Effect of peripheral intravenous catheter type and material on therapy failure in a neonatal population.

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Background

In neonatal settings vascular access devices are essential for treatment. However, their use is not without risks. The design and materials of peripheral vascular access devices have been evaluated amongst adult populations, but contemporary studies in neonatal settings are scant.

Purpose and Outcome

This research describes the prevalence of peripheral intravenous catheter failure related to three different catheter types with the intent to identify modifiable risks that might be used to evaluate device efficacy, innovate neonatal practice, and support future policy developments.

Method and Setting

This was a retrospective observational analysis of routinely collected anonymized intravenous therapy related data. The study was carried out at the tertiary neonatal intensive care unit (112 beds) of the Women's Wellness and Research Center of Hamad Medical Corporation, Doha, Qatar.

Participants

All neonates who were admitted to the unit requiring intravenous treatment wherefore peripheral intravenous cannulation was indicated, were included in this study.

Data related to removal based on material of the inserted catheter

	26G Neoflon (*n* = 3877)	26G Neoflon Pro (*n* = 3936)	26G SuperCath 5 Safety (*n* = 3090)
Dwell time			
Hours	34 ± 25	31 ± 23	35 ± 24
Reason for removal			
Elective removal	1538 (40%)	1408 (36%)	1331 (43%)
Administrative censoring	44 (1%)	38 (<1%)	27 (<1%)
Failure of therapy:			
Accidental removal	66 (2%)	123 (3%)	76 (2%)
Leaking	476 (12%)	376 (10%)	413 (13%)
Occlusion	113 (3%)	201 (5%)	117 (4%)
Phlebitis	476 (12%)	504 (13%)	102 (3%)
PIVIE	1163 (30%)	1286 (33%)	895 (29%)
No data/ missing	1 (<1%)	0 (0%)	129 (4%)
Failure of therapy			
Yes	2294 (59%)	2490 (63%)	1603 (52%)
No	1583 (41%)	1446 (37%)	1487 (48%)

Data is presented as mean ± standard deviation, or as absolute number (percentages), as appropriate.

Results

Using different catheter types resulted in significantly less therapy failures as phlebitis and increased dwell time, compared to control groups. This remains significant after adjusting for age (gestation, insert), birth weight, and catheter type.

Factor	*B*	SE	Odds	*p*-Value	95% CI
Type of catheter inserted	0.167	0.034	0.85	<0.001	0.79–0.90
Reason for removal	2.210	0.047	0.11	<0.001	0.10–0.12
Dwell time	0.012	0.001	0.97	<0.001	0.96–0.99
(Constant)	4.607	0.307	2.21	<0.001	

Multivariate logistic regression analyses for complications leading to removal of the device

Conclusion

The study's findings are in accord with international literature concerning the superiority of Vialon (polyurethane) over Teflon (polytetrafluorethylene) catheters with respect to the risk of phlebitis and longer dwell times. However, the risk of failure of therapy did not differ between catheters. This finding is reassuring and supports practitioner judgment when selecting peripheral catheter devices.