Is there an optimal way of securing peripheral IV catheters in children?

Kevin Hugill, Director of Nursing Education, Hamad Medical Corporation, Doha, Qatar, explains why the answer to this question might not be as simple as people think—and urges more reflection among practitioners.

Venous cannulation using a short peripheral intravenous catheter (PVC) provides an effective way of delivering medications and fluids to patients of all ages. The use of these medical devices in acute care is ubiquitous. Laudenbach et al. (2014) consider PVC insertion to be the most common invasive procedure that hospitalised children experience. Despite its pervasive presence, intravenous (IV) cannulation is not benign and can bring numerous complications, such as phlebitis and extravasation (Unbeck et al., 2015). IV cannulation is more challenging in children (Box 1). In addition, venepuncture is stressful, painful and can be emotionally traumatic for children and parents alike.

Cursory inspection of paediatric nursing practice highlights differences in the way PVCs are secured. There are many reasons for this, chief among them the unique needs of different groups of children (e.g. preterm, adolescent). Other possible reasons for inconsistency might reflect experiential learning by practitioners or technological innovation. However, some variation is unexplained and lacks any rationale or evidence base. This article aims to inspire reflection and debate about PVC securement among practitioners working with children. Box 2 gives some suggested activities to begin this process.

The aetiology of PVC complications is complex and multifactorial. Inadequate securement is a factor in most unscheduled PVC replacements (Rickard et al., 2016) and can expedite the onset of complications such as occlusion and infiltration (Laudenbach et al., 2014; Unbeck et al., 2015). Several studies involving children report that around one quarter to one third of PVCs require replacement during treatment (Malyon et al., 2014; Roza et al., 2015; Unbeck et al., 2015). Skin damage (epidermal stripping, pressure injury) and mechanical phlebitis are related to securement or excessive movement of the catheter in the blood vessel (Marsh et al., 2015). There is broad agreement that secure fixation can decrease the risk of complications, yet does not always take into account the unique needs of different groups of children (e.g. preterm, adolescent). The interpretation of these findings should be cautious given the small sample size and the considerable age range of participants.

There is extensive international literature demonstrating how to minimise risks during PVC insertion, use and removal (e.g. National Institute for Health and Care Excellence, 2015; Infusion Nurses Society, 2016). Some of this advice is generic, while other information relates to specific patient groups or types of device. However, despite the importance of catheter protection and security, there is a lack of robust evidence about the best methods or medical products to ensure catheter securement (Marsh et al., 2015).

IV securement for children shares some issues with other patient groups, but also has distinctive issues. All approaches need to facilitate:

- Securing the PVC in position, supporting device contours and the angle of insertion
- Protecting the device and preserving the insertion site
- Enabling visibility of insertion site
- Preventing children from interfering with the PVC while supporting normal activities
- Acceptability for children and parents
- Preventing iatrogenic harm.

How these issues are best addressed is at the core of debate about optimal PVC securement. A universal approach does not exist, as each child’s needs vary over time. Transparent film dressings are widely used. Their use has advantages in terms of site visualisation and protection of the surrounding skin from microbial contamination compared with tape and gauze (Bernatchez, 2014). Adhesives used in dressings and tapes have been linked to tissue injury in children, including epidermal stripping, skin tears and dermatitis, particularly in those children born preterm (McNichol et al., 2013). Care must be taken in the selection, use and removal of dressing films and tape adhesives to mitigate these risks.

One study (Laudenbach et al., 2014; n=80, ages 2–17 years) found no differences in the rates of complication (infection, leakage, dislodgement) between children whose PVC was secured with tape and those using a securement device. The interpretation of these findings should be cautious given the small sample size and the considerable age range of participants. Other research teams (Rickard et al., 2015) have proposed larger multicentre studies.
These were small studies in one patient group, (cyanoacrylates used in wound care) and (Dalal et al, 2009; Raghaven and Praveen, 2015). PVC use is limited and their use is sometimes units reported only marginal or no benefit joint areas are cannulated; anecdotally, some keep abreast of developments. Two areas of innovation are medical-grade tissue adhesives of splinting on PVC dwell time in neonatal take care. Evidence on their ability to prolong complications. Currently, there is a lack of robust guidance to direct practice for all groups of children. Because of the large number of PVCs used, even small reductions in premature failure rates could make significant improvements to children’s overall experiences and NHS budgets. To advance this ambition, children’s nurses need to work in collaboration with others, including medical-device manufacturers, children and parents, to develop the evidence base. This is a challenge, but asking questions and reflecting on our own practice is a vital first step. BJN

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