

# Effectiveness of a Venous Catheter Stewardship Intervention Targeting Parenteral Antimicrobial Therapy at Hospital Discharge

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## Background

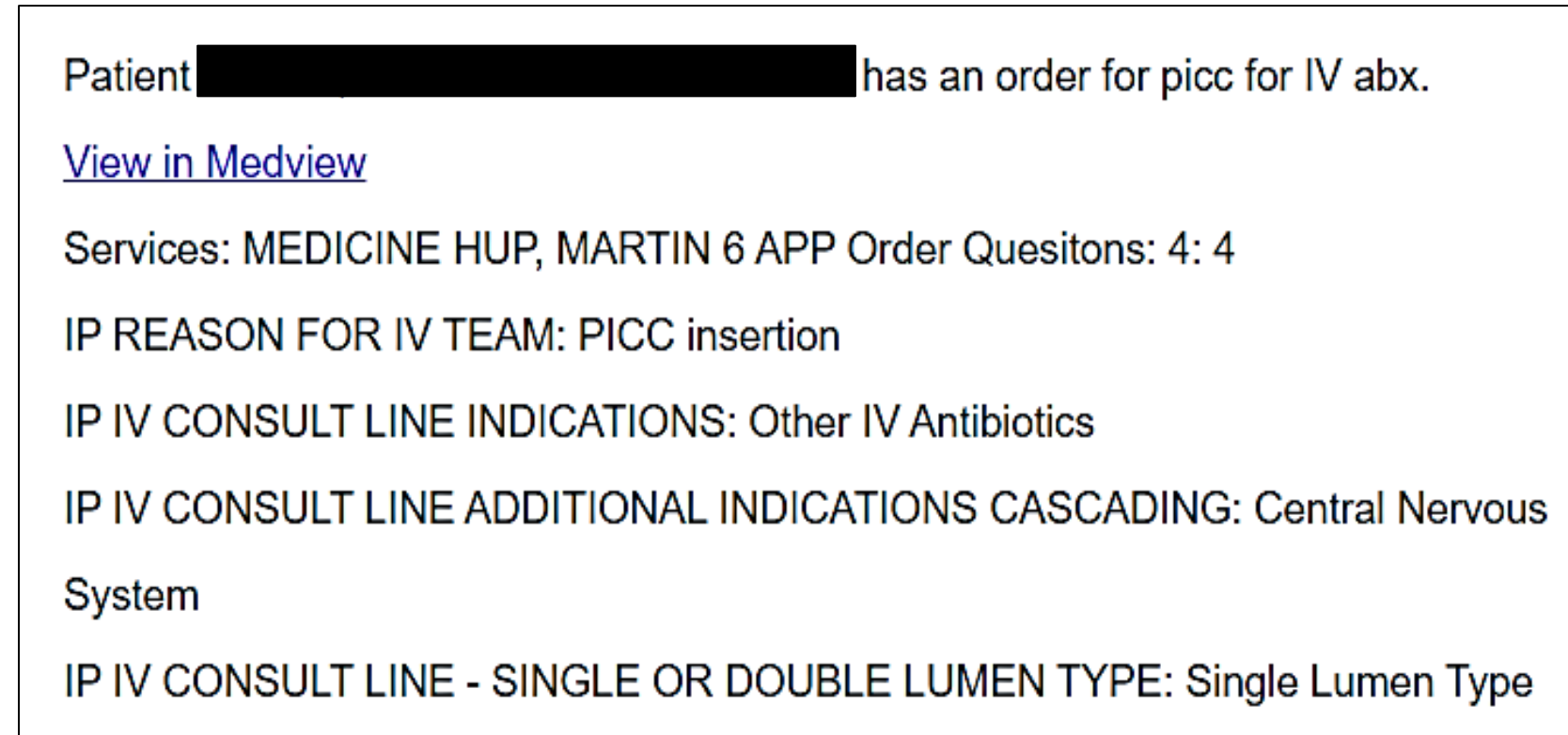
• Peripherally inserted central catheters (PICCs) and midline catheters are often placed in hospitalized patients to facilitate a transition to outpatient parenteral antimicrobial therapy (OPAT).

Potential Benefits of OPAT	Potential Risks of OPAT
↓ hospital length of stay	• catheter-associated infection
↓ risk of hospital-associated conditions	• venous thrombophlebitis
↑ patient satisfaction/quality of life	• adverse drug events
↓ overall healthcare costs	• catheter malfunction/missed doses

- Given the risks of OPAT, it is imperative to carefully consider each patient's candidacy in the context of antimicrobial stewardship (AMS).
- Prior studies estimate that formal infectious diseases and/or AMS review of OPAT referrals results in catheter avoidance in 10-40% of cases. Overall, recommendations to optimize therapy are made in ≥50% of cases where OPAT is initially considered.
- Inpatient Infectious Diseases consult is not mandatory prior to OPAT at our institution. Therefore, we examined the role of a prospective audit and feedback intervention targeting PICC/midline catheter placement for antimicrobial therapy.

## Methods

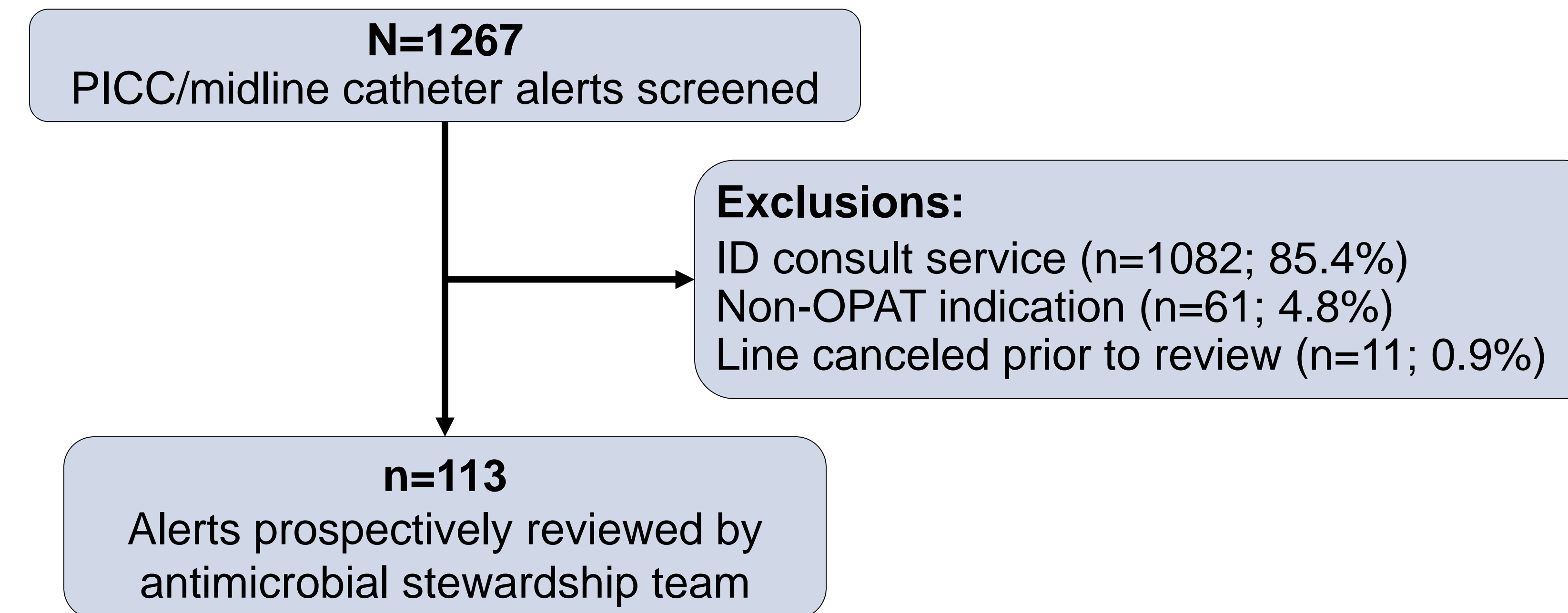
• Prospective cohort study of patients identified by a real-time PICC/midline catheter alert from 5/20/2019 – 5/29/2020 at two large academic medical centers.



- E-mail alerts to the AMS team were generated using a homegrown web application platform (Agent, Penn Medicine Center for Healthcare Innovation, Philadelphia, PA).
- Alerts were generated each time a provider placed an electronic PICC/midline catheter order with an antimicrobial indication selected. Upon receipt of an alert, the AMS team performed a prospective review (08:00-16:30 Monday-Friday) encompassing 1) venous catheter necessity and 2) antimicrobial optimization. Off-hours alerts were reviewed during the next available business day.
- Alerts were excluded if OPAT was recommended by an Infectious Diseases consult service, if the catheter order was canceled prior to review, or if the catheter was ordered solely for a non-OPAT indication (e.g. difficult peripheral IV insertion).
- Data were analyzed using descriptive statistics (percentages, medians).

## Patient Identification

During the study period, 1267 PICC/midline catheter alerts were screened, with 113 alerts undergoing prospective AMS review



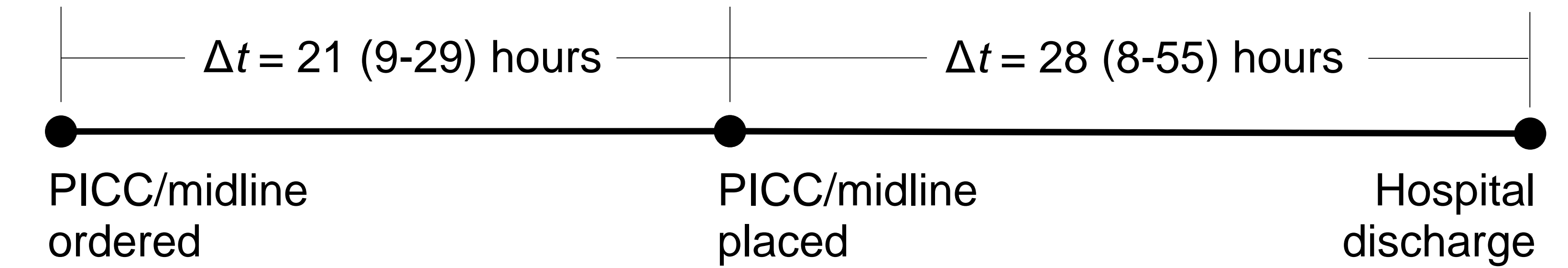
## Cohort Characteristics

Characteristic <sup>a</sup>	n=113 patients
Male sex	56 (49.6)
Age, years	65 (45-73)
Primary service	
Pulmonary/Advanced Lung Disease	39 (34.5)
Hospitalist/General Medicine	27 (23.9)
Hematologic Oncology	11 (9.7)
Colorectal Surgery	5 (4.4)
Podiatry	4 (3.5)
Other	27 (23.9)
Infectious indication <sup>b</sup>	
Lower respiratory tract infection	39 (34.5)
Bloodstream infection	29 (25.7)
Urinary tract infection	25 (22.1)
Intra-abdominal infection	17 (15.0)
Skin structure infection	7 (6.2)
Other	19 (16.8)
Culture-positive infection <sup>c</sup>	83 (73.5)
Parenteral antimicrobials ordered <sup>b</sup>	
Cefepime	31 (27.4)
Ceftriaxone	20 (17.7)
Piperacillin-tazobactam	17 (15.0)
Vancomycin	17 (15.0)
Meropenem	10 (8.8)
Ertapenem	8 (7.1)
Other	41 (36.3)
>1 parenteral antimicrobials ordered	22 (19.5)

<sup>a</sup>Variables expressed as n (%) or median (IQR) as applicable; <sup>b</sup>More than one per patient may be applicable; <sup>c</sup>*Enterobacteriales* (33), *P. aeruginosa* (32), *Enterococcus* sp. (13), *S. aureus* (11), *Streptococcus* sp. (8), coagulase-negative staphylococci (2), Other (15)

## Cohort Characteristics

Characteristic	n=113 patients
Length of hospital stay, index admission	6 (4-12) days
Antimicrobial treatment duration, total	15 (13-21) days



## Stewardship Outcomes

Event Description <sup>a</sup>	n=113 patients
Recommendation to avoid catheter placement	30 (26.5)
Recommendation accepted	19/30 (63.3)
Other antimicrobial stewardship recommendations <sup>b</sup>	50 (44.2)
IV-to-oral conversion	28 (24.8)
De-escalation	22 (19.5)
Obtain ID consult	15 (13.3)
Discontinue antimicrobial(s)	6 (5.3)
Dose adjustment	3 (2.7)
Escalation	3 (2.7)
Modify planned duration	3 (2.7)
Laboratory monitoring	1 (0.9)
OPAT Disposition	
Home infusion	67 (59.3)
Skilled nursing facility	12 (10.6)
Rehabilitation facility	5 (4.4)
Not discharged on OPAT <sup>c</sup>	29 (25.7)

<sup>a</sup>Variables expressed as n (%); <sup>b</sup>More than one per patient may be applicable; <sup>c</sup>19 patients were intervened upon, 10 patients completed therapy prior to discharge

- Rate of 30-day infection-related readmission or ED presentation was comparable between OPAT recipients (**10.7%**) and patients where catheter placement was avoided (**10.5%**) in favor of oral or no antibiotics.

## Conclusions

- Prospective review of PICC/midline catheter orders for OPAT prompted a catheter-avoidance recommendation in 1 in 4 cases.
- Where venous catheter avoidance was not possible, other opportunities for antimicrobial optimization were common.
- This high-yield intervention should be considered at institutions where Infectious Diseases consultation is not mandated prior to OPAT.

## References

1. Heintz BH, et al. Impact of a multidisciplinary team review of potential outpatient parenteral antimicrobial therapy prior to discharge from an academic medical center. *Ann Pharmacother* 2011;45:1329-37.
2. Conant MM, et al. Mandatory infectious diseases approval of outpatient parenteral antimicrobial therapy (OPAT): clinical and economic outcomes of averted cases. *J Antimicrob Chemother* 2014;69(6):1695-1700.
3. Bassey E, et al. Experience with mandatory infectious disease consult for outpatient parenteral antimicrobial therapy. Abstract #703. IDWeek 2012. San Diego, California.