

Comparison of Midline to Peripherally Inserted Central Catheters: A Randomized Clinical Trial

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INTRODUCTION

Intravenous accesses are the most common invasive procedures, involving approximately 80% of all hospital admissions, with an average of two devices per patient during hospitalization.

Midline catheters (MCs) are widely used, but their safety and efficacy compared to peripherally inserted central catheters (PICCs) have not been adequately evaluated.

We aimed to compare the safety and efficacy of MCs with PICCs among adult patients anticipating intravenous therapy from 5 to 28 days in a parallel, 2 arm, open-label, single center randomized clinical trial.

METHODS

Inclusion criteria: Age 18 year or above, indication for IV medicine or fluid therapy including blood products, isotonic saline- or glucose-solutions, antibiotics, and chemotherapy registered for use in peripheral venous catheters with an anticipated need for an IV access lasting 5 - 28 days.

Exclusion criteria: Pregnancy, infection or burns at both upper extremities, existing central venous catheter, informed consent not obtainable, or earlier randomization to the study.

Randomization: Randomization of patients in a 1:1 ratio to either MC group or PICC control group.

Blinding: The study participants, the clinical team, and the researchers were not blinded to the intervention, as the devices used were visibly different.

Figure 2. Unadjusted Kaplan-Meier Estimates of Cumulative Catheter Removal Rates

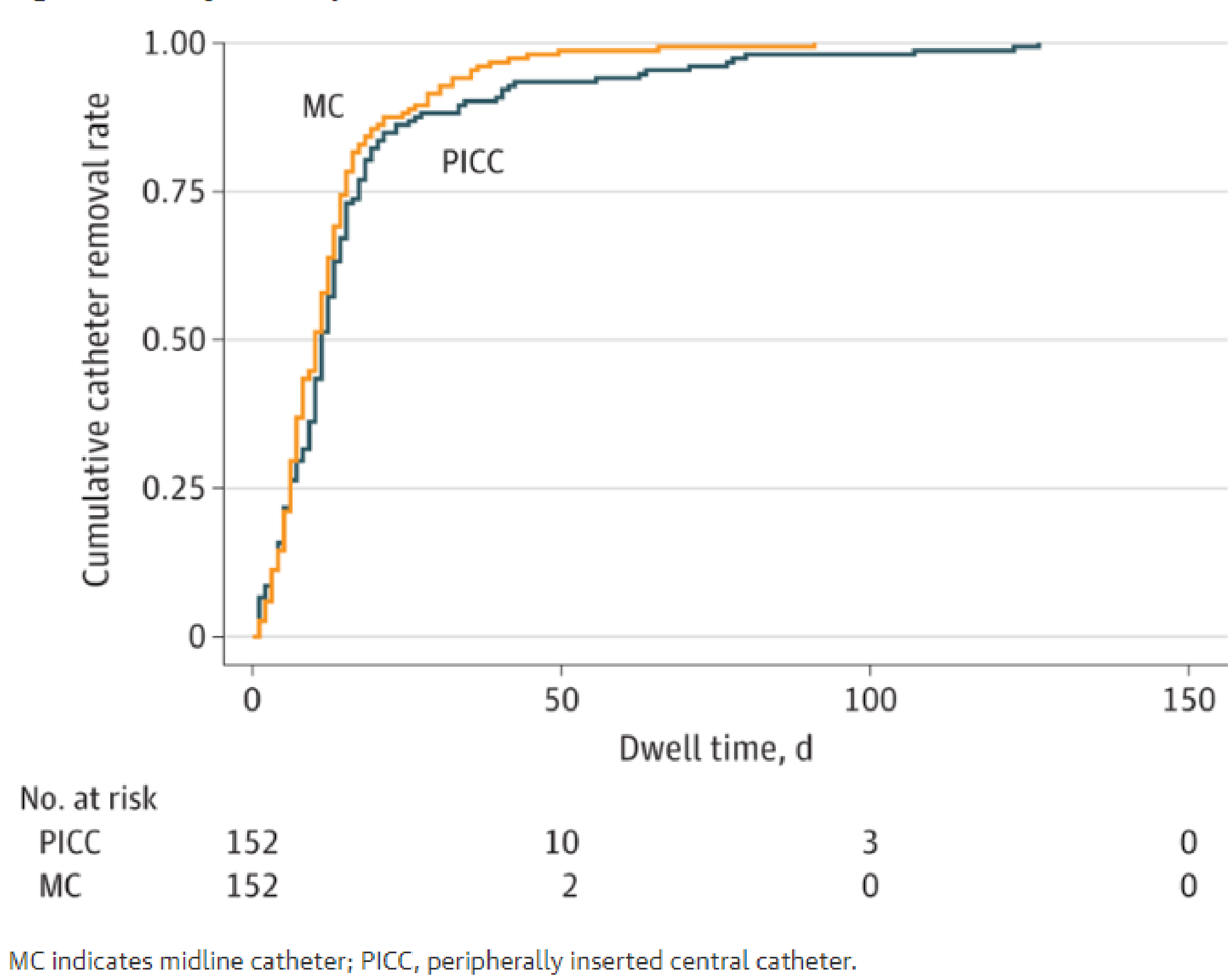


Table 2. Catheter-Related Complications

Outcome	Patients, No. (%)		P value
	MC group (n = 152)	PICC group (n = 152)	
Primary			
CRBSI	0	1 (0.7)	>.99
Secondary			
Deep vein thrombosis	0	2 (1.3)	.50
Reasons for catheter removal			
Treatment ended	132 (86.8)	142 (93.4)	
Pain during infusion	2 (1.3)	0	
Phlebitis	0	1 (0.7)	
Infiltration	2 (1.3)	0	
Accidental removal	4 (2.6)	1 (0.7)	.045
Occlusion	3 (2.0)	2 (1.3)	
Leaking	7 (4.6)	1 (0.7)	
Other	2 (1.3)	5 (3.3)	
Premature removal, all cause	20 (13.2)	10 (6.6)	.08
Incidence of premature catheter removal per 1000 catheter-days (95% CI)	10.3 (6.6-15.9)	3.9 (2.1-7.3)	.02

RESULTS

A total of 304 patients were from 2018 to 2022 included in the analysis, and 152 patients were allocated to each catheter group.

The incidence of catheter-related bloodstream infection (CRBSI) was low, with 0 (0.0%) in the MC group and 1 (0.7%) in the PICC control group (P > .99).

The MC group had a higher catheter-related complication rate (13.2% vs. 7.2%), and an IRR of 2.37 (95% CI, 1.12-5.02; P = .02) for complications compared to the PICC control group.

In a post hoc analysis stratified by catheter dwell time, no significant difference in complication rate (IRR, 1.16; 95% CI, 0.50-2.68; P = .73) between the two groups was found for catheters used less than 16 days.

CONCLUSION

The incidence of CRBSI was low in patients receiving medium to long-term intravenous therapy, with no difference between MCs and PICCs.

The use of MCs resulted in a higher incidence of catheter-related complications compared to use of PICCs. This finding should be balanced in the decision of type of catheter used at the individual patient level.



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