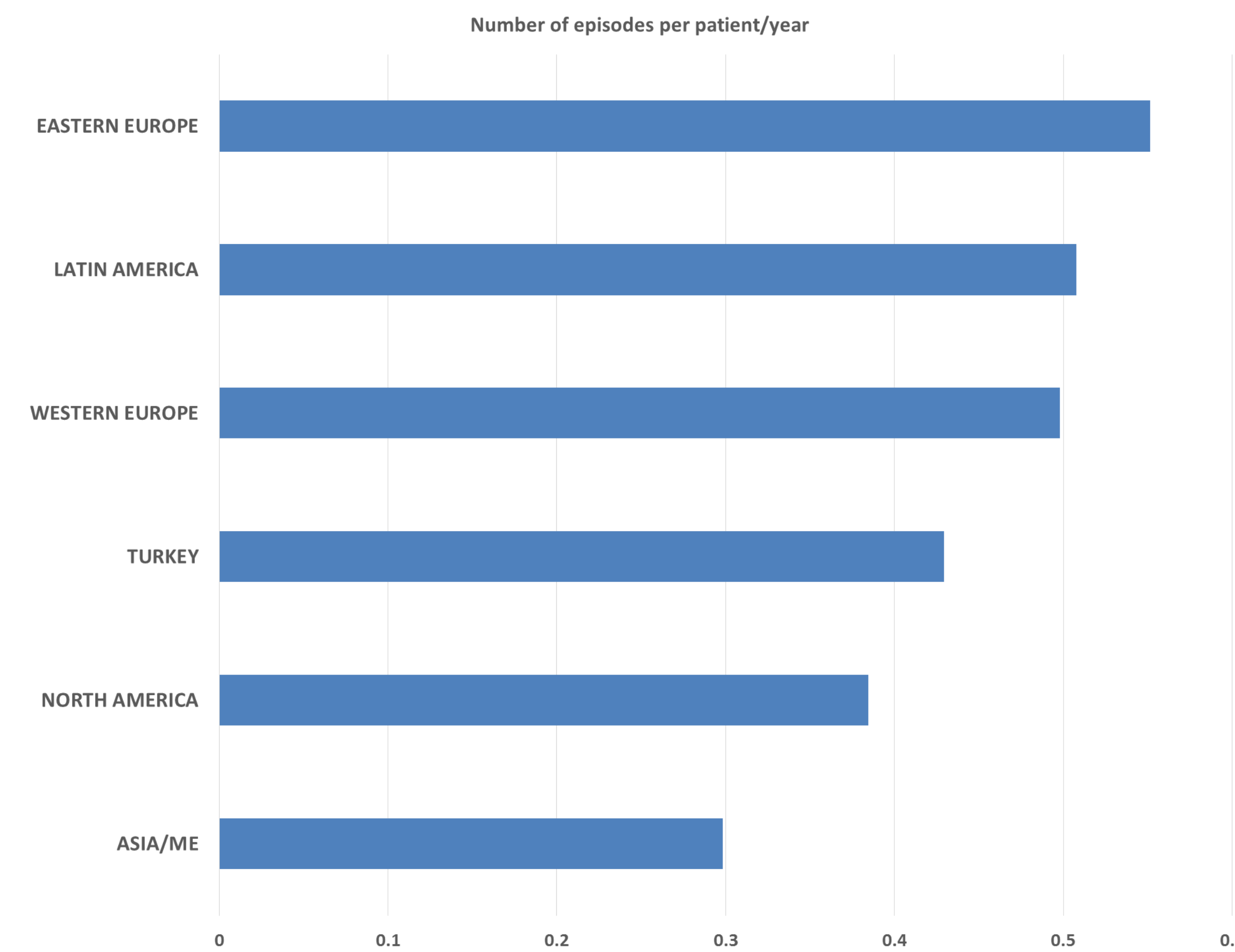
Analysis of variance followed by Newman-Keuls tests for multiple comparison was used to assess differences between group means. The association of outcomes with potential effector variables was assessed using univariate and multivariate logistic regression analysis.

Results

- Data from 3,162 patients in 43 countries was entered into the registry
- Sixty-six percent of the patients were <12 years of age and automated PD (APD) was the predominant (76%) PD modality
- Overall, there were 2021 episodes of peritonitis reported in 1052 patients with an annualized peritonitis rate of 0.44
- The annualized rate varied by region ($p=0.01$) with the lowest rates present in Asia/Middle East (0.3) and North America (0.38) (Figure 1)

Results (cont.)

Figure 1. Annualized Peritonitis Rate by Region



- Clinical symptomatology was greatest with gram negative peritonitis episodes (Table 1)

Table 1. Clinical Symptoms at Diagnosis

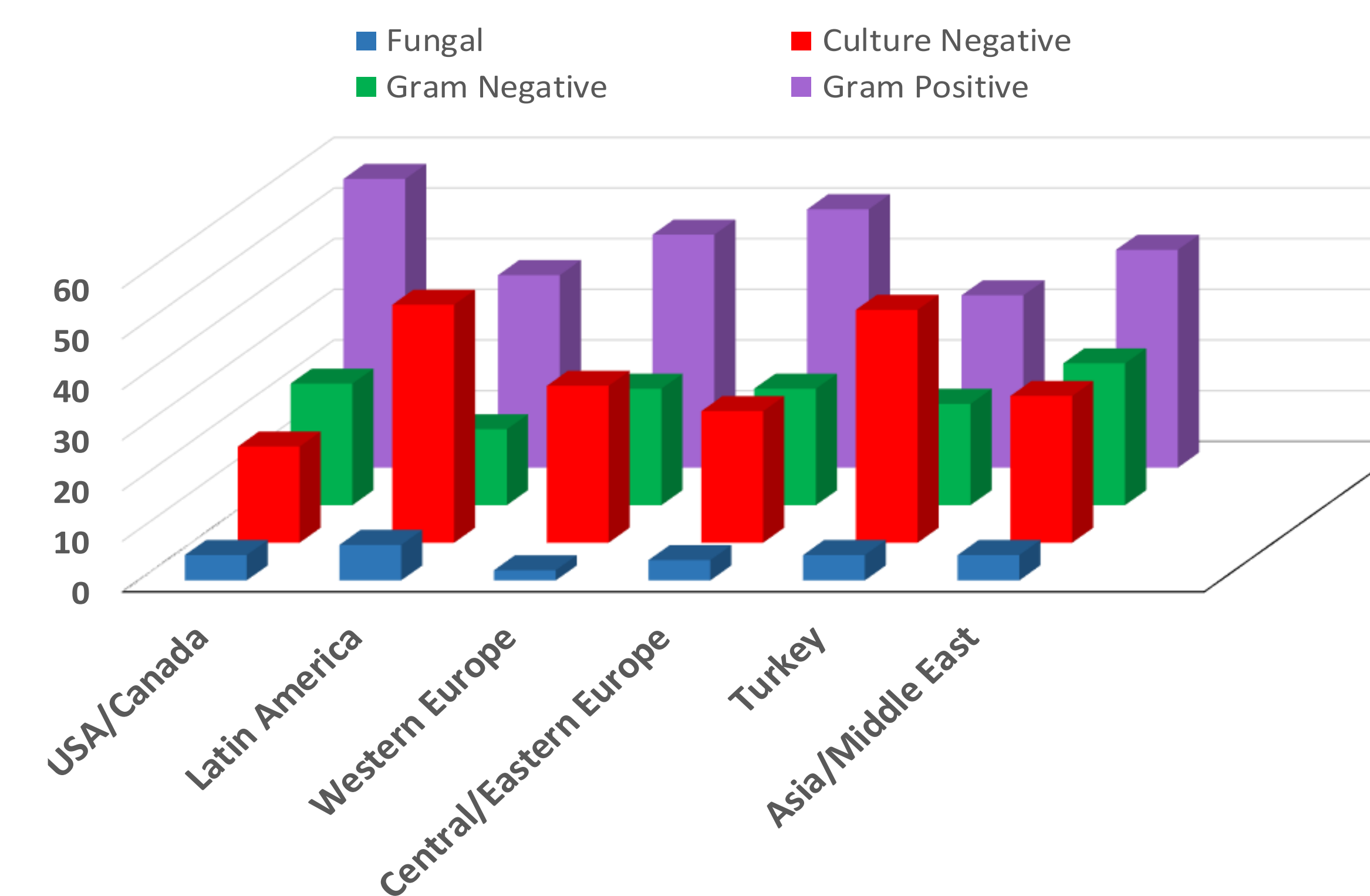
Parameter	All episodes	G(+) N=821	G (-) N=401	Culture neg N=645	p
Severe abdominal pain	502 (25%)	184 (22%)	159 (40%)	102 (16%)	<0.001
Moderate abdominal pain	1140 (56%)	482 (59%)	195 (49%)	385 (60%)	<0.001
Temperature > 38° C	593 (29%)	242 (29%)	147 (37%)	155 (24%)	<0.001
Marked effluent cloudiness	1842 (91%)	736 (90%)	385 (96%)	580 (90%)	<0.001
Effluent cell count	2067 ± 2232	2223±2334	2606 ±2413	1600 ±1893	<0.001
% PMN's	75.2 ± 19.8	75.7±18.8	80.5±17.5	72.1±20.1	<0.001

- Risk factors for peritonitis included CAPD vs APD (OR 1.13, $P=0.02$), upward pointing exit site (OR 1.26, $P<0.001$) and presence of an ostomy (OR 1.95, $p<0.01$)

Results (cont.)

- S. Aureus and S. Epidermidis were the most frequently isolated organisms and culture negative peritonitis was most common in Turkey and Latin America (Figure 2)

Figure 2. Distribution of Culture Results by Region



- Significant regional variation in antibiotic susceptibility was noted for aminoglycosides and methicillin (Table 2)

Table 2. Antibiotic Susceptibility by Region

	All	USA/Canada	Latin America	Western Europe	CE Europe	Turkey	Asia/ME	p
Methicillin								
All	310 (61)	35 (67)	73(57)	90 (69)	37 (54)	19 (66)	56 (57)	0.02
G(+)	265 (63)	29 (63)	68 (60)	81 (79)	30 (51)	17 (63)	40 (57)	
G(-)	45 (50)	6 (100)	5 (33)	9 (31)	7 (78)	2(100)	16 (55)	
Glycopeptide								
All	281 (92)	19 (100)	70 (95)	91 (89)	42 (89)	5 (100)	54 (90)	<0.001
G(+)	240 (99)	18 (100)	58 (98)	74 (100)	40 (100)	4 (100)	46 (96)	
G(-)	41 (64)	1 (100)	12 (80)	17 (61)	2 (28)	1 (100)	8 (67)	
Aminoglycoside								
All	276 (85)	17 (81)	60 (90)	92 (88)	39 (74)	3 (100)	65 (84)	0.002
G(+)	152 (80)	12 (80)	35 (85)	53 (87)	25 (66)	2 (100)	25 (74)	
G(-)	124 (92)	5 (83)	25 (96)	39 (89)	14 (93)	1 (100)	40 (93)	
Ceftazidime								
All	181 (78)	6 (100)	42 (79)	63 (73)	22(65)	3 (100)	45 (88)	0.34
G(+)	84 (75)	3 (100)	28 (93)	32 (73)	10 (50)	2 (100)	9 (69)	
G(-)	97 (80)	3 (100)	14 (61)	31 (74)	12 (86)	1 (100)	36 (95)	
Cefepime								
All	130 (88)	6 (100)	28 (82)	41 (91)	20 (95)	3 (100)	32 (84)	0.33
G(+)	62 (91)	2 (100)	19 (95)	24 (100)	9 (100)	2 (100)	6 (55)	
G(-)	68 (86)	4 (100)	9 (64)	17 (81)	11 (92)	1 (100)	26 (96)	

Results (cont.)

- Full functional recovery occurred in 82% of cases with no regional variation (Table 3)

Table 3. Outcome by Region

	All	USA Canada	Latin America	WE Europe	CE Europe	Turkey	Asia /ME	p
3 day response (N)	677	30	161	196	74	30	167	
Resolution of abdominal symptoms	77%	63%	82%	78%	85%	83%	66%	0.002
Lack of effluent cloudiness	75%	71%	66%	80%	78%	83%	75%	0.02
Resolution of temperature>38° C	91%	93%	95%	87%	99%	82%	88%	0.01
Final outcome (N)	2021	155	401	426	192	200	268	
Full recovery	83%	82%	82%	81%	85%	89%	85%	0.12
Temporary discontinuation	8%	8%	8%	10%	6%	4%	10%	0.1
Permanent discontinuation	9%	10%	10%	11%	9%	7%	5%	0.23

Discussion

- Peritonitis remains a frequent complication associated with the performance of CPD in children
- Attention to risk factors for infection may decrease the regional variation in the rate of peritonitis.
- Risk factors for culture negative peritonitis in specific global regions should continue to be sought.

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