

Ultrasound-Guided vs. Blind Venipuncture in Difficult Access Patients: A Prospective Multi-Center Observational Study in Emergency Settings



Study snapshot

Design: prospective multi-center observational study
Sites: Humanitas Gradenigo Hospital, Turin; San Francesco Hospital, Nuoro
Population: 100 adult DIVA patients
Comparison: ultrasound-guided vs blind PIV placement
Focus: first-attempt success, placement time, complications, patient satisfaction

Background

Peripheral intravenous access is essential in emergency care for IV therapy and blood sampling. In DIVA adults, blind venipuncture is less effective when veins are neither visible nor palpable, increasing failed attempts, discomfort, and delays. The source thesis reports 18.27 million Italian ED admissions in 2023; around 70% required venous access and about 80% of these were short peripheral catheters. DIVA prevalence in emergency settings was reported as roughly 35% to 60%.

Objectives

- Compare ultrasound-guided and blind venipuncture in adult DIVA patients.
- Assess first-attempt success, number of attempts, placement time, complications, and satisfaction.
- Integrate local observational findings with literature data.

Methods

- Prospective observational study in two Italian emergency departments.
- Adult patients were classified as DIVA using the A-DIVA scale.
- Total sample: 100 enrolled patients.
- Outcomes were collected on an ad hoc structured data form.
- Exclusion criteria in the source included age <18 years and patients already carrying vascular catheters.

DIVA definition

DIVA was evaluated using the A-DIVA scale. The source abstract describes DIVA by absence of visible and/or palpable veins, more than one attempt, a history of multiple venipunctures, and adult age. Higher procedural difficulty was also associated with female sex, age >65 years, multiple comorbidities, and higher DIVA score.

Sample and procedural data

100

Enrolled adult DIVA patients

2

Italian emergency departments

95%

Confidence level used for sample-size planning

≥97

Target minimum sample size reported in the thesis

The study states that the sample was planned as a pilot convenience sample, with a minimum target of 97 participants and final enrolment of 100 DIVA patients.

Main findinas from local cohort

Outcome	Finding reported in source	Interpretation
Overall success attempts	45.4% first attempt; 32.4% second; 17.8% third; 2.6% fourth	Most successful insertions occurred within the first two attempts.
Mean successful placement time	236 seconds overall	Procedures were completed in about 4 minutes on average.
Placement time by technique	241 s ultrasound-guided vs 230 s blind	Only a small difference in mean time was observed locally.
Patient satisfaction	Mean 7.0/10 overall; 7.25 ultrasound-guided vs 6.62 blind	Patient experience favored ultrasound guidance.

Complications

The study focused on early procedure-related complications leading to unsuccessful venipuncture and a new attempt. Reported categories included non-collaborative patient, failed venipuncture, iatrogenic venous injury, and extravasation.

Most frequent: Iatrogenic venous injury was the most common complication at 32.5%.

Next most frequent: Non-collaborative patient accounted for 27.5% of observed complications.

Clinical message

- Ultrasound-guided venipuncture improved first-attempt success in DIVA patients according to the local cohort summary and the broader literature review.
- Patient satisfaction was higher with ultrasound guidance in the observational study.
- The local dataset showed only a minimal time difference between techniques.
- DIVA scoring appears useful for triage and for directing complex patients toward ultrasound-guided access.

Practice implications

- Introduce structured DIVA assessment at triage or before vascular access attempts.
- Reserve trained operators and ultrasound devices for high-score or clinically complex patients.
- Support implementation with formal training in ultrasound-guided PIV placement.
- Track attempts, complications, satisfaction, and rescue access use as quality indicators.

Economic considerations

The thesis argues that ultrasound guidance remains economically favorable despite initial training and equipment costs. It reports literature-based cost reductions of roughly 20% to 30% per DIVA patient and estimated savings of about €70 to €150 per treated patient.

Conclusions

Ultrasound-guided venipuncture emerged as the preferred strategy for difficult-access adults in emergency settings. The source emphasizes better first-attempt success, lower complication burden, and higher patient satisfaction, supporting broader institutional adoption.