

The Burden of Peripheral Intravenous Catheter Failure in Older Hospitalised Patients

BIO-VAC Study | Liverpool Hospital, Sydney, Australia

BIO-VAC

BACKGROUND & OBJECTIVE

Background: Peripheral intravenous catheter (PIVC) insertion in older adults (≥65 years) is complicated by age-related physiological changes, multimorbidity, and cognitive impairment.

Objective: Examine PIVC characteristics, failure rates, and economic burden in hospitalised older adults admitted under Geriatric Medicine.

METHODS

- Prospective cohort study (June–October 2023)
- 215 older adults, mean age 83 years
- Liverpool Hospital (tertiary)
- Kaplan-Meier failure risk analysis
- Cox proportional hazards modelling
- Economic evaluation with cost comparison

KEY FINDINGS

52% PIVC failure within 72–96 hours
1.30 Hazard ratio per additional catheter (p=0.019)
235 min Mean wait for replacement PIVC

STUDY POPULATION

215 older adults enrolled	189 with PIVC at baseline
128 females (59.5%)	35 from aged care (16.3%)
57 with dementia (26.5%)	138 CALD background (64.2%)

MAIN RESULTS

- **123 of 189 (65.1%)** baseline PIVCs failed prematurely
- **232 additional PIVCs** inserted during median 11-day stay
- **38 (10.7%)** failures due to infiltration/extravasation

Insertion characteristics: 71.4% non-recommended sites, 56.1% cubital fossa, 50.8% idle at enrolment

CLINICAL IMPACT

- **Repeated cannulation burden:** Median 3 attempts per subsequent PIVC; 25% reported ≥4 attempts
- **Patient experience:** Median pain 4/10; 25% reported pain ≥6/10
- **DIVA recognition gap:** Only 9.8% documented DIVA history despite high insertion attempts
- **Treatment delays:** Waiting times contributed to extended hospital stays

ECONOMIC BURDEN

\$620.14 Cost per patient (elderly)
\$312.85 Cost per patient (general pop.)
\$297,784 Annual cost for study hospital

Note: Elderly population cost 1.98× higher; driven by reinsertion (\$241.54) and delays (\$378.60)

CONCLUSIONS

PIVC failure in hospitalised older adults is **common and clinically significant**, with substantial economic impact driven by repeated insertions and treatment delays.

- Early PIVC failure requires improved assessment strategies
- Need for escalation protocols (ultrasound, experienced inserters)
- Consideration of alternative vascular access devices (midline, PICC)
- Timely removal of idle PIVCs to reduce avoidable harm

FUTURE DIRECTIONS

- Multicentre RCTs evaluating alternative devices
- Technology-assisted insertion techniques
- Formal DIVA assessment tools in practice