

Introducing a long peripheral catheter to support improved outcomes for difficult intravenous access (DIVA) patients

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INTRODUCTION

Approximately 90% of hospitalised patients require a peripheral catheter (PC) during their stay. Reports indicate that the majority (90%), fail before therapy completion, and that up to 50% can fail within the first 24 hours [1, 2]. Reasons for failure include infiltration, dislodgement or extravasation, and may be more common in patients with difficult intravenous access (DIVA). DIVA patients include those with a high BMI leading to thicker subcutaneous adipose tissue to navigate, patients with smaller or damaged superficial veins such as patients with a history of intravenous drug use or chemotherapy treatment [3].

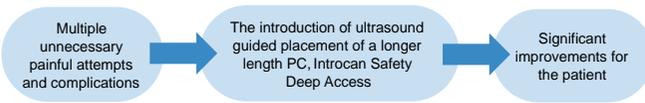
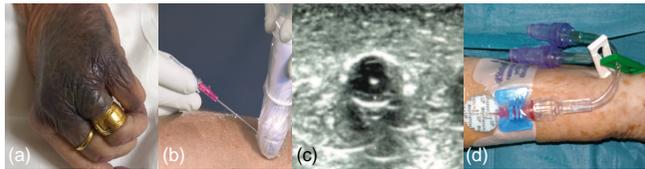


Figure 1. (a) A patient's hand showing phlebitis and haematoma after multiple failed attempts at short peripheral catheter (SPC) insertion; (b, c) Insertion of an Introcan Safety Deep Access (LPC) under USG; (d) An Introcan Safety Deep Access *in situ*

METHODS

Multiple failed cannulations have significant implications on our patients (Fig.1), finances and resources, as they would require escalation to Anaesthetists and the PICC and Vascular teams for other vascular access devices. Therefore, our Vascular Access Team initiated an improvement strategy including the introduction of a DIVA policy and the insertion of a long peripheral catheter (LPC), Introcan Safety Deep Access (64mm) under ultrasound guidance (USG).

The training consisted of a 4-hour workshop with phantom USG practice followed by 1:1 training with patients requiring cannulation. The trainees were required to complete 15 successful USG cannulations with the LPC along with other competencies in the training programme.

"USG cannulation has been a "game changer" in gaining access on some of our more challenging patients...patients have often waited hours for their vascular access and have subsequently missed doses of medications, thus having a tangible impact on their recovery and subsequent length of stay in hospital. Having had multiple failed cannulation attempts, patients are visibly relieved when I turn up with an ultrasound machine & the Introcan Safety Deep Access"
Simon Tippler, Trigger Response Nurse

RESULTS

Data was collected on 366 LPCs inserted into patients with DIVA. 3% of the patients in the study were overweight, the remainder were DIVA due to damaged vasculature. 31% of LPCs were inserted by clinicians newly trained on USG insertion of PIVCs; 69% by experienced clinicians.

Therapy completion rate was 89.5%, far higher than other published rates in DIVA patients (Fig. 3). In those devices that failed, 2.3% were due to a VIP score >1, dislodgement or removal by the patient (4.5%), or patient death (3.8%) (Fig. 2). In addition, **first stick success rate was high at 94.3%** for the LPC (Fig. 3).

We additionally calculated the total cost of a midline insertion (standard practice for DIVA patients) compared with LPC insertion. The equipment costs for midlines totalled **£107.66** per attempt, compared with **£18.44** per attempt of a LPC. This results in a **total saving of £89.22** per insertion attempt. We weighed the equipment needed for both procedures, and found that midline equipment was **1014g heavier** than that for LPCs.

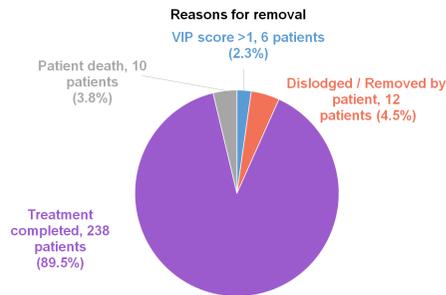


Figure 2. Reasons for LPC removal (where reason was documented)

"The Introcan went in easily, quickly and was painless. It was completely the opposite experience compared to [previous] cannulation [when] the staff took 2 hours to manage to insert a cannula that did not last long"
Patient experience with an LPC

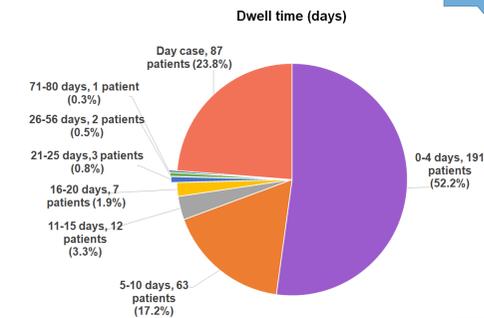


Figure 3. Introcan Safety Deep Access (LPC) dwell time

Data presented in figures 2 and 3 collected between March 2021 and April 2022

DISCUSSION & CONCLUSION

The 94.3% first stick success rate was considerably higher than the 66.0 – 76.3% reported when using landmark technique [4], or 73% reported in other studies using USG [5]. This was despite almost a third of insertions being performed by clinicians newly trained to perform USG LPC insertion at the time of the study, suggesting that the training on the device was successful. The 89.5% completion of therapy rate was superior to published rates for therapy completion in DIVA patients. 27% for SPCs [6] or 69% for LPCs [7] (Fig. 4).

The total equipment costs per insertion of a midline was £107.66 per attempt, compared with £18.44 for a LPC, resulting in an almost six-fold reduction in equipment costs, or a total saving of £89.22 per insertion attempt. Considering the high first-stick success rate on our ward, this saving becomes even more remarkable, as expenditure increases with the number of attempts [8].

The total weight of equipment for a midline insertion, including packaging, was 1105g, compared with 91g for a LPC, meaning that not only is the extra equipment more financially costly to procure but also requires more resources to produce and costs more to dispose of in both clinical and non-clinical waste streams.

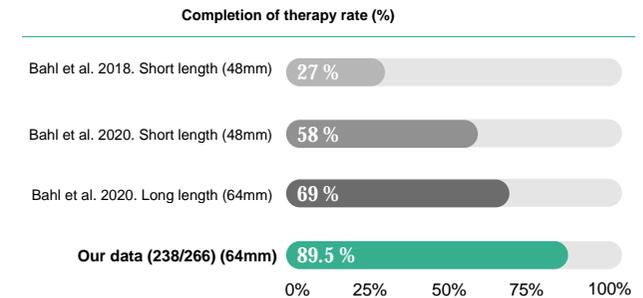


Figure 4. Completion of therapy rate for PIVCs inserted into DIVA patients

The success of the new pathway can be attributed to the longer length of Introcan Safety Deep Access and its improved purchase within the vein; accurate placement using USG; and the follow-up care and maintenance provided by the hospital's PICC and Vascular Access team who implemented this project. Following these results, we are extending the roll-out of an ultrasound guided LPC to additional clinical areas to improve patients' experience when the insertion of a PC is required for treatment.

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