Intravenous (IV) cannulation and care in NICU

Sites where Local Guideline applies

This Local Guideline applies to:

1. Adults  
2. Children up to 16 years  
3. Neonates – less than 29 days

Target audience

All neonatal clinicians inserting intravenous cannulae and/or caring for infants with an intravenous cannula

Description

Provides information to clinicians in NICU & SCN regarding insertion and management of intravenous devices

National Standard

Standard 8 Preventing & Managing Pressure Injury

Keywords

IV, venous, cannulation, extravasation, fluids, JHCH, NICU

Document registration number

JHCH_NICU_10.01

Replaces existing document?

Yes

Registration number and dates of superseded documents

JHCH_NICU_10.01 March 2013

Related Legislation, Australian Standard, NSW Ministry of Health Policy Directive or Guideline, National Safety and Quality Health Service Standard (NSQHSS) and/or other, HNE Health Document, Professional Guideline, Code of Practice or Ethics:

- Aseptic Technique for medium or Higher Risk Procedures Conducted in Clinical Settings
- NSW Health Kids & Families GL2015_008 Standards of Paediatric Intravenous Fluids
- NSW Health Policy Directive PD2017_032 Clinical Procedure Safety
- Medication Safety in HNE Health PD2013_043:PCP31

Prerequisites (if required)

To perform IV cannulation nursing staff require credentialing - see IV cannulation & Venepuncture in the Neonate 2017 Learning Package for process.

Local Guideline note

This document reflects what is currently regarded as safe and appropriate practice. The guideline section does not replace the need for the application of clinical judgment in respect to each individual patient but the procedure/s require mandatory compliance. If staff believe that the procedure/s should not apply in a particular clinical situation they must seek advice from their unit manager/delegate and document the variance in the patient's health record.

Position responsible for the Local Guideline and authorised by

Pat Marks. General Manager / Director of Nursing CYPFS

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Date authorised

30th January 2018

This document contains advice on therapeutics

No

Issue date

14th February 2018

Review date

14th February 2021
PURPOSE AND RISKS

This local clinical procedure has been developed to provide instruction to health professionals and to ensure that the risks of harm to the child associated with insertion and management of an intravenous cannula are prevented, identified and managed.

The risks are:
- Vascular damage
- Infection
- Extravasation
- Limb injury

The risks are minimised by:
- Credentialed clinicians to insert intravenous cannulas
- Clinicians having knowledge of IV cannulation and therapy management
- Clinicians seeking assistance if the therapy is outside their scope of practice
- Following the instructions set out in the clinical procedure
- Recognition of the common clinical signs of the risks of infiltration
- Correct aseptic technique when attending to IV therapy

Risk Category: Clinical Care & Patient Safety

GLOSSARY

<table>
<thead>
<tr>
<th>Acronym or Term</th>
<th>Definition</th>
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<tbody>
<tr>
<td>HPR</td>
<td>Hourly Patient Rounding</td>
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<tr>
<td>IVC</td>
<td>Intravenous catheter</td>
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<tr>
<td>Peripheral IV &amp; Subcutaneous Cannula Care Plan</td>
<td>IV care plan to document insertion, removal &amp; site checks</td>
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<tr>
<td>NVIP</td>
<td>Neonatal Visual Infusion Phlebitis</td>
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</tbody>
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Staff Preparation

It is mandatory for staff to follow relevant: “Five moments of hand hygiene”, infection control, moving safely/safe manual handling, documentation practices and to use HAIDET for patient/carer communication: Hand hygiene Acknowledge, Introduce, Duration, Explanation, Thank you or closing comment.
Intravenous (IV) Cannulation and Care: One Page Summary and Checklist

### Technique
- Remember 5 moments of hand hygiene
- Always consider pain relief
- Minimise handling
- Preferred sites - hands, forearm, feet, legs, scalp
- Avoid antecubital fossa and great saphenous veins for long-line use

### Procedure
- Clean trolley
- Prepare equipment
- Administer pain relief
- Cannulate site
- Flush to ensure patency
- Secure - DuoDERM under hub
- Steri-Strip over the hub
- Attach mini luer lock extension
- Cover with transparent sterile adhesive
- Attach micro-filter (labeled with time and date)
- Secure to board with stretchy Elastoplast
- Commence on fluids with pump for neonatal care
- Document

### Care of Site
- Keep site visible - use transparent IV dressings
- Observe regularly – for security, redness, swelling, leak, blanching
- Check pump rate and volume infused in line with excellence
- Respond to complications promptly

### Removal
- Maintain asepsis
- Remove tape
- Remove transparent sterile adhesive, and Steri-Strips
- Withdraw cannula and apply pressure to site with sterile gauze
- Observe for bleeding
- Do not apply dressing
- Document in notes
Rationale

Cannulation is a common invasive procedure that is performed in the Neonatal Intensive Care Unit (NICU), with many neonates requiring intravenous (IV) access for the administration of fluids and/or medications during their stay. Many complications associated with IV cannulation are preventable and if diagnosed early major complications can be prevented. Studies have shown that a very low incidence of cannula infection or complication from peripheral intravenous cannulation is achievable in the neonate.

Outcomes

1. Intravenous cannulation will be undertaken by Medical Officers, Nurse Practitioners, and RNs who have completed the IV cannulation program.
2. The peripheral intravenous catheter will be inserted safely and in the appropriate site for the administration of IV fluids and medications.
3. There will be no significant compromise to circulation distal to the site.
4. The peripheral venous catheter will be inserted using aseptic technique, following the “5 moments” of hand hygiene standard.
5. All measures to minimise infant pain during the procedure will be undertaken including administering sucrose 25% oral solution or breast milk and other non-pharmacological settling techniques.
6. The infant will experience minimal handling during the procedure.
7. The cannula site will be observed at least hourly for redness, swelling, blanching or pain and documented on IV care plan, hourly patient rounding form and flow chart.
8. Reduction in morbidity and mortality associated with intravenous peripheral cannulation in the neonate.

Technique and procedure for intravenous cannulation

**IV site selection**

Neonates have several IV sites available. Preferred sites for IV insertion include hands, forearm, feet, legs and scalp. A peripheral vein in an upper or lower limb is preferable. As insertion of IVs into scalp veins requires slightly different skills and is used less frequently, these are not to be inserted by nursing staff; if required should be inserted by medical staff or nurse practitioners. Only 2 attempts at IV insertion before more experienced staff support must be requested.

Dorsum of the hand:
- Tributaries of the cephalic and basilic veins
- Dorsal venous arch
- AVOID the antecubital fossa as this vein is saved for the possible insertion of a peripherally inserted central line
Calf and dorsum of the foot:
- Dorsal venous arch
- Medial and lateral marginal veins
- AVOID the great saphenous vein as this vein is saved for the possible insertion of a peripherally inserted central line

Figure 1 Veins in hands and arm (Ref: nurse.ayuda-porfavor.com.ar)

Figure 2 Vessels in leg and foot (Ref: https://redbacteria.wordpress.com/)
Procedure

Equipment:
- Basic dressing pack
- 24g cannula (Angiocath, Insyte-N or Neoflon)
- 2mL syringe - x 2 if collecting bloods
- Luer lock extension set
- Micro filter
- 10mL ampoule sodium chloride 0.9% (normal saline)
- Sterile Steri-Strips
- Transparent sterile adhesive dressing for example Tegaderm or OPSITE
- 12.5mm leucoplast
- 2.5cm Leukoplast tape
- Appropriately sized arm board
- Chlorhexidine 0.5%

Clean the IV trolley with alcohol wipe prior to opening equipment

1. Prepare equipment by flushing the extension set and filter with sodium chloride 0.9%
2. Maintain asepsis and universal precautions throughout procedure
3. Identify target site, ensuring vessel is a vein and not an artery (veins fill towards the heart, artery fills away from the heart).
4. Consider the comfort of the infant, and the use of sucrose.
5. Clean the skin with chlorhexidine solution in two consecutive applications and allow to dry for 30 seconds.
6. Insert cannula into the vein, and slowly advance into the vein, checking for blood in the hub of the cannula. If successful, slowly advance the cannula whilst the stylet is removed, until resistance is felt or the hub of the cannula reaches the skin. For further information regarding insertion technique, refer to the Intravenous Cannulation and Venipuncture Learning Package.
7. Gently flush the cannula to ensure patency.
8. Secure cannula as follows:
a. Place a small piece of DuoDERM if necessary (may use thin or thick depending on position under the hub)
b. Place a Steri-Strip under the cannula hub, and cross over the hub to secure. Repeat with a second Steri-Strip.

c. Attach mini Luer lock extension set to hub of cannula.
d. Attach microfilter to end of extension set – label IV fluid chart with date and time the filter is to be changed.
e. Cover insertion site and hub of cannula with a transparent sterile adhesive dressing e.g. Tegaderm® or Opsite®.
f. Stabilise limb to an armboard using the stretchy Elastoplast, making sure all fingers/toes are visible.
g. Secure IV filter to the baby’s arm using the non-stretch Leukoplast.
h. Ensure the filter is labelled with the date and time inserted, and when it is to be changed.
i. Record on IV Care Plan date of insertion and site.

9. Commence fluids or apply a flushed luer lock bung as ordered and document.
10. Reassure parents if in attendance.
11. Observe cannula insertion site and tip at least hourly and report any abnormalities.
12. If cannulation unsuccessful only 1 further attempt permitted-total of 2 attempts before requesting expert to insert cannula.
Care of IV cannula, lines and site

- Ensure the cannula is taped for security and allows maximum observation of site
- Use transparent IV dressings, Steri-Strips, and non-stretchable tape (Leukoplast)
- Observe the IV cannula hourly, at a minimum, for secure placement, and for changes in the site around the cannula insertion and the fluid tracking direction, in line with HPR.
- Check IV cannula site at least hourly for redness, swelling, blanching and pain, and report and record a description of these observations and changes in condition. Use the NVIP to document and follow directions for any changes noted.
- Ensure the cannula site is not covered with clothing or blankets to allow for observation of the site;
- Regularly (hourly) check the infusion pump for the correct infusion rate and pumping action
- When administering medications or changing lines follow ‘scrub the hub’ aseptic technique-Refer to CPG ‘Aseptic Technique in NICU’.
- Pressure limits are pre-set for IV infusion pumps- pressure readings should be checked regularly. Settings may require changing temporarily if frequent alarms due to occlusion from infant flexing limb and affecting flow. Vigilance observing site should be exercised if pressure settings changed.
- Only use an infusion pump suitable for neonates. Do not use an adult infusion pump.

Documentation

- The Peripheral IV & Subcutaneous Cannula care plan HNE029200 (IV care plan) is the record for IV insertion, assessment, management and cessation and must be completed by the staff siting the IV, caring for the IV and removing the IV. Once a shift staff must sign the IV care plan to identify their assessment of IV (the IV care plan eliminates the need to document shift by shift assessment in the progress notes)-see Appendix 1
- Skin score at IVC site (NVIP) must be attended hourly and documented on patient’s flowchart-see Appendix 2
- Staff must sign the Hourly Patient Rounding form to document that the patient needs have been assessed, including IVC assessment –see Appendix 3
- Complications and management of IV issues must still be documented in progress notes.

Complications

1. Infiltration and extravasation (see LG Extravasation of IV in NICU:JHCH_NICU_10.02). Extravasation is a serious complication of peripheral IV cannulas in infants and needs to be managed accordingly to avoid morbidity.
   1. Phlebitis
   2. Leaking
   3. Occlusion

Removal of peripheral intravenous cannulae
Outcomes:
1. The peripheral venous catheter will be removed safely.
2. The infant will experience minimal handling and discomfort during the procedure.
3. To be free from cannula related sepsis

Procedure for Removal of IV Cannula
1. Maintain asepsis and universal precautions throughout procedure.
2. Remove adhesive tape carefully.
3. Gently remove transparent adhesive dressing and Steri-Strips.
4. When catheter is free of restraint, carefully withdraw and apply pressure to site with sterile gauze.
5. Observe site for bleeding – do not apply dressing.
6. Document removal on IV care plan

References

Driscoll,C; Langer,M; Burke,S; and El Metwally,D. 2015. Improving detection of IV Infiltrates in Neonates. BMJ Open Quality. Vol 4


Appendices

Appendix 1 Peripheral IV & Subcutaneous Cannula Care Plan
Appendix 2 Neonatal Visual Infusion Phlebitis Score
Appendix 3 Patient Care Essentials Rounding Care Plan
Appendix 4

Safety Alert Extravasation of IV fluids: Care of cannula site in neonates and children

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Approved by
NICU Operational, Planning & Management Committee 17/01/2018
JHCH Clinical Quality & Patientcare Committee 28/01/2018

Feedback
Any feedback on this document should be sent to the Contact Officer listed on the front page.
Appendix 1 Peripheral IV & Subcutaneous Cannula Care Plan

<table>
<thead>
<tr>
<th>PIVC/ S/C insertion record</th>
<th>An initial below confirms that the dressing is intact, there is no erythema, tenderness, pain, swelling and the PIVC is patent.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Consent Obtained:</td>
<td>□</td>
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<tr>
<td>Insertion: Date &amp; Time</td>
<td>□</td>
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<td><strong>/</strong>/ <strong>:</strong></td>
<td>□</td>
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<tr>
<td>__ gauge □ PIVC □ S/C</td>
<td>□</td>
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<tr>
<td>Site: L R</td>
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<tr>
<td>By:</td>
<td>□</td>
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<tr>
<td>Designation:</td>
<td>□</td>
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<tr>
<td>□ Dressing dated.</td>
<td>□</td>
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<tr>
<td>IV Set/s Labelled</td>
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<tr>
<td>Change due: <strong>/</strong>/ __</td>
<td>□</td>
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</tbody>
</table>

| Consent Obtained:         | □                                                                                                               |
| Insertion: Date & Time    | □                                                                                                               |
| __/__/ __:__              | □                                                                                                               |
| __ gauge □ PIVC □ S/C    | □                                                                                                               |
| Site: L R                 | □                                                                                                               |
| By:                      | □                                                                                                               |
| Designation:              | □                                                                                                               |
| □ Dressing dated.         | □                                                                                                               |
| IV Set/s Labelled         | □                                                                                                               |
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| Consent Obtained:         | □                                                                                                               |
| Insertion: Date & Time    | □                                                                                                               |
| __/__/ __:__              | □                                                                                                               |
| __ gauge □ PIVC □ S/C    | □                                                                                                               |
| Site: L R                 | □                                                                                                               |
| By:                      | □                                                                                                               |
| Designation:              | □                                                                                                               |
| □ Dressing dated.         | □                                                                                                               |
| IV Set/s Labelled         | □                                                                                                               |
| Change due: __/__/ __     | □                                                                                                               |

Replace cubital fossa and emergency inserted cannulas within 24 hours (except paediatric patients). MO to review & document condition of PIVC site when undertaking daily patient assessment. Monitor patients temperature whilst cannula in situ. Report fevers >38 degrees – Consider Septis.
### Appendix 1 Peripheral IV & Subcutaneous Cannula Care Plan

**CENTRAL VENOUS ACCESS DEVICE (CVAD) CARE PLAN**

<table>
<thead>
<tr>
<th><strong>DEVICE INFORMATION</strong></th>
<th><strong>SHUNT ASSESSMENT</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>CVAD Type:</td>
<td></td>
</tr>
<tr>
<td>Indications:</td>
<td></td>
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<tr>
<td>Contraindication:</td>
<td></td>
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<tr>
<td>Pre-Procedure:</td>
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<tr>
<td>Post Procedure:</td>
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<tr>
<td>Device Information:</td>
<td></td>
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<tr>
<td>Intermittent Care:</td>
<td></td>
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<tr>
<td>Continuous Care:</td>
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<tr>
<td><strong>FAUTLY NAME</strong></td>
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<td><strong>GIVEN NAME</strong></td>
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<td><strong>M/F</strong></td>
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<td><strong>D.O.B.</strong></td>
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<td><strong>ADDRESS</strong></td>
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<tr>
<td><strong>LOCATION / WARD</strong></td>
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</tr>
<tr>
<td><strong>COMPLETE ALL DETAILS OR AFFIX PATIENT LABEL HERE</strong></td>
<td></td>
</tr>
</tbody>
</table>

**FAUTLY NAME**

**GIVEN NAME**

**M/F**

**D.O.B.**

**ADDRESS**

**LOCATION / WARD**

**COMPLETE ALL DETAILS OR AFFIX PATIENT LABEL HERE**

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**INSTRUCTIONS**

- **Removal:**
  - Remove the device and document by a medical officer in the patient's health care record.
  - If the device is still in place, detach it from the catheter.
  - Record the time and date of removal in the patient's health care record.
  - Document any adverse events or complications associated with the removal in the patient's health care record.

- **Replacement:**
  - Perform the replacement procedure as described in the CVAD care plan.
  - Document the time and date of replacement in the patient's health care record.
  - Record any adverse events or complications associated with the replacement in the patient's health care record.

- **Monitors:**
  - Monitor the patient's vital signs and any other specific monitors as indicated by the CVAD care plan.
  - Document any changes in the patient's condition in the patient's health care record.

- **Medications:**
  - Administer any prescribed medications as indicated by the CVAD care plan.
  - Document the times and doses of medications in the patient's health care record.

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**ACKNOWLEDGMENTS**

This CVAD care plan was developed by a multidisciplinary team of healthcare professionals to ensure the safe and effective use of CVADs in the NICU. The team included pediatricians, nurses, and other healthcare providers who contributed their expertise to the development of this plan. This care plan is intended to be used as a guideline and may not be suitable for all patients. It is the responsibility of the healthcare provider to assess each patient's individual needs and make any necessary modifications to the plan.

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**REFERENCES**


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**REVISION HISTORY**

This CVAD care plan was last revised on January 2017. The next scheduled revision is due in January 2022. The plan will be reviewed and updated by the multidisciplinary team as necessary to ensure its continued relevance and effectiveness.
Appendix 2 Neonatal Visual Infusion Phlebitis Score

Neonatal Visual Infusion Phlebitis Score (N.V.I.P. Score) adapted from Jackson I.V Therapy
and care phlebitis scale (PJVCS Score on NICU Observation chart)

<table>
<thead>
<tr>
<th>I.V. site appears healthy</th>
<th>0</th>
<th>No signs of phlebitis. Continue to observe</th>
</tr>
</thead>
<tbody>
<tr>
<td>One of the following evident</td>
<td>1</td>
<td>Possible 1st signs of phlebitis. Observe closely / consider resiting cannula</td>
</tr>
<tr>
<td>Baby grimaces &amp; withdraws limb / signs of discomfort when site is touched</td>
<td></td>
<td></td>
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<tr>
<td>Slight redness near I.V. site</td>
<td></td>
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<tr>
<td>Two of the following evident</td>
<td>2</td>
<td>Early stages of phlebitis. Notify MO Stop infusion Resite Cannula. Document.</td>
</tr>
<tr>
<td>Baby grimaces &amp; withdraws limb / signs of discomfort when site is touched</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Erythema + Swelling</td>
<td></td>
<td></td>
</tr>
<tr>
<td>All of the following is evident</td>
<td>3</td>
<td>Early stages of phlebitis. Notify MO Stop infusion Follow Extravasation CPG Resite Cannula. Document. Complete IIMS</td>
</tr>
<tr>
<td>Baby grimaces &amp; withdraws limb / signs of discomfort when site is touched</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Erythema + Induration (hardening)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>All of following is evident &amp; EXTENSIVE</td>
<td>4</td>
<td>Advances stage of phlebitis. Notify MO Stop infusion Follow Extravasation CPG Document. Complete IIMS Consider treatment</td>
</tr>
<tr>
<td>Baby grimaces &amp; withdraws limb / signs of discomfort when site is touched</td>
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<tr>
<td>Erythema</td>
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<td>Induration (hardening)</td>
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<tr>
<td>Blistering, necrosis or ulceration</td>
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Score every hour for all cannulas. Score for 24 hours after removal if redness is evident and for 12 hours if there are no signs of phlebitis. Insert a photo into the clinical record and continue to document progressive photos for any severe extravasation. Obtain permission from the parents for photos.
## Appendix 3 Patient Care Essentials Rounding Care Plan

<table>
<thead>
<tr>
<th>ESSENTIAL ASSESSMENTS</th>
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<tr>
<td>Resuscitation equipment</td>
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<tr>
<td>Medical devices</td>
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<td>Identification</td>
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<tr>
<td>Medications/fluids</td>
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</table>

Patient care essentials to be assessed every hour. Initial in space that patient has been visualised and care essentials considered. If patient absent, mark ‘A’ in the assessment column.

Date: __/__/__

I have assessed all the 3 P’s

The following required care was attended *(initial only the care attended, otherwise leave blank)*

- Parents
- Position
- Physical inspection

*Is there anything I can do for you? (patient/carer)*

**HAPDET**
- Hand Hygiene, Acknowledge, Introduce/Identify, Duration, Explanation, Thank you/Tidy up/Time

**Nursing Clinical Handover** – Nurse initial that patient/carer was involved in handover. If patient unable to be involved put ‘U’ and initial and document reason in Medical Records.

<table>
<thead>
<tr>
<th>Time</th>
<th>Patient/Carer involvement</th>
<th>Printed name, initial &amp; designation (Nurse finishing shift)</th>
<th>Printed name, initial &amp; designation (Nurse on shift)</th>
<th>PATIENT ID</th>
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Extravasation of IV fluids
Care of the cannula site in neonates and children

Background
Recent incidents have highlighted the need to ensure appropriate care of venous cannula sites, especially in neonatal and paediatric patients.

Two young children experienced extravasation—the infiltration of a substance that causes blistering of tissue from an intravenous line into the surrounding tissue—in association with a peripheral cannula. One child experienced swelling from the shoulder to the fingertips with cyanosis of the right thumb and subsequent development of blisters on the arm. The second child required surgery following the development of swelling and blistering of the arm.

Care of the peripheral venous cannula site
Simple steps to follow when caring for a peripheral venous cannula site of neonates and children include the following:

- Use limbs in preference to the scalp, with upper limbs in preference to lower limbs.
- Ensure a nurse is available to assist with cannulation and taping.
- Ensure the cannula is taped for security and allows maximum observation of the site.
- Use transparent IV dressings, steristrips, and non-stretchable tape (leukoplast).
- Regularly observe the IV cannula for secure placement, and for changes in the site around the cannula insertion and the fluid tracking direction. Direct observation is required.
- Check the IV cannula site hourly for redness, swelling, blanching and pain, and record a description of these observations.
- Ensure the cannula site is not covered with clothing or blankets to allow for observation of the site.
- Regularly check the infusion pump for the correct infusion rate and pumping action.
- Set appropriate pressure limits for pumps that have this functionality. The pressure should be checked regularly.
- Ensure the infusion pump is appropriate for neonates and children. Do not use an adult infusion pump.

Further reading

Suggested Actions by Area Health Services:
1. Ensure that this Safety Notice is distributed to all relevant stakeholders.
2. Review peripheral cannula site practices.
Implementation, monitoring compliance and audit

1. Approved clinical guideline will be uploaded to the PPG and communication of updated ‘Intravenous (IV) cannulation and care in NICU’ clinical guideline to NICU staff will be via email and message on the HUB.

2. All staff performing IV cannulation require credentialing -see IV cannulation & Venipuncture in the Neonate 2017 Learning Package for process and recorded on HETI

3. Incident investigations associated with this Guideline and Procedure will include a review of process.

4. The Guideline and Procedure will be amended in line with the recommendations.

5. The person or leadership team who has approved the Guideline and Procedure is responsible for ensuring timely and effective review of the Guideline and Procedure.

6. Evaluation will include a review of the most current evidence as well as a consideration of the experience of Neonatal staff at JHCH in the implementation of the Guideline and Procedure.

7. Annual audit completed by NICU alongside JHH Infection Control department.