

Incidence and risk factors associated with short peripheral intravenous catheter failure

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INTRODUCTION

Short peripheral intravenous catheters (PIVCs) are the most commonly used medical devices in hospitals but adverse events related to vascular catheterization are highly common, overlooked in many cases.

Catheter-related bloodstream infections are among the most serious complications their rate and frequency are well described, PIVCs has a higher incidence than catheter-related bloodstream infections, it is generally underdiagnosed.

OBJETIVE

We aimed to determine the incidence and characteristics of catheter failure (CF) in public hospital system from Barcelona metropolitan-south area.

METHODS

Setting: Two hospitals, part of the Catalan Institute of Health, from Barcelona south area.

Design: Multicenter prospective cohort study.

Main outcome : catheter failure (CF) secondary to phlebitis.

Study period: from 1st January 2016 to 31th December 2017.

All adult patients admitted in the hospitalization wards of these hospitals during the study period were included and follow-up from the day of admission until the day of discharge. Patients with a hospital admission ≤ 24 h were excluded. All PIVCs and PIVC-related events during this period were followed up.

This study was evaluated and approved by the Clinical Research Ethics Committee (CEIC) of the Bellvitge University Hospital (reference 243/20).

RESULTS

Of 47,249 patients, **94.5%** (44,661 patients) had at least one **PIVCs during their hospitalization** (190,559 days of catheter). Accumulative incidence rate of CF was **4.6%**.

BASELINE CHARACTERISTICS

Demographic characteristics	GLOBAL (n=44,661)
Male sex, n (%)	25,648 (57.4)
Age (years), mean (SD)	64.6 (16.5)
Unscheduled admission, n (%)	22,147 (49.6)
Medical ward, n (%)	22,827 (51.1)
Length of hospital stay, mean (SD)	6.8 (9.6)
Clinical characteristics	
Chronic disease	19,641 (44.0)
Uncontrolled pain	11,274 (25.2)
Vascular fragility	1,753 (3.9)
Position impairment	2,051 (4.6)
Hemodynamic instability	26,484 (59.3)
Involuntary movements	209 (0.5)
Extreme weight	2,442 (5.5)
Anatomical and functional disorders	5,121 (11.5)
Agitation	395 (0.9)
Mental status impairments	3,065 (6.9)
Impaired cognitive functions	110 (0.2)
Perception of reality disorders	69 (0.2)
Aggressive behavior	134 (0.3)
Catheterization dwell days, mean (SD)	4.27 (5.6)

Independent factors related to CF were age, gender, unscheduled admission, medical condition, length of hospital stay, hemodynamic instability, extreme weight, uncontrolled pain and catheterization dwell days. Patients with CF more often had undesirable health outcome, as bloodstream related catheter bacteraemia and in-hospital mortality (1.1% vs. 0.2%, $p < 0.001$ and 2.9% vs. 1.6%, $p < 0.001$; respectively).

UNIVARIATE AND MULTIVARIATE ANALYSIS OF RISK FACTORS FOR DEVELOPED CF

	UNIVARIATE			MULTIVARIATE		
	Non-CF (n=42,592)	CF (n=2,069)	p-Value	OR	95% CI	p-Value
Demographic characteristics						
Male sex, n (%)	18,093 (42.5)	920 (44.5)	0.08	1.14	1.00-1.01	0.01
Age (years), mean (SD)	64.8 (16.5)	68.2 (15.6)	<0.001	1.01	1.00-1.01	0.02
Unscheduled admission, n (%)	20,571 (48.3)	1,576 (76.2)	<0.001	2.09	1.84-2.38	<0.001
Medical ward, n (%)	21,394 (50.2)	1,433 (69.3)	<0.001	1.33	1.18-1.51	<0.001
Length of hospital stay, mean (SD)	6.1 (8.2)	14.4 (18.3)	<0.001	1.02	1.01-1.02	<0.001
Clinical characteristics						
Chronic disease	18,598 (43.7)	1,043 (50.4)	<0.001	1.03	0.93-1.13	0.56
Uncontrolled pain	10,493 (24.6)	781 (37.7)	<0.001	1.33	1.21-1.48	<0.001
Vascular fragility	1,658 (3.9)	95 (4.6)	0.11	0.92	0.74-1.15	0.46
Position impairment	1,956 (4.6)	95 (4.6)	0.99			
Hemodynamic instability	25,013 (58.7)	1,471 (71.1)	<0.001	1.25	1.13-1.39	<0.001
Involuntary movements	191 (0.4)	18 (0.9)	0.01	1.16	0.69-1.94	0.58
Extreme weight	2,332 (5.5)	110 (5.3)	0.80	0.79	0.64-0.97	0.02
Anatomical and functional disorders	4,858 (11.4)	263 (12.7)	0.07			
Agitation	364 (0.9)	31 (1.5)	0.004	0.95	0.64-1.42	0.81
Mental status impairments	2,287 (6.6)	238 (11.5)	<0.001	0.99	0.85-1.17	0.99
Impaired cognitive functions	107 (0.3)	3 (0.1)	0.49			
Perception of reality disorders	65 (0.2)	4 (0.2)	0.56			
Aggressive behavior	127 (0.3)	7 (0.3)	0.68			
Catheterization dwell days, mean (SD)	3.99 (5.1)	9.90 (9.4)	<0.001	1.06	1.05-1.06	<0.001

CONCLUSIONS

Identify factors related to CF during hospitalization can help to **implement strategies for optimize the use and type of PIVCs**. Furthermore, these results may contribute to a reduction of catheter insertions, patient discomfort, hospital cost and healthcare workload.