

# Comparison of Complications Between Intravenous Catheters in Outpatient Parenteral Antimicrobial Therapy (OPAT) in Pediatrics

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# Background

Outpatient Parenteral Antimicrobial Therapy (OPAT) can decrease patients' hospital length of stay; however, complications can still occur. Most literature examining OPAT in the pediatric population primarily cites peripherally inserted central catheters (PICCs). Previous studies show that PICC complications occur in up to 30% in pediatrics. Risk for adverse events increases with longer duration of therapy, decreasing age, and urban residence. 1-3

Common complications of OPAT include infection, occlusion, dislodgement, phlebitis, leakage, and thrombosis.<sup>4</sup> Most reported complication rates are low. The incidence of line infection ranges from 0-7%.<sup>5</sup> OPAT is common in pediatric patients, however, data is lacking in non-PICC catheters. This study is exempt from IRB review and all patient data was de-identified.

### Purpose

This study compares catheter-related complication rates occurring among different intravenous catheters in pediatric patients. The primary objective is to identify which catheter is associated with the most complications in each age group and overall. Secondary objectives were therapy completion and infection rate in PICCs, non-PICC central venous catheters (CVC), and implanted ports.

### Methods

This retrospective observational study discusses pediatric patients receiving intravenous anti-infective therapy throughout the organization between July 2020 and June 2022 extracted through electronic medical record data. Pediatric patients were defined as ages 0-18 years and stratified into groups (0-3, 4-7, 8-10, 11-13, 14-18) then categorized by complication type.

Complication types were defined as: line infection, suspected line infection, other/unspecified infection, line dislodgement, thrombosis, occlusion, redness/swelling/leaking, or damaged catheter. Patients lacking documentation of catheter type, therapy received, or discharge date were excluded from the study.

### Results

After data extraction, there were 86 reportable complications; the most common complication among all catheters was line dislodgement (26.14%). Redness, swelling, and extravasation was most common in patients 0-3, line dislodgement in patients 4-7, line dislodgement, line infection, and redness, swelling, and extravasation in 8-10, occlusion in 11-13, and line dislodgement and occlusion in 14-18 [Table 1].

PICCs were the most frequently used catheter (49.26%) and were also associated with the most complications across all age groups (14.65%) [Figures 1-3, Table 2]. PICCs had the highest incidence of complications in each age group, other than ports in ages 11 – 13 (13.04%).

Of reportable complications, PICCs had the highest rate of therapy completions at 62.3% compared to CVC lines and ports, at 36.84% and 12.5% respectively [Table 3].

In all patients with PICCs, CVCs, and ports, 1.26% had confirmed line infections, with PICCs accounting for 0.7% [Figure 4]. Of reportable patients with a line infection, 90.9% were also receiving chronic therapy.

Table 1: Top 3 Events per Line Type

Line Type	# of events	# of patients	Rate
CVC	13		
Line infection	5	316	1.58%
Other infection/unspecified	4	316	1.27%
Line dislodgement	4	316	1.27%
PICC	49		
Line dislodgement	18	430	4.19%
Occlusion	16	430	3.72%
Redness, swelling, extravasation	15	430	3.49%
Port	6		
Line infection	3	127	2.36%
Occlusion	2	127	1.57%
Damaged catheter	1	127	0.79%

Table 2: Rate of Complication per Line Type in Each Age Group

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Age	Line Type	Events	Total Patients	Rate of Complications	
0 to 3	CVC	8	103	7.77%	
0 to 3	PICC	9	79	11.39%	
0 to 3	Port	1	17	5.88%	
4 to 7	CVC	3	81	3.70%	
4 to 7	PICC	19	83	22.89%	
4 to 7	Port	2	33	6.06%	
8 to 10	CVC	5	45	11.11%	
8 to 10	PICC	7	55	12.73%	
8 to 10	Port	1	13	7.69%	
11 to 13	CVC	2	40	5.00%	
11 to 13	PICC	7	64	10.94%	
11 to 13	Port	3	23	13.04%	
14 to 18	CVC	1	47	2.13%	
14 to 18	PICC	21	149	14.09%	
14 to 18	Port	0	41	0.00%	

Table 3: Rate of Therapy Completion

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Lino Typo	Therapy	Therapy not			
Line Type	complete	complete			
PICC	62.30%	37.70%			
CVC	36.84%	63.16%			
Port	12.50%	87.50%			

Figure 1: Rate of Complications in PICCS

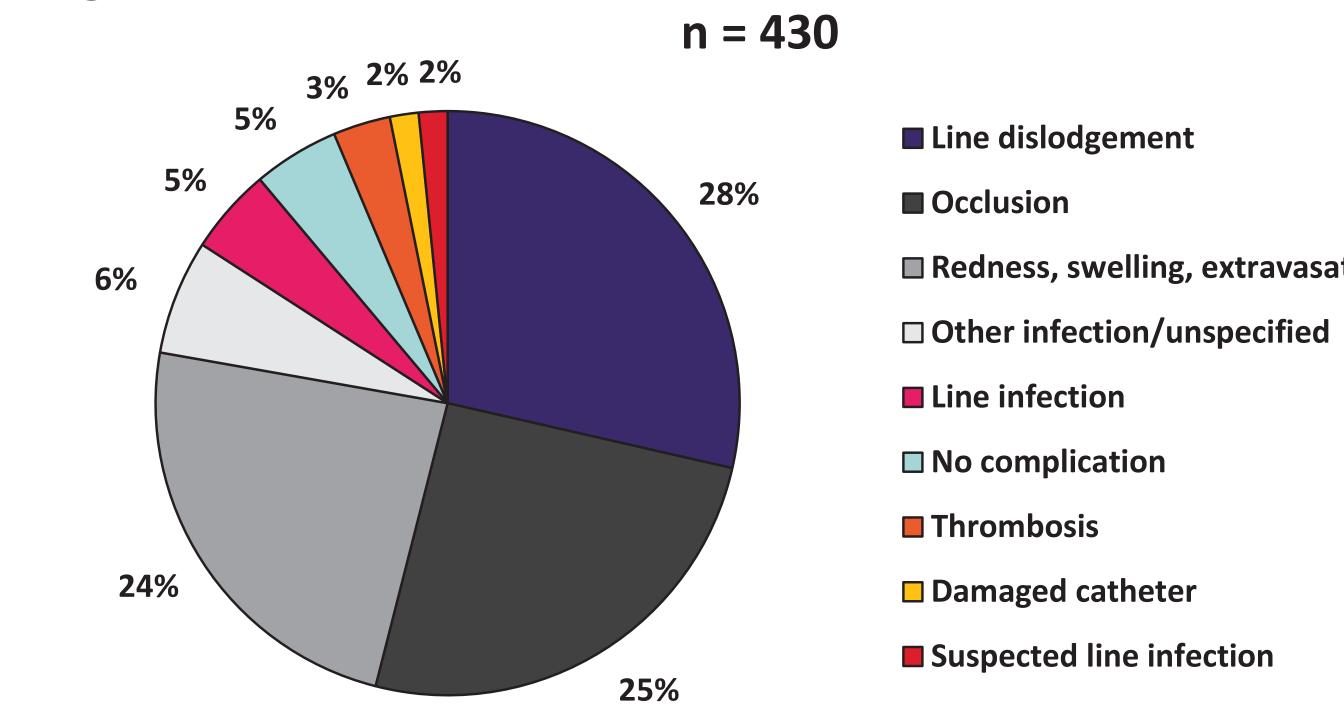


Figure 2: Rate of Complications in CVCs

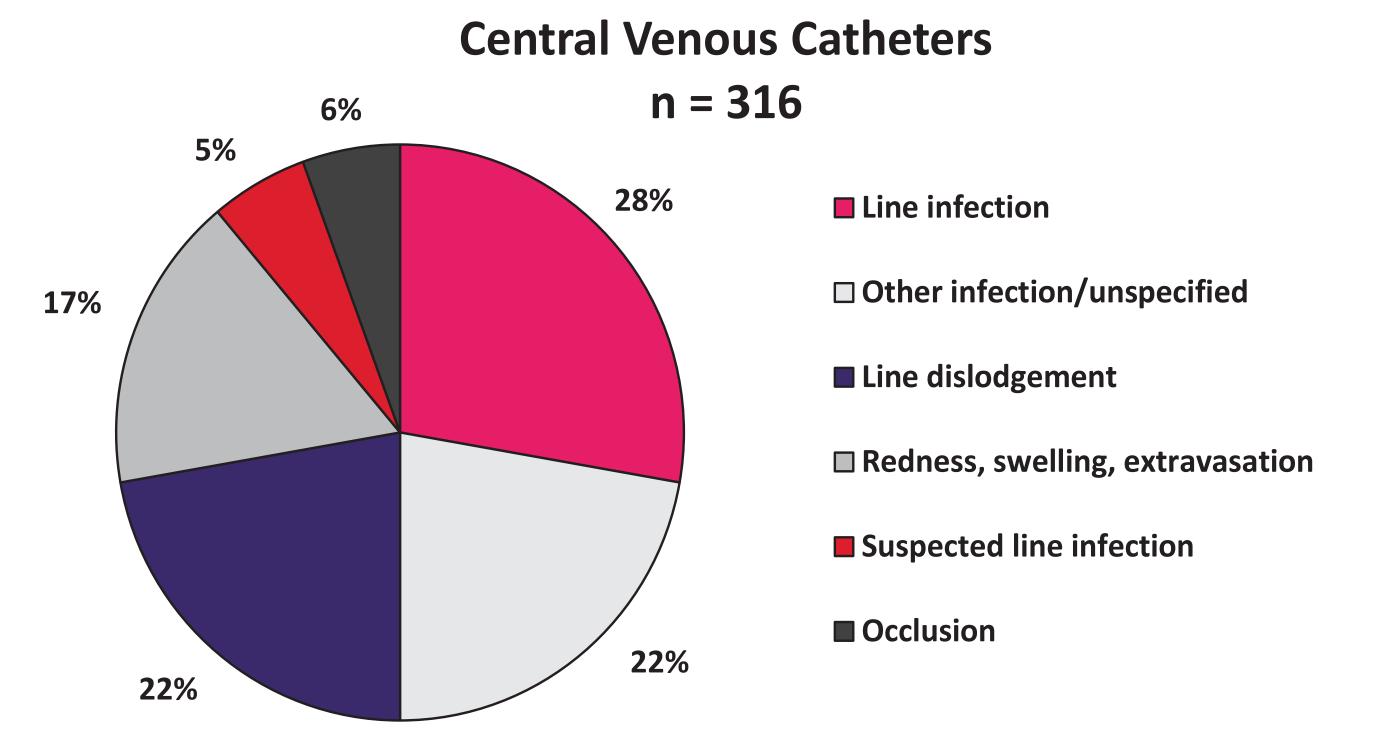
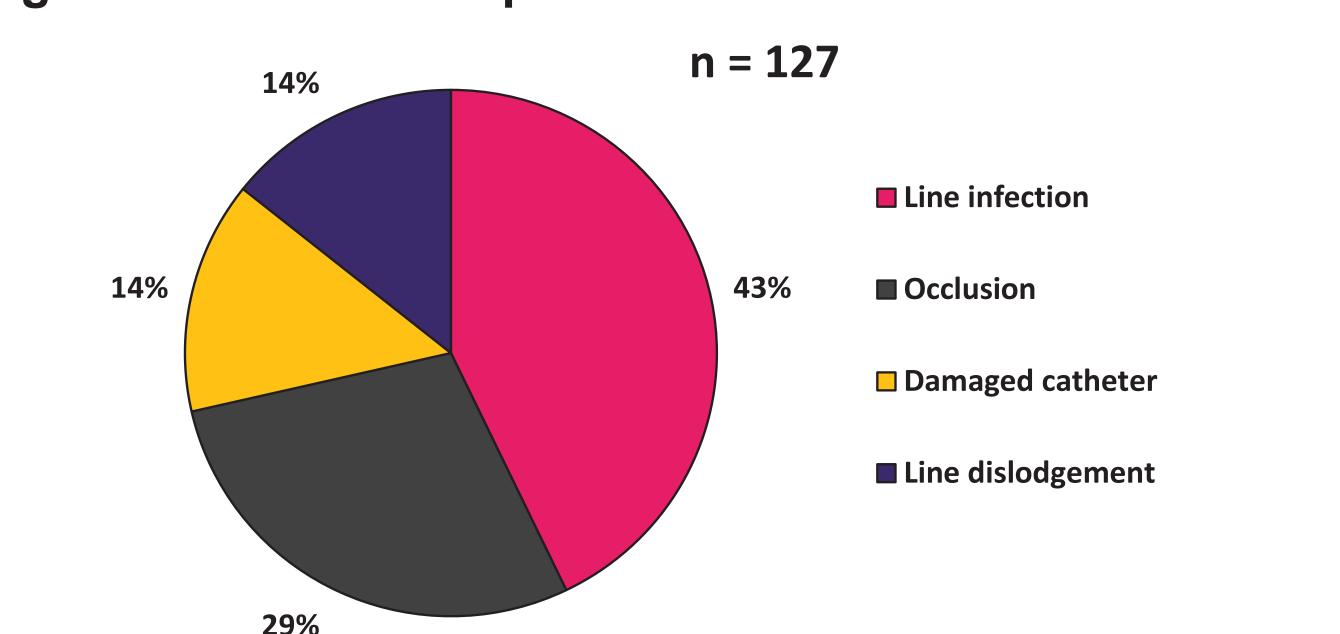
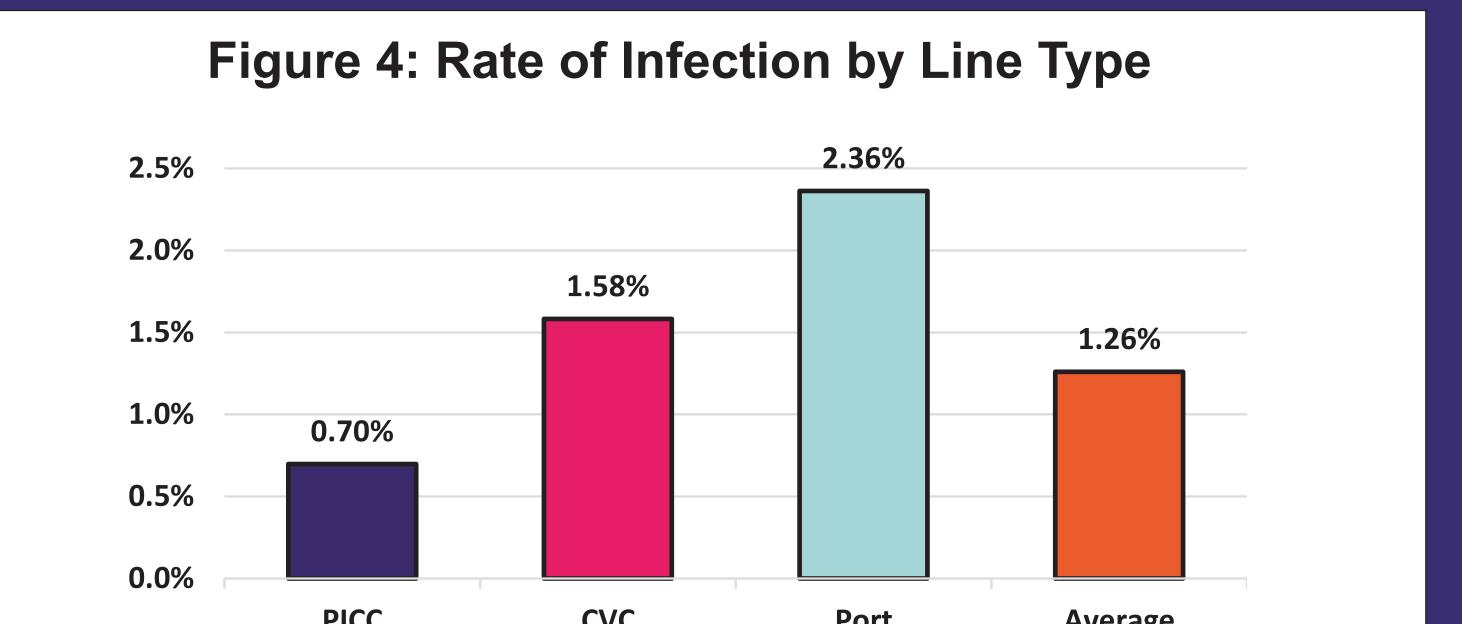


Figure 3: Rate of Complications in Ports





#### Discussion

As a retrospective observational study, limitations included dependence on event reporting and insufficient data on race and ethnicity. Additionally, this study does not evaluate pre-existing complications prior to OPAT.

PICCs were the most used catheter for pediatric patients receiving OPAT and were associated with the most complications. Line dislodgement and occlusion were the most common complications in this two-year period. Of patients with reportable complications, 52.27% completed therapy and PICCs were associated with a 32.87% higher rate of therapy completion than CVCs and ports combined.

Overall infection rates were low in all studied access types and occurred mostly in patients concurrently receiving long-term therapy.

#### References

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## Disclosures

Authors of this presentation have the following to disclose concerning possible financial or personal relationships with commercial entities that may have a direct or indirect interest in the subject matter of this presentation: Michelle Sahlani, Susan Dietze, Maria Giannakos, Christopher Roy, David Shepherd, Joseph Soultatos. Nothing to disclose.