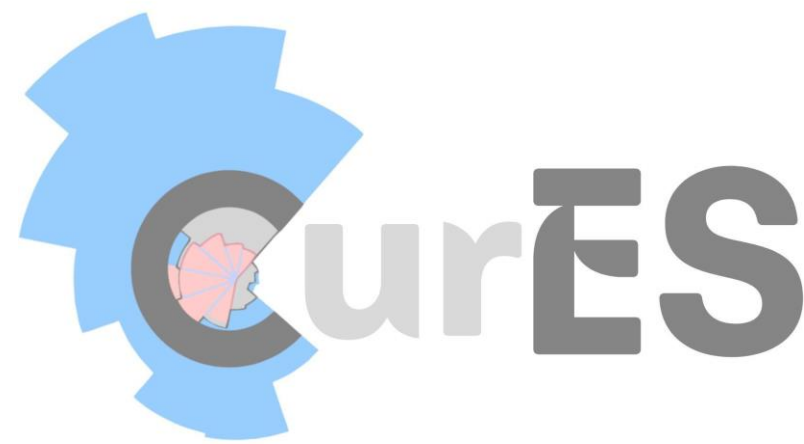


Independent risk factors for difficult peripheral intravenous cannulation. A multicentre study in 8 hospitals in Spain



Rodriguez-Calero MA^{1,2}, de Pedro-Gomez JE², Molero-Ballester LJ³, Fernandez-Fernandez I³, Matamalas-Massanet C³, Moreno-Mejias L³, Blanco-Mavillard I^{2,3}, Moya-Suarez AB⁴, Personat-Labrador C², Parra-Garcia G⁵, Morales-Asencio JM⁶

- 1. Health system of the Balearic Islands, Palma, Spain
- 2. University of the Balearic Islands, Palma, Spain
- 3. Manacor Hospital, Manacor, Spain
- 4. Costa del Sol Hospital, Marbella, Spain
- 5. Sant Joan de Deu Hospital, Palma, Spain
- 6. University of Málaga, Málaga, Spain

Introduction:

The study aim was to identify risk factors (RF) for difficult peripheral intravenous cannulation (DPIVC) in hospitals.

Methods:

Case-control study carried out from February to December 2017. We included adult inpatients in need of a peripheral intravenous catheter (PIVC) in medical and surgical wards, critical care unit, A&E and surgical area of 8 public hospitals. The nurse responsible for the insertion registered anonymously his/her pre-insertion assessment and variables related to the intervention. Subsequently, a researcher extracted health-related variables from the patient's medical history. Case inclusion criteria included one of the following: two or more failed attempts, need for puncture support, need for central access after failure to achieve PIVC, or decision to reject the technique.

Potential RF included health-related variables, conditions of the vascular access, area/setting and professional-related variables.

After descriptive analysis, we performed a univariate logistic regression. Statistically significant variables were included in multivariate logistic regression together with hospital areas as potential predictors.

Table 2. Multivariate analysis

	OR	IC95%	p
History of DPIVC	4,92	(3,17 - 7,63)	<0,001
Non-palpable veins	2,35	(1,65 - 3,36)	<0,001
Acute upper limb alterations	1,56	(1,06 - 2,30)	0,024
Puncture site: antecubital fossa	1,84	(1,23 - 2,75)	0,030
Puncture site: forehand	0,60	(0,40 - 0,90)	0,014

OR; Odds ratio; DPIVC: Difficult peripheral intravenous cannulation

Results:

We recruited 2662 patients, 50.3% were women. Age was 64.3±17.6 years. 221 patients presented DPIVC, 8.3% of the sample.

Univariate analysis offered 9 significant variables (table 1). In multivariate predictive model, a previous history of DPIVC, non-palpable veins and acute upper limb alterations appeared as independent RF (table 2).

We also found significant differences among hospital areas. Multiple catheterization was more frequent in medical and surgical wards, while upper limb alterations were more frequent in medical wards. We did not find statistically significant differences in any of the professional-related variables.

Discussion & conclusion:

Our study identifies independent RF for DPIVC in a diverse population. In addition, the kind of attention provided could influence the appearance of DPIVC. This information must be considered in interventions to prevent DPIVC, such as advanced cannulation techniques or vascular access teams.

Table 1. Univariate analysis of the risk factors

VARIABLE	TOTAL n=2663 n (%)	DPIVC n=221 n (%)	NO DPIVC n=2441 n (%)	p
AGE >65	1441 (54.1)	130 (58.8)	1311 (53.7)	0.159
Female gender	1338 (50.3)	136 (61.5)	1202 (49.2)	0.001
Non-palpable veins	498 (18.)	110 (49.7)	388 (15.9)	<0.001
Non-visible veins	793 (29.8)	121 (54.7)	672 (27.5)	<0.001
History of DPIVC	1108 (41.6)	185 (83.7)	923 (37.8)	<0.001
Upper limb alterations	450 (16.9)	81 (36.6)	369 (15.1)	<0.001
Acute	320 (12.0)	51 (23.0)	269 (11.0)	<0.001
Chronic	176 (6.6)	33 (14.9)	143 (5.8)	<0.001
Previous catheters inserted during current hospitalization	1592 (59.8%)	147 (66.)	1445 (59.2)	0.044
Admission to hospital / emergency in the last 90 days	544 (20.4)	56 (25.3)	488 (19.9)	0.068
Diabetes mellitus	586 (22.0)	50 (21.9)	536 (22.6)	0.866
Parenteral drug abuse	9 (0.3)	2 (0.9)	7 (0.2)	0.169
Chemotherapy	145 (5.4)	12 (5.4)	133 (5.4)	0.999
Hemodialysis	20 (0.8)	4 (1.8)	16 (0.7)	0.078
BMI				
<18.5	241 (9.1)	28 (13.0)	213 (9.0)	
18.5 - 30	1827 (68.6)	123 (57.2)	1704 (71.7)	<0.001
>30	523 (19.6)	64 (29.8)	459 (19.3)	
COPD	277 (10.4)	31 (14.03)	246 (10.8)	0.084

DPIVC: Difficult peripheral intravenous cannulation; BMI: Body Mass Index; COPD: Chronic obstructive pulmonary disease