POSITION STATEMENT:

Peripheral intravenous cannula insertion procedure using assistive visual technology including ultrasound and near infrared technology

Approximately 70% of hospitalised patients have a peripheral intravenous cannula (PIVC) inserted[1]. First insertion attempts fail in up to 40% in adults and 65% of children[1]. Complications occur in up to 69% of PIVCs resulting in up to 90% of PIVCs being removed prematurely before therapy is completed.[1, 2]

Patients with difficult intravenous access (DIVA) have reduced number of visible, palpable and quality veins for insertion of a PIVC [3, 4]; up to 35% of adult patients [4, 5] and 60% of paediatric patients have DIVA [6]. The CNSA vascular access guidelines (2024) comprehensively detail vessel health and preservation, device selection, and DIVA management for patients with cancer.

The clinical care standard for management of peripheral intravenous catheters (Australian Commission on Safety and Quality in Health Care, 2021) identifies PIVC insertion procedure for patients with DIVA performed by skilled clinicians using advanced techniques and technology improves rate of first insertion success[1], boosts patient's confidence in provider, minimises anxiety and results in minimal complications during catheter dwell time[7].

Purpose: To provide evidence-based statements to inform safe, patient focused, standardised PIVC insertion procedures using assistive visual technology including ultrasound (US) or near infrared (NIR) technology.

PATIENT

INCLUSION: Enhanced consumer experience, as per the Australian Cancer Plan (2023) acknowledges patients and family are core partners within the healthcare team for vascular access device assessment and management, including the vascular access team, nurses, medical staff, pharmacy, interventional radiology, and nephrology and infectious diseases as appropriate [8-11].

EDUCATION: Educate and collaborate with patient and family to make informed decisions about VAD selection and insertion procedures including use of US or NIR, preparation, risks, benefits, and post insertion care [1, 10, 12].

PREPARATION: Educate and assist the patient if appropriate to prepare for the procedure including adequate hydration, warmth, pain and relaxation techniques as required [1, 13].

WORKPLACE

USG-PIVC & NIR education and competency assessment are incorporated in workplace procedures, policies, and educational strategies[1].

RESOURCES: Appropriate technology (US machines) and materials (e.g. DIVA packs, increased cannula lengths) are readily available as required[1].

CLINICIAN

US or NIR guided PIVC insertion procedures implemented at outset, not as rescue strategy for patients with DIVA [5, 10].

Clinicians complete standardised, evidence based preparation prior to independent insertion of US or NIR guided PIVC insertion procedures including [1, 13]:

- EDUCATION: Theoretical knowledge and practical simulation including patient communication and education, first insertion success, vessel health and preservation, principles of ultrasound, Aseptic Non Touch Technique (ANTT®), and minimisation of post insertion failure.
- ASSESSMENT: including theoretical knowledge and practical skills.
- COMPETENCY: including successful, independent practice attempts supervised by an educated and competent vascular access expert.
- FREQUENCY: at least at two timepoints, including
  - (1) prior to unsupervised US or NIR guided PIVC insertion procedures and
  - (2) at least annual updates on current evidence and practical skills based on procedural volume undertaken

Date released: 19 March 2024

Endorsed by: AVAS AVATAR

REFERENCES

1. Australian Commission on Safety and Quality in Health Care. Management of Peripheral Intravenous Catheters Clinical Care Standard. In: Australian Commission on Safety and Quality in Health Care, editor. Sydney2021.
2. Alexandrou E, Ray-Barruel G, Carr PJ, Frost SA, Inwood S, Higgins N, et al. Use of Short Peripheral Intravenous Catheters: Characteristics, Management, and Outcomes Worldwide. J Hosp Med. 2018;13(5).
3. van Loon FHJ, Korsten HHM, Dierick-van Daele ATM, Bouwman ARA. The impact of the catheter to vein ratio on peripheral intravenous cannulation success, a post-hoc analyses. PLoS ONE. 2021;16(5):e0252166.
4. Rodriguez-Calero MA, de Pedro-Gomez JE, Molero-Ballester LJ, Fernandez-Fernandez I, Matamalas-Massanet C, Moreno-Mejias L, et al. Risk Factors for Difficult Peripheral Intravenous Cannulation. The PIVV2 Multicentre Case-Control Study. Journal of clinical medicine. 2020;9(3).
5. Sweeny A, Archer-Jones A, Watkins S, Johnson L, Gunter A, Rickard C. The experience of patients at high risk of difficult peripheral intravenous cannulation: An Australian prospective observational study. Australasian emergency care. 2022;25(2):140-6.
6. Malyon L, Ullman AJ, Phillips N, Young J, Kleidon T, Murfield J, et al. Peripheral intravenous catheter duration and failure in paediatric acute care: A prospective cohort study. Emergency medicine Australasia : EMA. 2014;26(6):602-8.
7. Sou V, McManus C, Mifflin N, Frost SA, Ale J, Alexandrou E. A clinical pathway for the management of difficult venous access. BMC Nurs. 2017;16:64.
8. Hallam C, Denton A. Vessel health and preservation 1: minimising the risks of vascular access. Nursing Times. 2020;116(7):22-5.
9. Cancer Australia. Australian Cancer Plan (Summary). Surry Hills, NSW.2023.
10. Ullman AJ, Bernstein SJ, Brown E, Aiyagari R, Doellman D, Faustino EVS, et al. The Michigan Appropriateness Guide for Intravenous Catheters in Pediatrics: miniMAGIC. Pediatrics. 2020;145(Suppl 3):S269-S84.
11. Curtis K, Gavin N, Duggan C. Right Patient Selection. In: Moureau N, editor. Vessel Health and Preservation: The Right Approach for Vascular Access. Prepublication: Springer; 2024.
12. Magallon-Pedrera I, Perez-Altozano J, Virizuela Echaburu JA, Beato-Zambrano C, Borrega-Garcia P, de la Torre-Montero JC. ECO-SEOM-SEEO safety recommendations guideline for cancer patients receiving intravenous therapy. Clinical & translational oncology : official publication of the Federation of Spanish Oncology Societies and of the National Cancer Institute of Mexico. 2020;22(11):2049-60.
13. Nickel B, Gorski LA, M. KT, Kyes A, DeVries M, Keogh S, et al. Infusion therapy standards of practice. J Infus Nurs. 2024;47 (suppl1):S1-S285.