Flowchart for the nurse's management of the peripheral intravenous catheter for prevention of associated injuries in hospitalised children

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This flow chart summarises nursing actions and is to be used in conjunction with the full evidence-based practice guideline (available from author, via cndu@uct.ac.za) and appropriate staff training.

Background

Sick children, especially neonates and infants, are susceptible to injuries due to their immature anatomy and physiology and developmental factors. These children often need a peripheral intravenous catheter (PIVC) which provides venous access necessary for therapeutic purposes, for the administration of intravenous fluid and medication, blood products and, on occasion, parenteral nutrition.

This intervention is very common but not without risks. Studies have shown that up to 98% of extravasation injuries involved peripheral intravenous catheters[3]. Phlebitis was observed in 17.4% of subjects and microbial colonisation with staphylococcus aureus 56.8% and staphylococcus epidermidis 18.1% were isolated from the hubs[7]. Care practices vary widely[4].

PIVC intervention is often regarded low risk and therefore receives less attention as nurses may underestimate injury risk.

Purpose of this guideline

The purpose of this guideline is to decrease:

- Chemical injuries caused by infusates or skin antiseptics.
- Infectious injuries due to contamination or colonisation of the catheter or intravenous site.
- Mechanical injuries caused by a catheter that is too large for the vasculature, catheter movement, insertion trauma, or catheter material and stiffness.
- To standardise PIVC practice.

Right care from the start to the end of the line

Before insertion

Child requires a PIVC

Inform and consent from caregiver
- Explain the indication, duration of therapy and ongoing care.
- Obtain verbal consent.
- Optimise comfort and pain management.

Inserter skills
Using the Difficult Venous Access[8] (DIVA*) criteria, does your expertise match the condition or complexity of the child's veins?
If no → escalate
If yes → proceed to choose the right catheter

Escalate
- Escalate to senior nurse/clinician.

OR
- Consider near infrared (nIR) light or ultrasound for children with difficult intravenous access.

Insertion

Choose the right catheter site and size
- Select catheter on the basis of child's age and needs**.
- Avoid areas of flexion, previous puncture sites or inflamed areas.
- Use smallest catheter size that allows flow rate – avoid large gauge.

Insert catheter and secure
- Apply standard Aseptic Non-Touch Technique (ANTT***).
- Disinfect skin with:
  - 2% chlorhexidine in 70% alcohol for children aged >2 months
  - 0.5% chlorhexidine in 70% alcohol for neonates and infants <2 months
- Allow to air dry.
- Insert and secure using 'under and over' technique.
- Apply a sterile semipermeable transparent dressing or use sterile gauze and opaque dressing (consider patient known allergies to tape/plaster).

Escalate after two failed insertion attempts

Post insertion

Inspection
- Assess PIVC site using the Modified Visual Infusion Phlebitis Scale[9]
- Assess site HOURLY during infusion of agents with irritant and vesicant properties
- Assess 3 – 6 hourly when saline locked

When accessing
- Apply standard Aseptic Non-Touch Technique.
- Scrub the hub for 15 – 20s, allow to air dry.
- Administer irritant and vesicant agents slowly.

Flush
- To maintain:
  - Line patency
  - Reduce the risk of blockage
  - Prevent the mixing of incompatible medicines or fluids
- Flush the line with 0.9% saline before and after IV fluid and medication administration. Never use sterile water.

Assess ongoing need and remove
- Daily review with the doctor.
- Remove if there is pain, swelling, erythema, tenderness and resistance to flush, dislodgement or when clinically indicated.
- Do not keep PIVC in situ when malfunctioning or no longer required.

Documentation
- Label PIVC with date and time of insertion.
- Record catheter size/gauge and location, skin integrity and care provided.
- Record date, time and reason for removal.

Treat PIVCs with the same attention and caution as central venous access devices

Modified Visual Infusion Phlebitis Scale from Jackson (1998)

IV site appears healthy	0	No signs of phlebitis OBSERVE CANNULA
One of the following is evident: • Slight pain near IV site • Redness near IV site	1	Possible first sign of phlebitis OBSERVE CANNULA
Two of the following are evident: • Pain at IV site • Erythema • Swelling	2	Early stage of phlebitis RESITE THE CANNULA
All of the following signs are evident: • Pain along path of cannula • Induration	3	Medium stage of phlebitis RESITE THE CANNULA CONSIDER TREATMENT
All of the following signs are evident and extensive: • Pain along path of cannula • Erythema • Induration • Palpable venous cord	4	Advanced stage of phlebitis or start of thrombophlebitis RESITE THE CANNULA CONSIDER TREATMENT
All of the following signs are evident and extensive: • Pain along path of cannula • Erythema • Induration • Palpable venous cord • Pyrexia	5	Advanced stage of thrombophlebitis INITIATE TREATMENT RESITE THE CANNULA

*** Difficult venous access (DIVA) criteria:**
- Urgent level of acuity
- No visible /palpable veins
- <18 months old
- History of prematurity
- Severe comorbidities and prolonged hospital stay
- Severe anxiety/documented needle phobia

****Suggested PIVC size/gauge**
- 22G – children
- 24G – neonates and infants
- 26G – preterm neonates

***** Aseptic Non-Touch Technique (ANTT):** Refers to the protection of Key-Sites and Key-Parts achieved through basic infective precautions such as hand hygiene and personal protective equipment (PPE), the use of sterilised equipment and medical supplies, and an appropriate combination of aseptic fields and a non-touch handling technique[5].

Key-Sites - Any portal of entry into the patient *(e.g. PIVC site, injection site, open wound)*[5]

Key-Parts - The part of the procedure equipment that, if contaminated, is likely to contaminate the patient *(e.g. syringe tip, male luer end/spike of administration set, injection needle)*[5]

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