

### Not just swelling... Preventing and identifying extravasation injuries

A neonate was brought to the Emergency Department (ED) with fevers over 39°C and poor oral intake. A peripheral intravenous catheter (PIVC) was inserted for administration of intravenous fluids (IV) and antibiotics. Over the course of the shift the patient became increasingly distressed and when examined, the arm where the PIVC was insitu was exhibiting signs of an extravasation injury. The limb was cool to touch, hard and swollen with blisters, loss of epidermis and a radial pulse was absent. The PIVC was removed and the patient was reviewed by the Plastics team. Due to the extent of the injury, the patient was taken to theatre where a fasciotomy was performed. The patient was discharged home four days later with regular follow-up.

In 2017, there were 153 incidents recorded in IIMS relating to children 16 years and under with an extravasation injury caused by a PIVC. The incidents ranged from mild redness and tenderness at the site to more severe injuries such as compartment syndrome (occurs when there is increased pressure within a compartment in the limb compromising function and circulation of the tissues<sup>1</sup>) requiring a fasciotomy to relieve the pressure and return blood flow. Injuries can be made worse by the types of fluids and/or medications being infused via the PIVC.

Extravasation is defined as the leakage of a medication or fluids into the extravascular space, either from a vessel or direct infiltration<sup>2</sup>. Non-traumatic compartment syndrome can occur as a result of an extravasation injury and should be treated as a medical emergency to prevent neurovascular injury and deficit to the limb.

#### Taping and securing

When securing a PIVC, a sterile and transparent occlusive dressing should be used to cover the insertion site. Sterile steri-strips can be used for stabilisation. It is recommended that sterile cotton wool or sterile gauze be placed under the hub of the cannula to prevent a pressure injury. Many paediatric pressure injuries are caused by the hub of a cannula.

Avoid tight taping that can act as a tourniquet if the limb was to become swollen. An arm board or splint can be used to immobilise the limb. The taping used to secure the splint should not be too tight and fingers should be in a neutral position<sup>4</sup>. The insertion site should be visible at all times, and if using a non-compressive bandage to prevent patient tampering, a "window" should be created to ensure direct viewing of the insertion site at all times.

#### Monitoring and observations

All PIVC insertion sites should be assessed for perfusion and IV pump pressures recorded in the patient's medical record hourly as per your local guideline and observed at clinical bedside handover. Ensure pump pressure alarms are set to an acceptable limit for paediatric patients (for example no higher than 75mmHg) and that alarms are audible (Refer to local guidelines for additional guidance). Infant distress without clear explanation should be explored to identify a cause. Pain should always be considered and the source of the pain identified, treated and reversed if able.

#### Intravenous fluids and medications

Where possible, fluids with high glucose concentrations (>10%) or fluids with high concentrations of potassium chloride (>40mmol per 1000mL) should be administered via a central venous access device. High irritant medications and vesicant agents such as vancomycin and flucloxacillin should be diluted to a suitable concentration and infused slowly to prevent irritation and patient discomfort. For additional information on diluting IV medications, The Paediatric Injectable Medicines Handbook (The Children's Hospital at Westmead) is available via the Clinical Information Access Portal (CIAP) under the medications tab.



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#### Staging an extravasation injury<sup>3</sup>

**Stage 1:** There may be swelling and pain at the site. The PIVC will be difficult to flush.

**Stage 2:** Slight/mild swelling and leakage around the site may be present, intact skin, however, the site may be warm to touch with a possible hardened area, mild blanching, redness and/or discolouration of the skin. There will be pain at the site and pulses remain palpable.

**Stage 3:** Moderate swelling and/or hardened area around the site and cool to touch. There may be blanching of the skin, redness and/or discolouration which could be purple or black. Pulses can be weak on the affected limb.

**Escalate care via the local Clinical Emergency Response System (CERS) procedure ensuring a senior clinician review.**

**Stage 4:** Severe swelling, blistering and hardening around the site may be present. Skin temperature will be cool or cold to touch with blanching, redness and/or discolouration which may be purple or black. Pulses will be weak or absent on the affected limb and capillary refill time may be >4 seconds.

**This is a medical emergency and requires immediate escalation and review, following local CERS procedure.**

#### References

1. Elliot, K.G. & Johnstone, A.J. 2003, 'Diagnosing acute compartment syndrome', *Journal of Bone and Joint Surgery*, vol. 85, no. 5, pp. 625-32.
2. Fischer, D., Knobf, M. & Durivage, H. 2003, *The Cancer Chemotherapy Handbook*, 6<sup>th</sup> edn, Mosby, Philadelphia, PA.
3. Sydney Children's Hospitals Network, 2016, *IV Extravasation Management Practice Guideline*, viewed 5 June 2016  
[http://www.schn.health.nsw.gov.au/\\_policies/pdf/2016-9057.pdf](http://www.schn.health.nsw.gov.au/_policies/pdf/2016-9057.pdf)

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The Paediatric Patient Safety Program works across a range of areas to improve the quality and safety of health care for children and young people in NSW.

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