The Catheter in PDOPPS and Other International Databases

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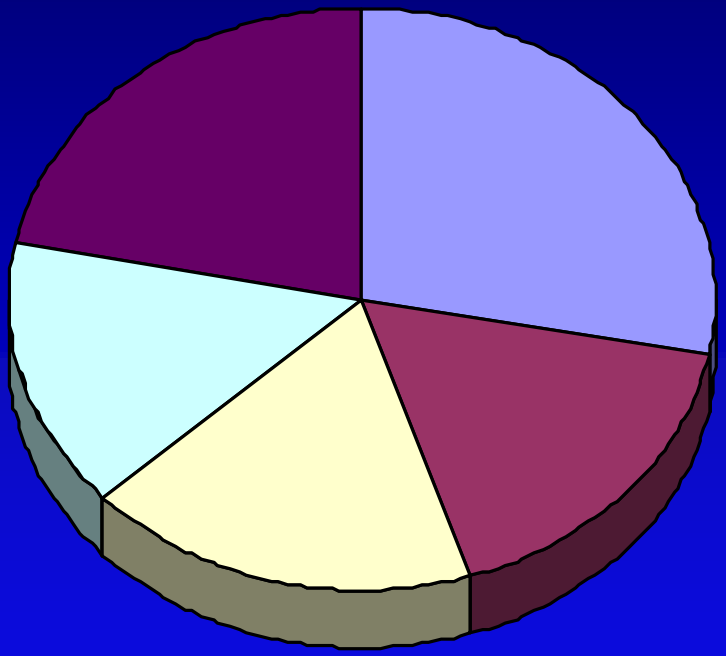
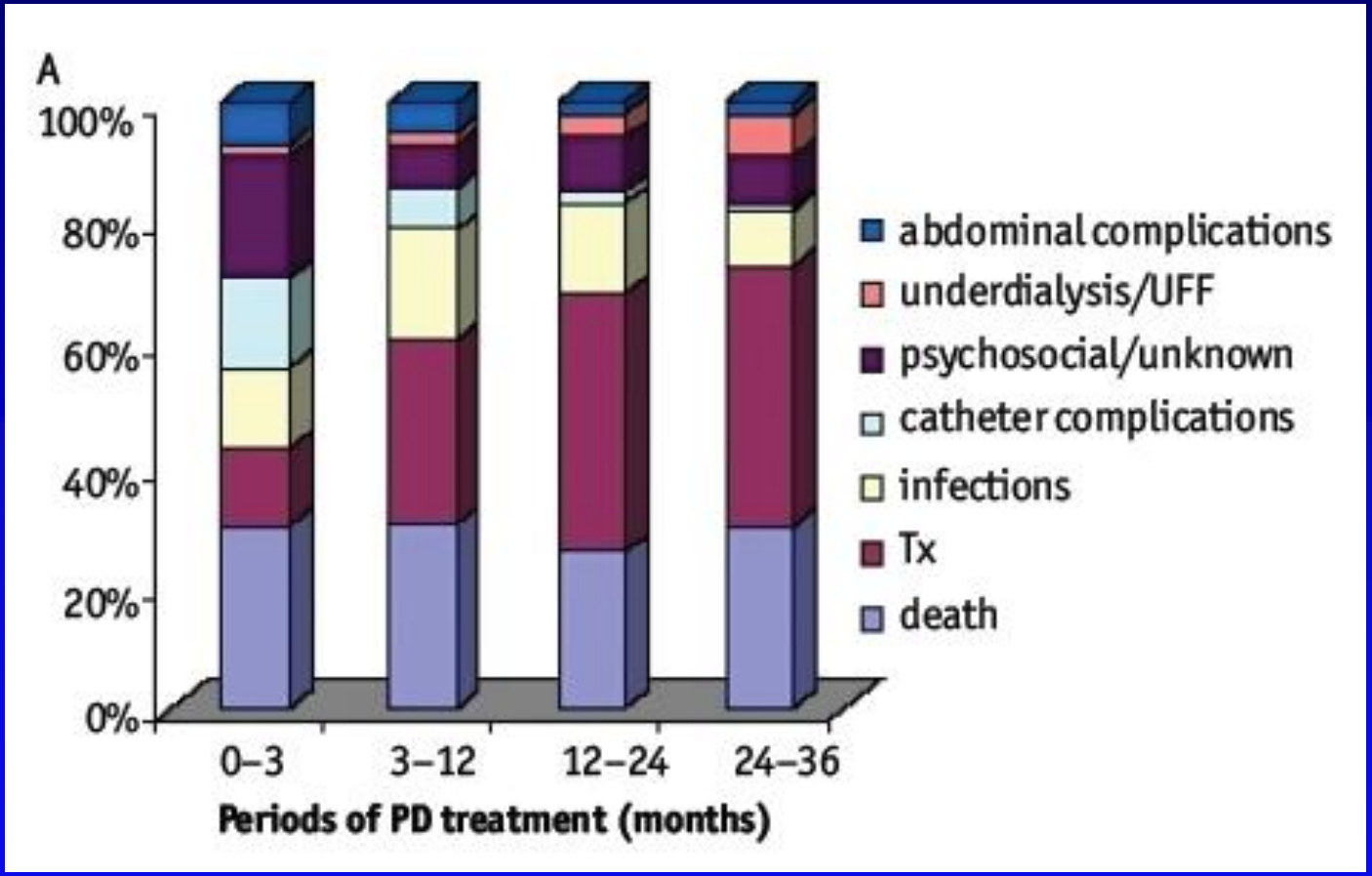
No Conflicts of Interest to Declare

Causes of Transfer from PD to HD



Adapted from Mujais S. Kid Int 70: S21, 2006

Causes of Dropout from PD Over Time



Kolesnyk I et al. Perit Dial Int 30:170, 2010

Structure of Peritoneal Dialysis Outcomes and Practice Patterns Study

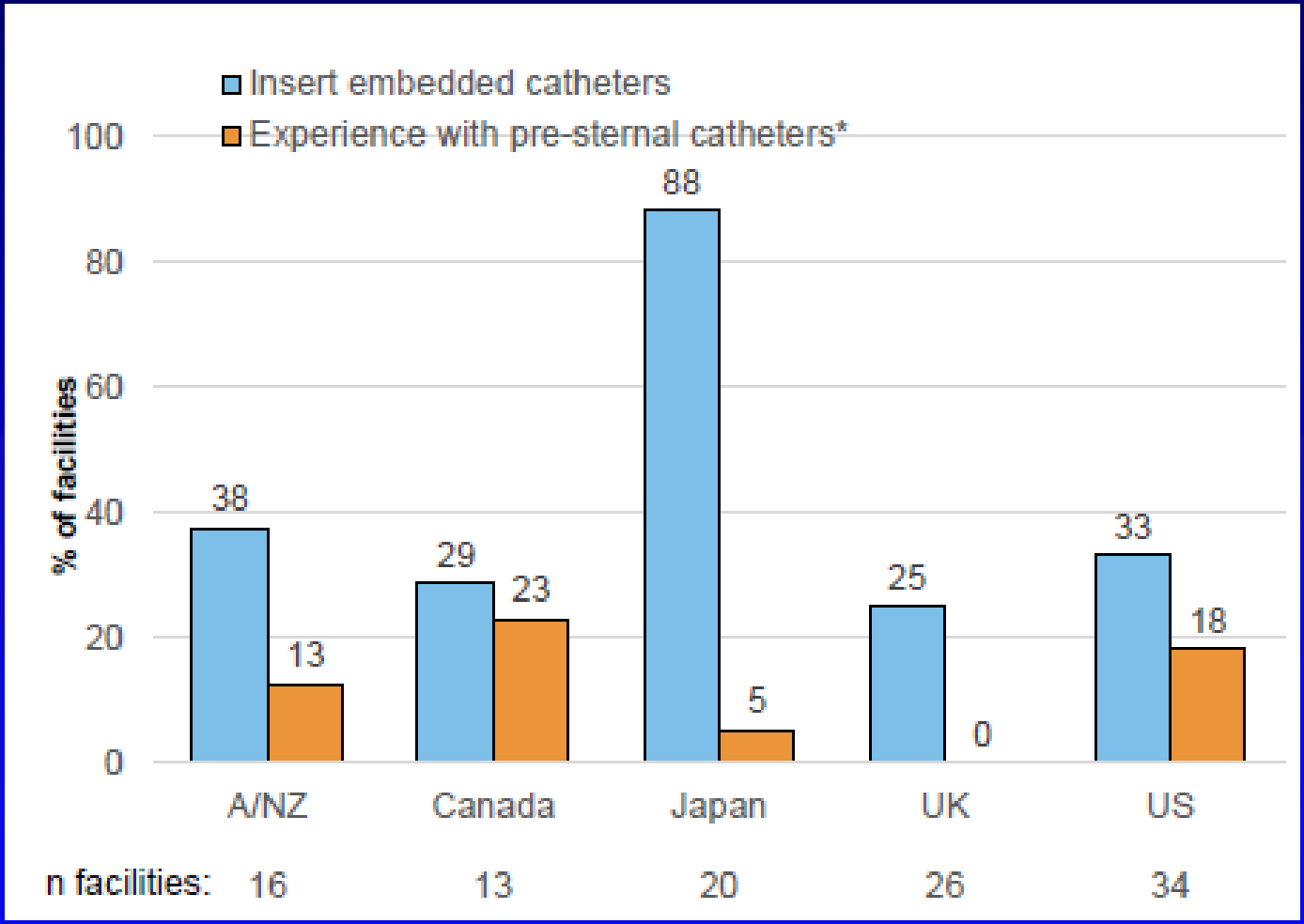
- Prospective cohort study of 11,389 patients in 170 centers from 6 countries/ regions:
  - US
  - Japan
  - Canada
  - Australia/ New Zealand
  - Thailand
  - UK

Catheter Insertion Practices in PDOPPS: Variation in Insertion Techniques

	A/NZ (n=18)	Canada (n=14)	Japan (n=20)	UK (n=28)	US (n=34)
Available methods of peritoneal dialysis catheter implantation					
Open surgery	67%	54%	85%	63%	29%
Laparoscopic surgery	83%	77%	40%	70%	94%
Percutaneous (Non-Fluoroscopic-Assisted)**	17%	31%	5%	30%	0%
Percutaneous (Fluoroscopic-Assisted)**	22%	31%	0%	7%	3%

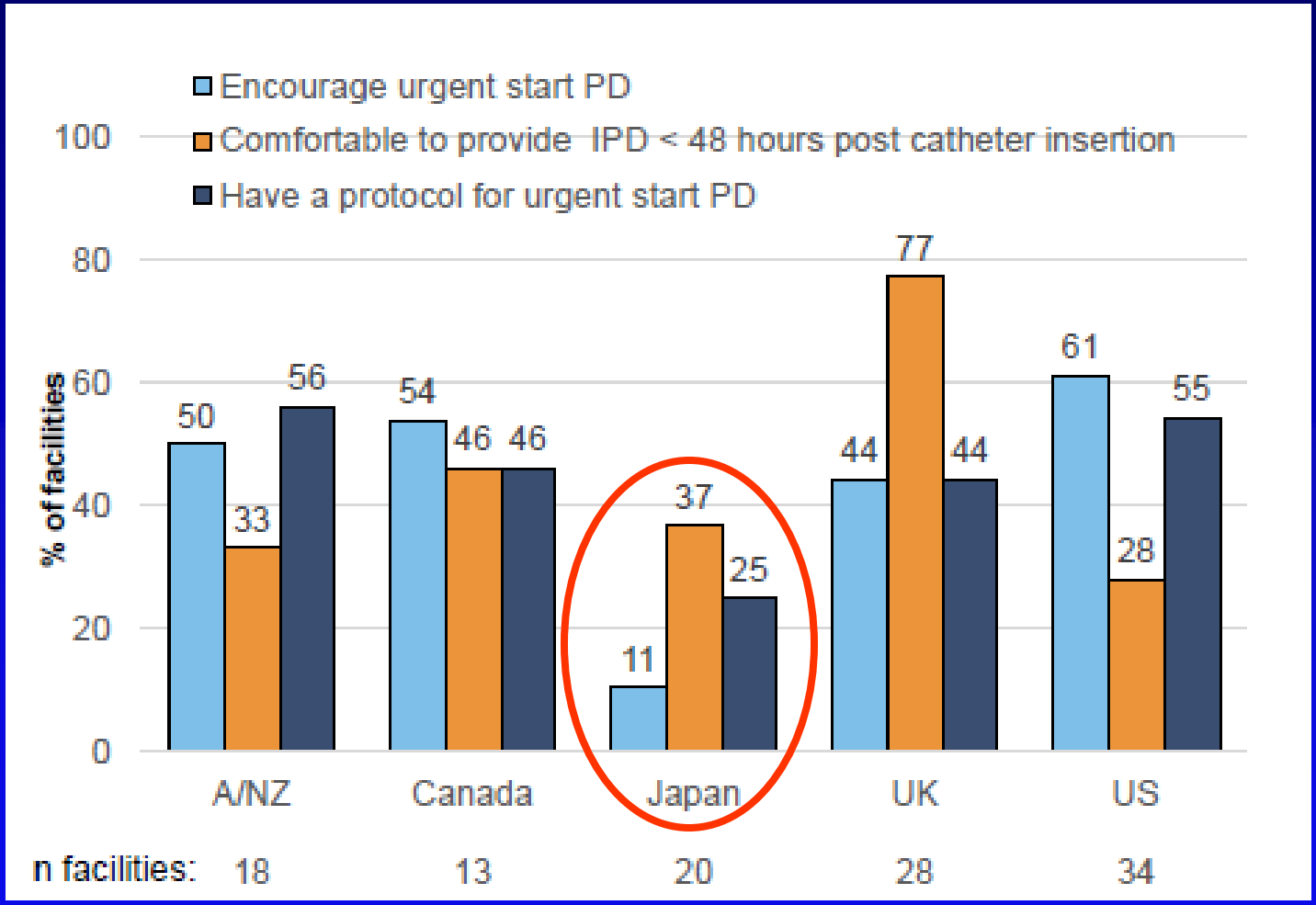
Wilkie M et al. ERA- EDTA abstract. 2017

Catheter Insertion Practices in PDOPPS: Use of Embedded or Pre-sternal Catheters



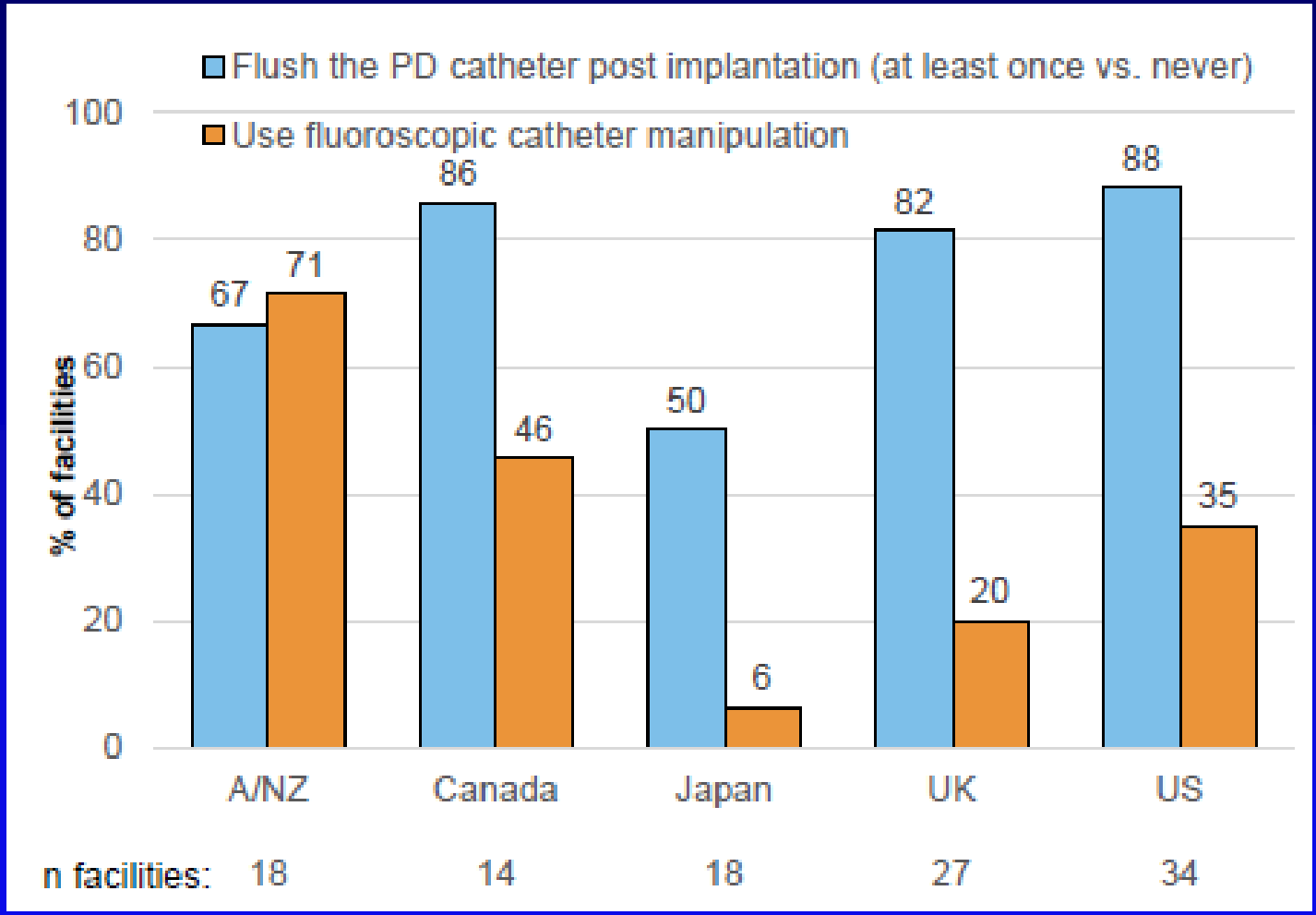
Wilkie M et al. ERA- EDTA abstract. 2017

Catheter Insertion Practices in PDOPPS: Use of Urgent Start



Wilkie M et al. ERA- EDTA abstract. 2017

Catheter Insertion Practices in PDOPPS: Post- Insertion Management



Wilkie M et al. ERA- EDTA abstract. 2017

Adherence to ISPD Guidelines: Prophylactic Antibiotics for Catheter Insertion

"We recommend that systemic prophylactic antibiotics be administered immediately prior to catheter insertion (1A)."

	ANZ	Canada	Japan	Thailand	UK	US
Number of facilities	18	20	28	22	17	65
PD catheter insertion	83%	100%	89%	86%	100%	63%
Non-surgical PD catheter manipulation	47%	60%	29%	32%	62%	33%
Routine dental procedures	22%	35%	7%	29%	0%	51%
Complicated dental procedures	61%	70%	68%	43%	24%	83%
Gynecological procedures	53%	40%	32%	48%	53%	65%
Genitourinary procedures	47%	35%	41%	45%	47%	53%
Upper gastrointestinal endoscopy	17%	25%	7%	36%	0%	31%
Lower gastrointestinal endoscopy	61%	65%	36%	40%	77%	66%
No antibiotic use to the above 6 procedures	35%	25%	12%	42%	12%	10%

Boudville N et al. Nephrol Dial Transpl. In Press 2018

Adherence to ISPD Guidelines: Prophylactic Antibiotics for GI, or GU Procedures

"We suggest antibiotic prophylaxis prior to colonoscopy (2C) and invasive gynecologic procedures (2D)".

	ANZ	Canada	Japan	Thailand	UK	US
Number of facilities	18	20	28	22	17	65
PD catheter insertion	83%	100%	89%	86%	100%	63%
Non-surgical PD catheter manipulation	47%	60%	29%	32%	62%	33%
Routine dental procedures	22%	35%	7%	29%	0%	51%
Complicated dental procedures	61%	70%	68%	43%	24%	83%
Gynecological procedures	53%	40%	32%	48%	53%	65%
Genitourinary procedures	47%	35%	41%	45%	47%	53%
Upper gastrointestinal endoscopy	17%	25%	7%	36%	0%	31%
Lower gastrointestinal endoscopy	61%	65%	36%	40%	77%	66%
No antibiotic use to the above 6 procedures	35%	25%	12%	42%	12%	10%

Boudville N et al. Nephrol Dial Transpl. In Press 2018

Adherence to ISPD Suggestion: Prophylactic Antibiotics for Dental Procedures

"Transient bacteremia is common after dental procedures and may lead to peritonitis. Prophylactic antibiotics …before extensive dental procedures may be reasonable."

	ANZ	Canada	Japan	Thailand	UK	US
Number of facilities	18	20	28	22	17	65
PD catheter insertion	83%	100%	89%	86%	100%	63%
Non-surgical PD catheter manipulation	47%	60%	29%	32%	62%	33%
Routine dental procedures	22%	35%	7%	29%	0%	51%
Complicated dental procedures	61%	70%	68%	43%	24%	83%
Gynecological procedures	53%	40%	32%	48%	53%	65%
Genitourinary procedures	47%	35%	41%	45%	47%	53%
Upper gastrointestinal endoscopy	17%	25%	7%	36%	0%	31%
Lower gastrointestinal endoscopy	61%	65%	36%	40%	77%	66%
No antibiotic use to the above 6 procedures	35%	25%	12%	42%	12%	10%

Boudville N et al. Nephrol Dial Transpl. In Press 2018

Adherence to ISPD Guidelines: Monitoring the Incidence of Catheter-related Infections

"We recommend that every program should monitor, at least on a yearly basis, the incidence of peritonitis (1C)."

	ANZ	Canada	Japan	Thailand	UK	US
Number of facilities	18	20	28	22	17	65
Record and track peritonitis episodes	100%	100%	61%	96%	100%	100%
Record and track exit site infection episodes	100%	95%	41%	91%	88%	98%
Frequency of calculating peritonitis rates						
At least annually	94%	95%	14%	86%	94%	99%
Less often then annually	6%	5%	43%	14%	6%	0%
Never	0%	0%	43%	0%	0%	2%
Frequency of calculating exit site infection rates						
At least annually	89%	90%	7%	91%	82%	97%
Less often then annually	11%	5%	29%	5%	6%	0%
Never	0%	5%	64%	5%	12%	3%

Boudville N et al. Nephrol Dial Transpl. In Press 2018

Other International Databases

- Australia and New Zealand Dialysis and Transplant Registry (ANZDATA)
- International Pediatric Peritoneal Dialysis Network Registry (IPPN)
- ISPD- North America Research Consortium for PD (ISPD- NARC)
- Registre de Dialyse Péritonéale de Langue Française (RDPLF)
- UK Renal Registry

ANZDATA- Catheter Retention and Peritonitis Cure

- The probability of retaining the PD catheter after an episode of peritonitis increased with:
  - Low risk organisms (CNS, streptococci, culture negative); $p < 0.001$
  - PD patients accounting for > 29% of patients at a center; $p = 0.03$
- These two factors were also associated with increased probability of cure of peritonitis, as were:
  - BMI < 30 kg/m^2; $p = 0.03$
  - Proper empiric antibiotic coverage used in at least 91% of instances; $p = 0.007$

Htay H et al. Am J Kid Dis. In Press. 2018

ANZDATA- Catheter Blockage

- Units that routinely flushed catheters tended to be more likely to audit catheter outcomes (66% vs 38%; p= 0.23)

- And they were significantly more likely to have experienced blocked catheters in the preceding 12 months (84% vs. 0%; p= 0.01).

- Interpretation/ application of these findings is difficult. Authors suggest a clinical trial which seems reasonable.

Cho Y et al. Perit Dial Int. In Press. 2018

Catheter Endoscopy

Transcatheter Examination of the Peritoneal Dialysis Catheter with the SpyGlass Direct Visualization System: A New Aid in Diagnosis and Salvation of Ultrafiltration Failure from Partial Catheter Obstruction

- Diagnose and partially relieve omental wrap
- Diagnose and remove intraluminal blood clot

Puapatanakul P et al. Perit Dial Int 38:66, 2018

IPPN- The SCOPE Collaborative

- The **S**tandardizing **C**are to Improve **O**utcomes in **P**ediatric **E**SRD Collaborative is a quality improvement initiative that aims to reduce peritoneal dialysis–associated infections in pediatric patients on chronic peritoneal dialysis.

SCOPE: Catheter- Associated Peritonitis

- Data on 734 patients from 29 pediatric dialysis centers
  - 54% boys; median age 9 years

- Objectives:
  - Determine whether provider compliance with peritoneal dialysis catheter care bundles was associated with lower risk of infection at the individual patient level
  - Describe the epidemiology, risk factors, and outcomes for peritonitis

Sethna CB et al. Clin J Am Soc Nephrol 11:1590, 2016

SCOPE: Risk Factors for Catheter-Associated Peritonitis

Variables	Crude Rate Ratio (95% CI)	*P* Value	Adjusted Rate Ratio[a] (95% CI)	*P* Value
Age group, yr		<0.001		0.15
<2	Reference		Reference	
2–5	0.81 (0.62 to 1.06)	0.12	0.59 (0.22 to 1.59)	0.28
6–12	0.61 (0.51 to 0.73)	<0.001	0.66 (0.27 to 1.61)	0.35
13–17	0.59 (0.49 to 0.71)	<0.001	0.68 (0.25 to 1.85)	0.44
≥18	0.96 (0.65 to 1.44)	0.85	1.06 (0.23 to 4.95)	0.94
Race		<0.001		0.09
Nonblack	Reference		Reference	
Black	1.66 (1.42 to 1.95)		1.61 (0.93 to 2.80)	
Gastrostomy tube	1.49 (1.29 to 1.72)	<0.001	1.30 (0.69 to 2.45)	0.37
Vesicostomy or stoma	1.36 (1.10 to 1.69)	<0.01	1.04 (0.52 to 2.06)	0.92
Incontinence	1.53 (1.32 to 1.77)	<0.001	1.29 (0.56 to 3.01)	0.54
Touch contamination	1.75 (1.51 to 2.02)	<0.001	2.22 (1.44 to 3.43)	<0.001
Patient performs PD themselves	0.70 (0.59 to 0.81)	<0.001	1.17 (0.63 to 2.17)	0.60
Upward orientation	3.14 (2.42 to 4.08)	<0.001	4.20 (1.49 to 11.89)	<0.001
Plastic adapter	1.33 (1.15 to 1.54)	<0.001	1.38 (0.86 to 2.22)	0.18
Insertion compliance		0.001		0.67
No	Reference		Reference	
Yes	0.62 (0.47 to 0.82)		0.91 (0.57 to 1.44)	
Training compliance		0.43		NA
No	Reference		NA	
Yes	0.88 (0.64 to 1.21)		NA	
Follow-up compliance		<0.001		<0.001
No	Reference		Reference	
Yes	0.50 (0.40 to 0.62)		0.49 (0.30 to 0.80)	<0.01

Sethna CB et al. Clin J Am Soc Nephrol 11:1590, 2016

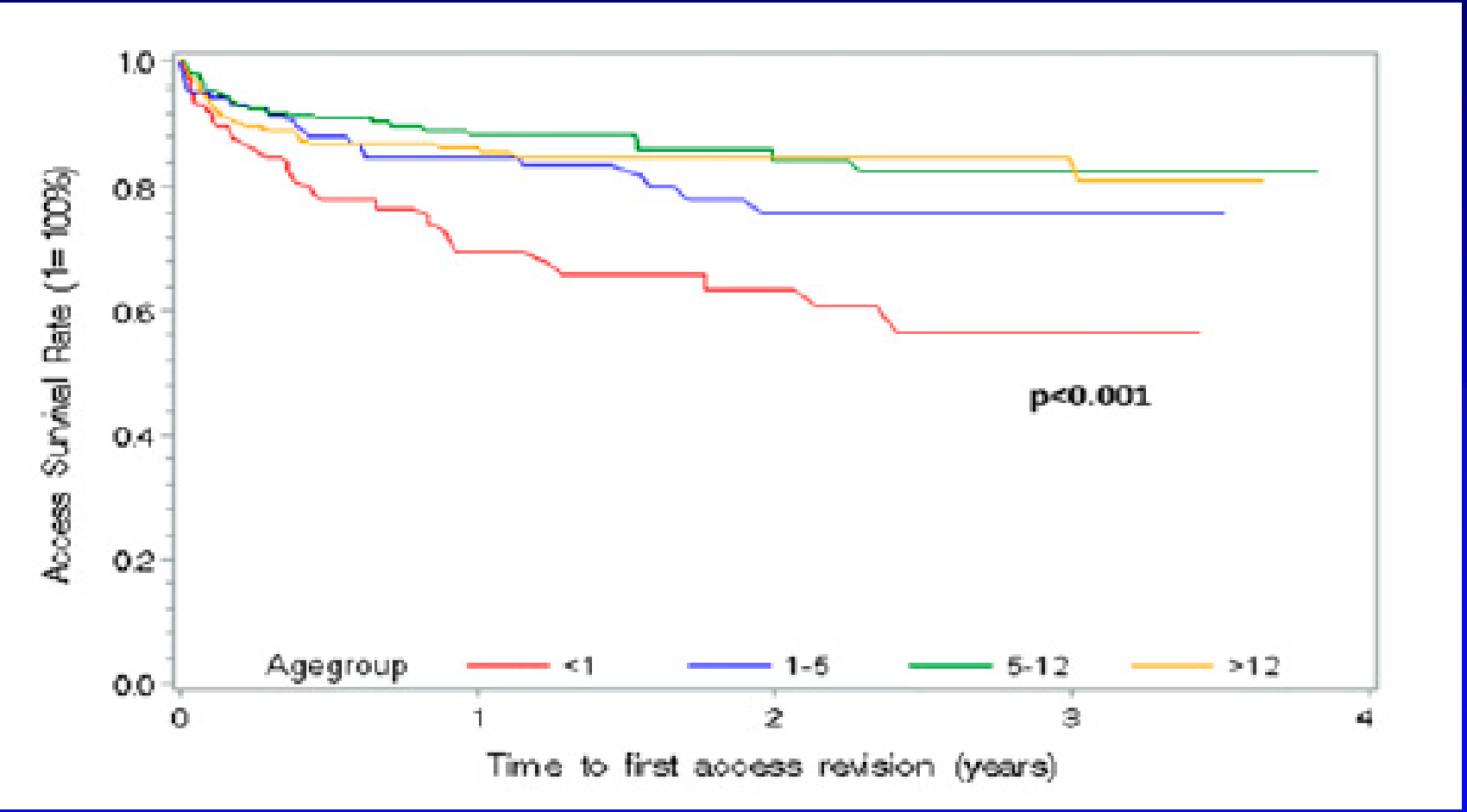
IPPN: Catheter Survival and need for Revision

- Data on 2453 patients from 105 pediatric dialysis centers in 38 countries
  - 55.7% male
  - age 11 days to 18.8 years; median 10.5 years

- Objectives:
  - Evaluate frequency, risk factors, interventions, and outcomes of peritoneal dialysis access revision

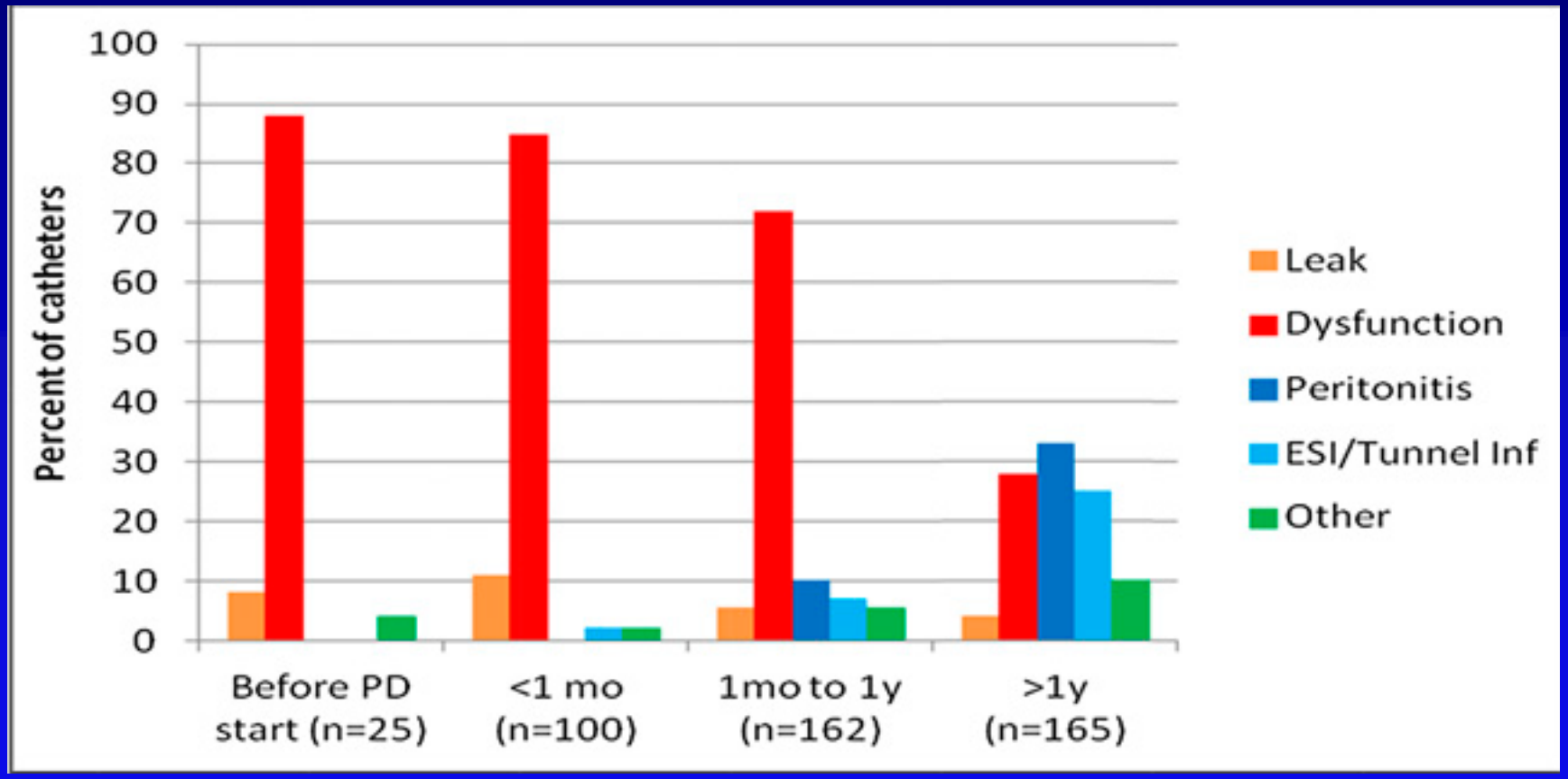
Borzych-Duzalka D et al. Clin J Am Soc Nephrol 12:105, 2017

IPPN: PD Catheter Survival by Patient Age at Insertion



Borzych-Duzalka D et al. Clin J Am Soc Nephrol 12:105, 2017

Indications for Catheter Revision by Duration of Time on PD



Borzych-Duzalka D et al. Clin J Am Soc Nephrol 12:105, 2017

Reasons for Access Revision by Type of Catheter

Reason	Tenckhoff Straight	Tenckhoff Curled/Straight Tunnel	Tenckhoff Curled/Swan Neck Tunnel	Other	*P* Value
All Reasons, *n*=424	100 (24)	47 (11)	247 (58)	30 (7)	
Leak, *n*=29	10 (35)	3 (10)	12 (41)	4 (14)	0.04
Dysfunction, *n*=270	59 (22)	25 (9)	172 (64)	14 (5)	<0.001
Peritonitis, *n*=71	15 (21)	11 (15)	39 (55)	6 (9)	<0.001
Exit site infection, *n*=54	16 (30)	8 (15)	24 (44)	6 (11)	0.02

Borzych-Duzalka D et al. Clin J Am Soc Nephrol 12:105, 2017

Catheter Insertion Practices in ISPD- NARC

- 51 sites in US (n= 28) and Canada (n= 23)
- 82% response rate
- Catheter insertion methods available:
  - Laparoscopy with advanced techniques (omentectomy or omentopexy, lysis of adhesions etc.)- 71%
  - Open surgical dissection- 62%
  - Blind insertion via trocar- 10%
  - Blind placement via Seldinger technique- 29%
- Three or more methods available at 80% of centers

Wallace EL et al. Perit Dial Int 36:382, 2016

Catheter Insertion Practices in ISPD- NARC Cont'd

- Double- cuffed catheters used at 95% of sites
- Swan neck used at 56% of locations with straight inter-cuff segment at 44%
- Nature of catheter tip not specified
- Variations include buried catheters (36%), upper abdominal (43%), pre-sternal (41%)
- All sorts of people place PD catheters:
  - Surgeons (general, vascular, urology, transplant)
  - Nephrologists
  - IR

Wallace EL et al. Perit Dial Int 36:382, 2016

Catheter Data from RDPLF

- France and territories, Algeria, Belgium, Switzerland, Tunisia
- I didn't know they speak French in Argentina and Uruguay…
  - Verger C et al. Kid Int 70:S12, 2006
- Catheter data from France only

CLUSTERS OF PRACTICE IN PERITONEAL DIALYSIS IN FRANCE: DATA FROM THE CATHETER SECTION OF THE RDPLF

Antoine Lanot,[1,2] Clémence Bechade,[1] Christian Verger,[3] Emmanuel Fabre,[3] Isabelle Vernier,[3,4] and Thierry Lobbedez[1,2,3]

Perit Dial Int 2018; 38(2):89–97

Distribution of Catheter- Related Practices in France

Practice	Number of centers using the technique as a reference (%)
Catheter type	
Swan neck, straight	14 (21.9)
Swan neck, coiled	10 (15.6)
Straight, straight	11 (17.2)
Straight, coiled	7 (10.9)
No standard	22 (34.4)
Surgical technique	
Laparoscopy	12 (18.8)
Open surgery	39 (60.9)
Trocart	1 (1.6)
No standard	12 (18.8)
Prophylactic antibiotic use prior to catheter implantation	
No antibiotic	27 (42.2)
Antibiotic	28 (43.8)
Vancomycin	6 (9.4%)
Other antibiotic	22 (34.4%)
No standard	9 (14.1)
Prophylactic *S. aureus* antibiotic use on exit-site site	
None	47 (73.4)
Antibiotic	8 (12.5)
No standard	9 (14.1)
S. aureus nasal screening	
None	31 (48.4)
Done	19 (29.7)
No standard	14 (21.9)

- 2770 catheters
- 64 centers
- 5 years (2012- 2016)
- No data on overall catheter survival

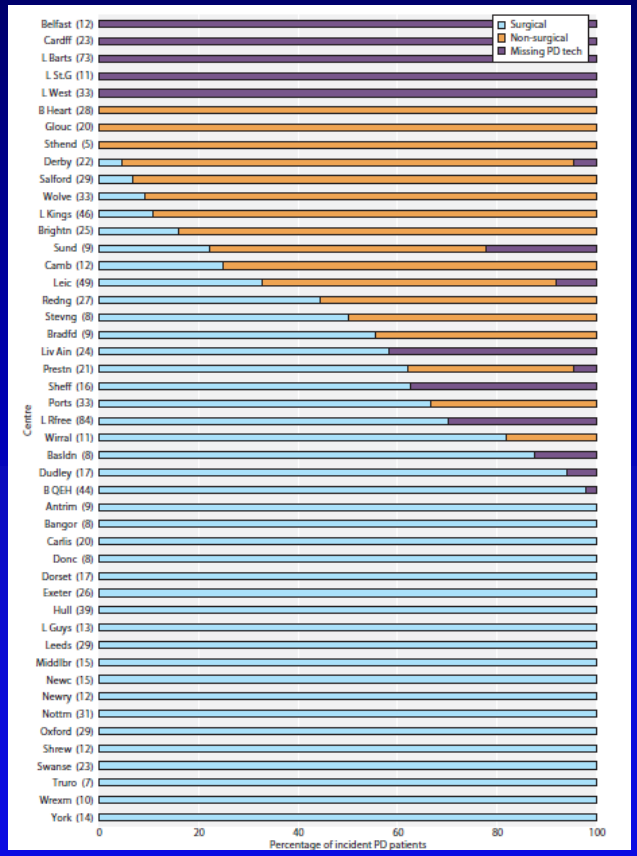
Lanot A et al. Perit Dial Int 38:89, 2018

UK Renal Registry: 2015

- Data requested from 62 dialysis centers in England, Wales, and Northern Ireland
- 52 centers (83.9 %) provided useable data
- n= 5107 patients
- Overall, 21.3% of patients started PD
- Probability of starting PD varied by timing of referral to nephrologist:
  - Early (≥ 90 days before start of dialysis)- 23.4%
  - Late (< 90 days before start of dialysis)- 11.2%

Hole B et al. Nephron Clin Practice 137 (suppl 1):269, 2017

PD Catheter Insertion Techniques Stratified by Center



- Approximately 40% of centers employ surgery (open or laparoscopic) exclusively.
- At the 17 centers that place catheters non-surgically (percutaneous or peritoneoscopic) 25.9% of incident RRT patients did PD vs. 21.0% overall.
- Approximately 48% of incident RRT patients started PD at the 6 centers that placed >90% of catheters percutaneously.

Surgical

Non- surgical

Hole B et al. Nephron Clin Practice 137 (suppl 1):269, 2017

Summary- 1

- Catheter Insertion
  - Catheter insertion practices vary widely and many are acceptable:
    - Operator (surgeon, nephrologist, IR)
    - Technique employed (open, laparoscopic, percutaneous)
  - PD utilization might increase with more widespread availability of percutaneous catheter insertion techniques

Summary- 2

- Catheter Dysfunction
  - Appears to be more common in patients < 1 year old.
  - The data suggests an increased frequency of catheter dysfunction with swan neck catheters.

Summary- 3

- Infection
  - ISPD guidelines regarding prophylactic antibiotics and monitoring of infection rates are not adhered to with sufficient frequency.
  - Centers with a larger proportion of PD patients- > 29%- have a higher probability of successful cure of peritonitis and retention of the PD catheter after peritonitis.

Conclusions

- PD practitioners around the globe are urged to adhere to ISPD guidelines for monitoring of infection rates and for infection prophylaxis, particularly prior to catheter insertion.
- Further study is needed to determine whether more widespread availability of percutaneous techniques for PD catheter insertion will indeed increase utilization of the modality.
- A RPCT should be considered to determine whether swan neck catheters are associated with an increased frequency of catheter dysfunction.

THANK YOU

ANZDATA- Catheter Flushing Practices

Characteristics	Overall (*n*=49 units), number (%)	Australia (*n*=42 units), number (%)	New Zealand (*n*=7 units), number (%)	*P value**
Indications for flushing				0.07
Straight after catheter insertion only	2 (4)	2 (5)	0 (0)	
Immediately prior to PD commencement only	6 (12)	6 (14)	0 (0)	
During any period of PD rest only	13 (27)	13 (31)	0 (0)	
Straight after insertion/any period of PD rest	10 (20)	8 (19)	2 (29)	
Immediately prior to PD/any period of PD rest	5 (10)	5 (12)	0 (0)	
Straight after insertion/immediately prior to PD	2 (4)	1 (2)	1 (14)	
All 3 (straight after catheter insertion, immediately prior to PD commencement and during any period of PD rest)	11 (22)	7 (17)	4 (57)	
Frequency				0.36
Once only	8 (16)	8 (19)	0 (0)	
Alternate daily	1 (2)	1 (2)	0 (0)	
Weekly	23 (47)	19 (45)	4 (57)	
Monthly	7 (14)	5 (12)	2 (29)	
Other	7 (14)	7 (17)	0 (0)	
Flushing solution				0.47
Saline (including heparinized saline)	2 (4)	2 (5)	0 (0)	
Standard PD solution	34 (71)	28 (68)	6 (86)	
Neutral pH, low-GDP PD solution	6 (13)	6 (15)	0 (0)	
Saline/Standard PD solution	2 (4)	1 (2)	1 (14)	
Standard PD solution/Neutral pH, low-GDP PD solution	4 (8)	4 (10)	0 (0)	
Volume				0.64
500 mL	15 (31)	12 (29)	3 (43)	
1,000 mL	11 (22)	9 (21)	2 (29)	
2,000 mL	1 (2)	1 (2)	0 (0)	
Variable based on patient size and age of catheter	22 (45)	20 (48)	2 (29)	

Cho Y et al. Perit Dial Int. In Press

Risk Factors for and Outcomes of Catheter-Associated Peritonitis in Children: The SCOPE Collaborative

Christine B. Sethna, Kristina Bryant,† Raj Munshi,‡ Bradley A. Warady,§ Troy Richardson,‖ John Lawlor,‖ Jason G. Newland,¶ and Alicia Neu** on behalf of the SCOPE Investigators*

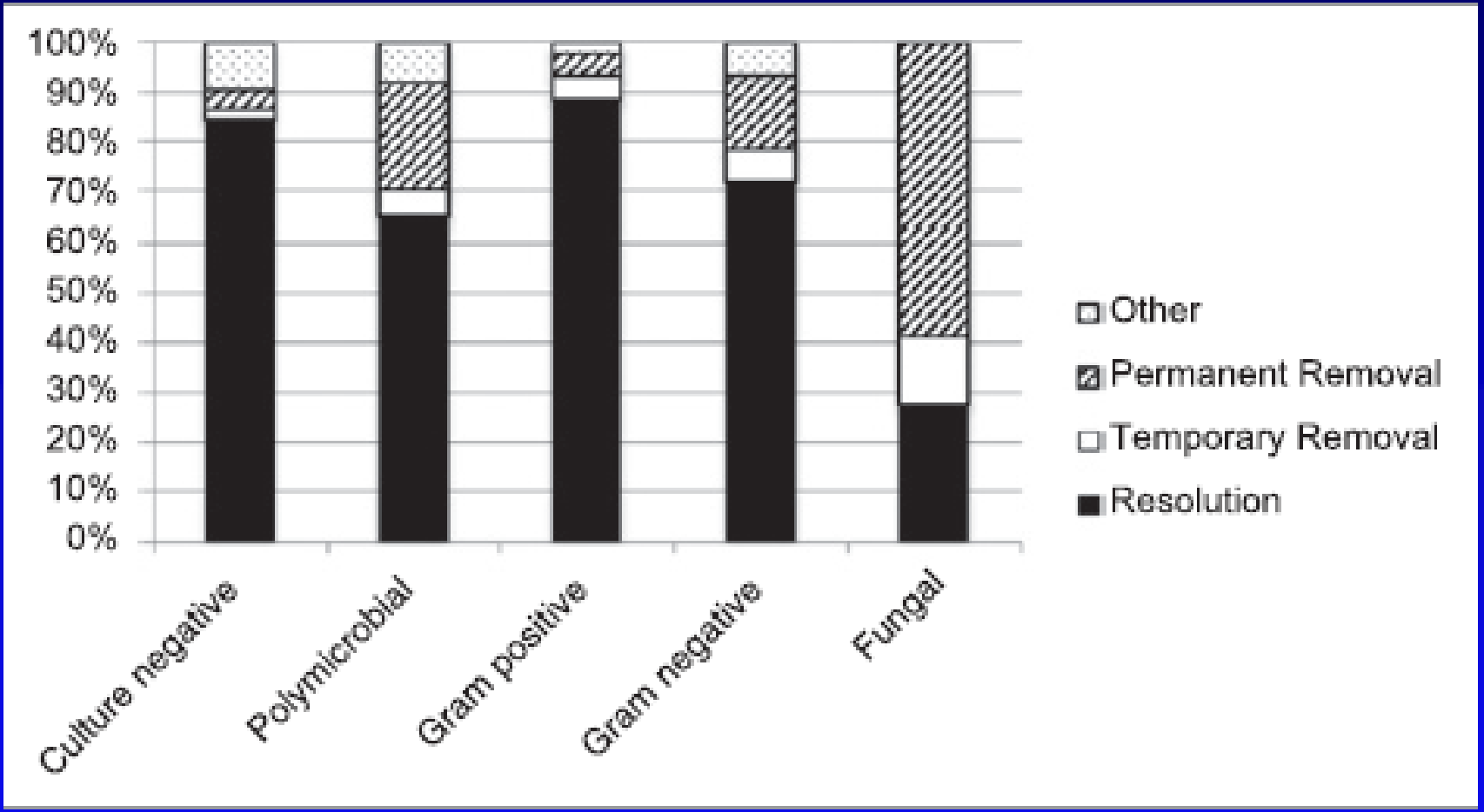
Clin J Am Soc Nephrol 11: 1590–1596, 2016.

Peritoneal Dialysis Access Revision in Children: Causes, Interventions, and Outcomes

Dagmara Borzych-Duzalka, T. Fazil Aki, Marta Azocar, Colin White, Elizabeth Harvey, Sevgi Mir, Marta Adragna, Erkin Serdaroglu, Rajiv Sinha, Charlotte Samaille, Juan Jose Vanegas, Jameela Kari, Lorena Barbosa, Arvind Bagga, Monica Galanti, Onder Yavascan, Giovanna Leozappa, Maria Szczepanska, Karel Vondrak, Kei-Chiu Tse, Franz Schaefer, and Bradley A. Warady, for the International Pediatric Peritoneal Dialysis Network (IPPN) Registry

Clin J Am Soc Nephrol 12: 105–112, 2017.

SCOPE: Outcome of Peritonitis by Organism



Sethna CB et al. Clin J Am Soc Nephrol 11:1590, 2016

IPPN: Multivariate Logistic Regression Analysis of Risk Factors for Acess Revision

Risk Factor	OR (95% CI)	*P* Value
Age at first observation	0.93 (0.92 to 0.95)	<0.001
Diagnosis of CAKUT	1.28 (1.03 to 1.59)	0.02
Swan neck tunnel with curled intraperitoneal portion	1.30 (1.04 to 1.63)	0.02
Two-cuff catheter	0.89 (0.67 to 1.21)	0.46
Presence of ostomy	1.42 (1.07 to 1.87)	0.01
Upward–pointing exit site	0.97 (0.70 to 1.31)	0.82
First catheter use <7 d after catheter placement	0.88 (0.71 to 1.09)	0.23
Gross national income per capita (international $)	1.10 (1.02 to 1.19)	0.01

Borzych-Duzalka D et al. Clin J Am Soc Nephrol 12:105, 2017