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Assessing difficult intravenous access in adult patients: translation and validation of the Modified A-DIVA scale to European Portuguese

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INTRODUCTION

The early diagnose of patients at risk of difficult peripheral intravenous catheterization (PIVC) is imperative to ensure the preservation of their venous network and reducing potential complications. However, no accurate and reliable predictive instruments are known in Portugal that could assist healthcare professionals within this scope. Therefore, **this study aimed to translate and validate the Modified A-DIVA scale to European Portuguese.**

METHODOLOGY

A methodological and cross-sectional study was conducted in **two phases**:

- i) Translation** of the Modified A-DIVA scale to European Portuguese (A-DM scale), following the six stages proposed by Beaton and collaborators;
- ii) Assessment of its psychometric properties** in a non-probability sample of 100 oncology patients who required PIVC in a surgical ward from an oncology hospital in Portugal.

All ethical assumptions in clinical research were guaranteed, with previous favorable ruling by the institution's Ethical Committee (ref. ref. TI 24/2019).



RESULTS

One hundred patients were enrolled in Phase 2, of which:

- 83% of the patients required a PIVC insertion due to an impending surgery;
- 12% had a previous non-functioning catheter;
- Average number of puncture attempts was 1.57 (1–8, SD±1.1)
- PIVC remained *in situ* for 2.1 days (0–8, SD ± 1.4);
- Complication rate was 26%.

Inter-rater reliability: The A-DM scale showed **excellent inter-rater accordance scores**, $k = 0.593$ (95% CI, 0.847-0.970), with statistically significant ($p < 0.0005$)(Table 1).

Convergent validity: A point-biserial correlation was run to determine the relationship between the A-DM scores and the scores obtained with the *Escala Avaliação Rede Venosa* (Santos-Costa et al, *in press*). There was a positive correlation between both scales, which was statistically significant ($r_{pb} = 0.739$, $p < 0.001$).

Criterion and construct validity were assessed through predictive, convergent, and correlational analysis using variables identified in recent literature as associated with difficult PIVC, with **moderate to large magnitudes and statistical significance** (Table 2).

Table 1

Results of the inter-rater reliability analysis performed for the escala A-DIVA Modificada (n = 200).

Item	Cohen's Kappa	p-Value
A pessoa apresenta história prévia de acesso endovenoso periférico considerado difícil?	0.917	<0.001
É esperada uma primeira tentativa de punção sem sucesso ou que o acesso endovenoso periférico seja difícil?	0.847	<0.001
É incapaz de identificar uma veia dilatada após palpação de um membro superior?	0.864	<0.001
É incapaz de identificar uma veia dilatada após observação de um membro superior?	0.847	<0.001
A veia dilatada de maior calibre apresenta um diâmetro menor que 3 milímetros?	0.970	<0.001
Total	0.910	<0.001

Table 2

Correlation matrix for the A-DM scale (n = 200).

Variables	r_{pb}	p-Value
Patient-related variables	Age	0.154
	Gender	0.069
	Body Mass Index	0.151
	Visible vein diameter (in millimeters)	-0.523
	Previous antineoplastic treatment	0.157
	Comorbidities: Arterial Hypertension	0.072
	Comorbidities: Dyslipidemia	0.011
	Comorbidities: Type-2 Diabetes	0.226
Procedural variables	Caliber (Gauge)	0.517
	Insertion site: hand	-0.063
	Insertion site: forearm	0.027
	Insertion site: antecubital fossa	0.072
	First-attempt success	0.512
	Number of puncture attempts	0.414
	Time for PIVC insertion (in minutes)	-0.016
	Easiness of puncture	0.620
PIVC outcomes	Premature removal	0.336
	Complication: infiltration	0.086
	Complication: phlebitis	0.122
	Complications (overall)	0.157

r—Pearson correlation; r_{pb} —point biserial correlation coefficient.

CONCLUSIONS

The A-DM scale is a **valid and reliable instrument** that can assist healthcare professionals in the early diagnose of patients at risk of difficult PIVC, **reducing current trends of successive multiple puncture attempts identified in recent studies conducted in Portugal**. Despite the promising results, future studies in different clinical settings and with diverse patient cohorts are required.