Letter to the editor

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A pilot workshop for ultrasound-guided insertion of long peripheral catheters

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Dear Editor,

Long peripheral catheters (LPCs) are 6–15 cm-long peripheral intravenous (IV) devices that provide up to 4 weeks of IV access.[1] Due to their length, location of insertion and utility in difficult venous access scenarios, LPCs are often placed under ultrasound-guidance.[2,3]

LPCs have been used at our children's hospital for over a decade. We have previously demonstrated their utility in children with cystic fibrosis[2] and surgical conditions.[4]

In response to demand from paediatric clinicians across our State, we piloted a single-day educational workshop taught by five paediatric anaesthetists, one paediatric surgeon and one ultrasound technician. Principles described by Davidson et al.,[5] WoCoVA[6] and ESA-PERSEUS[7] were applied in the design of this workshop.

Workshop structure

1. Pre-course questionnaire and skills rating
2. Short lectures
   - Types of IV catheters and the direct Seldinger technique
   - History of LPCs and current evidence
   - Ultrasound machines and probes
   - Ultrasound skills and upper arm anatomy
   - Catheter complications and troubleshooting
3. Demonstration and hands-on practice
   - Blind LPC insertion
   - Ultrasound machine operation
   - Ultrasound-guided peripheral IV catheter (PIVC) insertion
   - Ultrasound-guided LPC insertion
4. Post-course skills rating and course evaluation

LPC insertion was performed using the direct Seldinger technique, as follows:

1. PIVC is used to access the target vein
2. Guidewire advanced into PIVC
3. PIVC removed
4. LPC threaded over guidewire into vein
5. Guidewire removed

We used 2.5 cm 22G PIVCs (Introcan Safety®, B. Braun, Germany) and 8 cm 22G LPCs (Leaderflex®, Vygon, Germany). This technique was used as the Leaderflex LPC consists of a separate 26 cm guidewire, 8 cm LPC and 4.2 cm access needle. The access needle was deemed too traumatic and difficult for use in children, hence a PIVC was initially used to access the target vein. We adopted this technique since we believe that it prepares clinicians, who are not vascular access specialists, for the insertion of LPC using a simple method that can be easily implemented in their routine clinical practice.

Simulation was conducted on the Monash Doctors Venous Simulation Model (Figure 1), which consisted of twisting balloons (i.e., for balloon animals) filled with red-dyed water, suspended in a gelatin-based mould and vacuum-sealed in plastic. Balloons were suspended at varying depths to simulate deep and superficial veins.

Twenty-eight clinicians attended the workshop, including paediatricians ($n=19$), emergency physicians ($n=5$), anaesthetists ($n=2$) and intensivists ($n=2$). There were 19 consultant physicians and nine senior trainees. Nine healthcare institutions were represented, including seven metropolitan and two rural centres. Prior to our workshop, less than half the participants had previously used LPCs ($n=13$).

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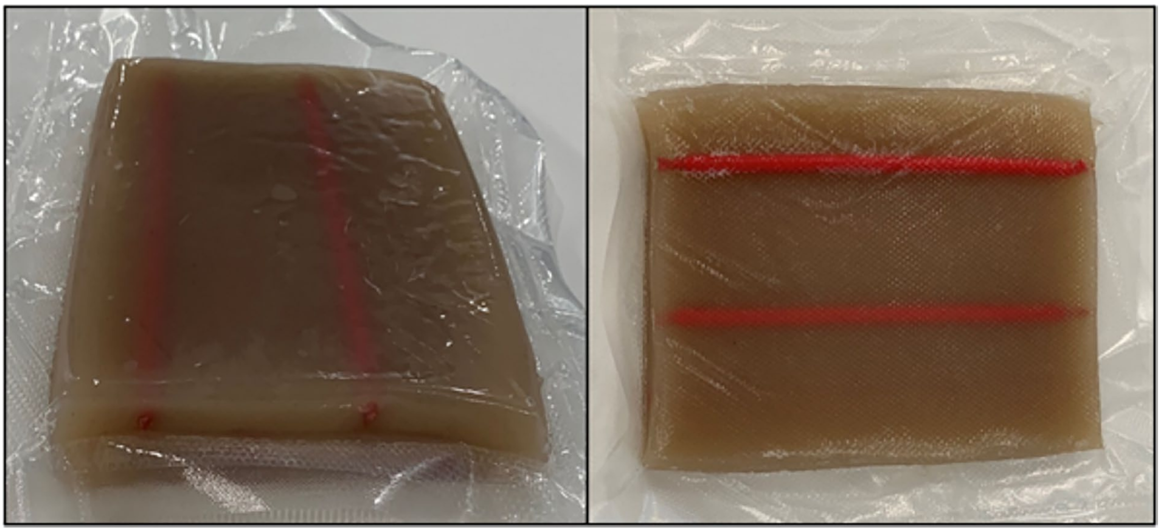

Figure 1. The Monash Doctors Venous Simulation Model, vertical (left) and horizontal (right) views. The model consists of twisting balloons filled with red-dyed water suspended in gelatin mould and vacuum-sealed in plastic.

Participants self-rated their proficiency with vascular access pre- and post-workshop on a five-point scale (1=novice, 5=expert). There were significant improvements in blind LPC insertion (2.3 vs 3.7 (mean), p=0.0005), ultrasound machine operation (2.5 vs 3.9, p=0.01), ultrasound-guided PIVC insertion (2.2 vs 3.7, p=0.0008) and ultrasound-guided LPC insertion (1.8 vs 3.8, p=0.0001).

Although the use of a subjective measure of skill attainment is a weakness of our workshop, we aim to employ objective methods of assessment in future iterations. This could be achieved by adapting the validated peripheral ultrasound-guided vascular access (P-UGVA)[8] scale. We encourage clinicians to replicate and improve upon our workshop at their own institutions.

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References

1. Qin KR, Nataraja RM and Pacilli M. Long peripheral catheters: is it time to address the confusion? *J Vasc Access* 2019; 20: 457–460.
2. Qin KR, Ensor N, Barnes R, et al. Long peripheral catheters for intravenous access in adults and children: a systematic review of the literature. *J Vasc Access* 2021; 22: 767–777.
3. Qin KR, Pittiruti M, Nataraja RM, et al. Long peripheral catheters and midline catheters: insights from a survey of vascular access specialists. *J Vasc Access* 2021; 22: 905–910.
4. Qin KR, Ensor N, Barnes R, et al. Standard versus long peripheral catheters for multiday IV therapy: a randomized controlled trial. *Pediatrics* 2021; 147: e2020000877.
5. Davidson IJ, Yoo MC, Biasucci DG, et al. Simulation training for vascular access interventions. *J Vasc Access* 2010; 11: 181–190.
6. Moureau N, Lamperti M, Kelly LJ, et al. Evidence-based consensus on the insertion of central venous access devices: definition of minimal requirements for training. *Br J Anaesth* 2013; 110: 347–356.
7. Lamperti M, Biasucci DG, Disma N, et al. European Society of Anaesthesiology guidelines on peri-operative use of ultrasound-guided for vascular access (PERSEUS vascular access). *Eur J Anaesthesiol* 2020; 37: 344–376.
8. Primdahl SC, Weile J, Clemmesen L, et al. Validation of the peripheral ultrasound-guided vascular access rating scale. *Medicine (Baltimore)* 2018; 97: e9576.