Section 5
National Clinical and Procedural Guideline for Nurses and Midwives undertaking Venepuncture and/or Peripheral Intravenous Cannulation in Infants and Children

For local adaptation by the Health Service Provider
5.0 Introduction

Please refer to Sections 1 to 3 as appropriate in conjunction with the Infants & Children section. Child refers to neonate, infant, child and adolescent’s under 16 years of age unless otherwise stated.

Infants are defined from one month to twelve months.

5.1 Guideline Statement

It is the policy of the HSE/HSE funded agencies that nurses and midwives undertaking venepuncture and/or peripheral intravenous cannulation must have successfully achieved competence having completed an education programme that is compliant with the HSE’s Guiding Framework for the Education, Training and Competence Validation in Venepuncture and Peripheral Intravenous Cannulation for Nurses and Midwives (2017). In addition, nurses and midwives undertaking venepuncture and/or peripheral intravenous cannulation will do so in accordance with the procedural elements as outlined in this guideline.

5.1.1 Purpose

The purpose of this guideline is to:

- Outline the roles and responsibilities of the clinical nurse/midwifery line manager and the nurse or midwife undertaking the skill of venepuncture and/or peripheral intravenous cannulation
- Set out procedures based on best evidence, aligned with the national HSE standardised approach, which safeguard the infant and child and guide the nurse or midwife in the performance of venepuncture and/or peripheral intravenous cannulation
- Aid in the preparation and support of the infant and child and their families while undergoing venepuncture and/or peripheral intravenous cannulation.

5.1.2 Scope

This guideline applies to all nurses and midwives working with infants and children, who have successfully completed the required education, training and competence assessment to carry out venepuncture and/or peripheral intravenous cannulation. Each nurse and midwife undertaking education and training in venepuncture and/or peripheral intravenous cannulation is accountable for his/her practice and decisions made to support practice. They must be prepared to make explicit the rationale for those decisions and justify them in the context of legislation, case law, professional standards and guidelines, evidence based practice, professional and ethical conduct (NMBI 2015).

Please note:

In absence of Upper Limb selection, the decision to use an alternative site must be made in cognisance with the Algorithm when accessing peripheral venous sites (Appendix 5 (c)). The aim of the algorithm is to provide guidance to further support nurses and midwives across all services, using a step by step decision making tool to ensure correct safe judgements and decisions are made in the process to safely and successfully perform venepuncture and/or peripheral intravenous cannulation procedures in the best interest of the patient. Nurses and midwives are also encouraged to refer to the Decision Making Flowchart within the Scope of Nursing & Midwifery Practice Framework (NMBI 2015), (Appendix 5 (d)).
5.1.3 Disclaimer
The information contained within this guideline document is the most accurate and up to date, at date of approval. The document contains a procedural guideline and it is the responsibility of the local organisation, to update this guideline, according to best practice.

5.1.4 Roles and Responsibilities

5.1.4.1 Role and Responsibility of the Clinical Nurse/Midwife Manager/Director of Nursing/Midwifery

It is the responsibility of the Clinical Nurse/Midwife Manager/Director of Nursing/Midwifery to ensure that nurses and midwives working with infants and children who are undertaking venepuncture and/or peripheral intravenous cannulation fulfil the required criteria as per 1.8.

5.1.4.2 Role and Responsibility of the Nurse and Midwife

It is the responsibility of each nurse and midwife to:

- Work within their Scope of Practice – Scope of Nursing and Midwifery Practice Framework, (NMBI 2015)
- Comply with local organisational venepuncture and/or peripheral intravenous cannulation procedures therein, when undertaking these clinical skills
- Become competent in the clinical skill of venepuncture and/or peripheral intravenous cannulation and the equipment specific to the procedure
- Be familiar and comply with this organisation’s infection prevention and control, health and safety procedures and risk management policies as they apply to venepuncture and/or peripheral intravenous cannulation
- Develop and maintain competence in venepuncture and/or peripheral intravenous cannulation specific to the needs of the service, its users and in line with their Scope of Practice.

The HSE recommend that registered nurses who are working with infants and/or children develop their competencies within the following age groups:

- 0-1 year old
- 1-5 year old
- 5 years and above.

5.1.4.3 Role and Responsibility of the Clinical Practice Supervisor/Assessor:

The Clinical Practice Supervisor/Assessor should be a Registered Nurse/Midwife who is competent in venepuncture and/or peripheral intravenous cannulation and is approved by Nursing & Midwifery Practice Development/Director of Nursing/Midwifery to undertake the assessment.

- The Clinical Practice Supervisor/Assessor must be competent in the clinical skills to facilitate assessment and have knowledge of local policies and the assessment process required for venepuncture and/or peripheral intravenous cannulation procedure
- The Clinical Practice Supervisor/Assessor must assess the nurse/midwife undertaking each procedure and complete the Record of Supervised Practice and Competence Assessment as outlined within Section 2
• The Clinical Practice Supervisor/Assessor must have undertaken Teaching & Assessment and/or Preceptorship education programme and/or an equivalent qualification to support the nurse/midwife to undertake the required number of supervised clinical practice assessments, applicable to their area of clinical practice.

Please note:
In circumstances where there is no resource of venepuncture and/or peripheral intravenous cannulation competent Registered Nurses/Midwives available, then a competent practitioner in venepuncture and/or peripheral intravenous cannulation from another profession, can assess a nurse/midwife, provided he/she is approved by Nursing & Midwifery Practice Development/Director of Nursing/Midwifery to undertake the assessment.

5.2 Procedural Guideline for Venepuncture – Infants/Children

5.2.1 Indications for the Venepuncture Procedure
Venepuncture is the procedure of entering a vein with a needle and is undertaken to:
• Obtain a blood sample for diagnostic purposes using haematological, biochemical and bacteriological analysis
• Monitor levels of blood components.

5.2.2 Considerations When Undertaking the Venepuncture Procedure
Venepuncture is one of the most common invasive procedures, it can be traumatic. It should only be ordered when necessary. A clinical environmental assessment should be undertaken prior to the procedure, with special awareness to the following:
• Minimise disruptions i.e. phone off the hook, sign on door (particularly in community settings)
• Assess the environment for the appropriateness of undertaking the procedure
• Allow adequate time for transportation of bloods to laboratory.

Please note:
Iatrogenic anaemia or iatrogenic blood loss is the regular removal of blood for testing purposes over a short period of time. It is especially important with infants and children as they have smaller blood volumes and may need to have blood transfusions to replace the blood removed.
Co-ordination is needed between physicians, nurses and midwives and laboratories to minimise duplication of blood orders and to ensure the collection of the minimum amount of blood specimens required for testing. Please refer to local organisational guidelines for the maximum amount of blood that can be drawn from infants/children.
5.2.3 Informed Consent

Informed verbal consent should be obtained from parent/legal guardian prior to the procedure and as per local organisational policy.

Informed consent is obtained from the parent/legal guardian in the following circumstances:
- If a child is under the age of consent (16 years)
- If the child does not have the cognitive ability to understand/or make an informed decision (for further information on consent, please refer to the HSE National Consent (2014)).

5.2.4 Clinical Holding

Minimal restraint and holding should be used for the venepuncture procedure. The holding used should be appropriate to age, cognitive ability and behaviour of the child. Please refer to local organisational policies on clinical holding and the restraining of children. For further information, please read “Restraining, Holding Still and Containing Young Children (RCN 2003) and Department of Health & Children Children First - National Guidelines for the Protection and Welfare of Children” (DOHC 2009).

5.2.5 Psychological, Pharmacological and Non-Pharmacological Methods of Pain Relief

Anxiety associated with cannulation can be reduced by good communication skills, diversion, distraction and relaxation techniques. Children’s previous experiences with cannulation should also be taken into consideration and measures applied that previously relieved pain and anxiety (Lavery 2003). The need for local anaesthetic agents prior to venepuncture should be decided on an individual basis (Scales 2005). Please refer to local guidelines and policies on pain scales and distraction techniques, pharmacological and non-pharmacological methods of pain relief. Pain scales used when appropriate should be developmentally, physically, emotionally and cognitively suitable for the infant/child.

Sucrose is administered to all infants irrespective of gestation as per local policy.

5.2.5.1 Topical Anaesthetic Agents

The need for topical anaesthetic agents prior to the procedure should be considered on an individual basis, must be prescribed and used in accordance with the manufacturer’s instructions.

Infants should be supervised when agents are applied in case of accidental ingestion.

5.2.6 Vein Selection in infants/children

Choosing the correct vein is important. When selecting the appropriate site of vein for venepuncture, it is best practice to begin in the most distal aspect of the vein. This allows for further attempts above the selected vein which will not have been impeded. When undertaking venepuncture in infants/children, the specific advantages and disadvantages of potential venepuncture sites must be considered. These are outlined in Table 1:
Table 1: Summary of possible veins that may be used for Venepuncture in Infants/Children

<table>
<thead>
<tr>
<th>Vein Type</th>
<th>Advantages</th>
<th>Disadvantages</th>
</tr>
</thead>
<tbody>
<tr>
<td>Median Cubital Vein in the Antecubital Fossa</td>
<td>• Deep veins with rich blood supply</td>
<td>• Brachial artery and radial nerve in close proximity</td>
</tr>
<tr>
<td></td>
<td>• Easy to palpate</td>
<td>• Difficult to locate in child with increased subcutaneous fat.</td>
</tr>
<tr>
<td></td>
<td>• Well supported by subcutaneous tissue (prevents vein rolling under the needle)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Accessible in thin people</td>
<td></td>
</tr>
<tr>
<td>Cephalic and Basilic Veins in the Forearm</td>
<td>• Larger veins</td>
<td>• Cannot be used if site is used for arteriovenous fistula</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Not well supported by subcutaneous tissue (vein can roll from needle)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Brachial artery close to both veins</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Median nerve close to basilic vein</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Radial nerve close to cephalic vein.</td>
</tr>
<tr>
<td>Metacarpal Veins in the Dorsal Venous Network</td>
<td>The metacarpal veins would be the first choice for infants and children and infants under 2 years as other veins may not be accessible due to higher levels of subcutaneous fat.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Easily accessible, easily visualised and palpable</td>
<td>• Difficult to secure</td>
</tr>
<tr>
<td></td>
<td>• Prominent in obese patients</td>
<td>• Skin can be delicate and subcutaneous tissue is diminished (small veins may only offer small volumes of blood)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Only suitable for small blood collection set (23G Butterfly system).</td>
</tr>
</tbody>
</table>
Anatomy of upper extremity veins:

Figure i (a) Superficial veins of the forearm.      (b) Superficial veins of dorsal aspect of the hand.

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Please note:
In some instances, vein viewing equipment may be available and need to be used in accordance with local Policies, Procedures, Protocols and Guidelines (PPPG’s).

Please note:
Infants/children may also require venepuncture in either the foot or in the leg. These are not very common sites and should only be carried out by suitably trained/experienced practitioners when all other sites are inaccessible. Refer to section 5.1.2 and Appendix 5(c) for more details.
5.2.7 Clinical Assessment

A clinical assessment should be carried out by the nurse or midwife prior to the venepuncture procedure. Consideration must be given to the infant/child’s developmental, cognitive and mobility needs when selecting a site. A Four Step Approach is outlined as follows:

Four Step Approach to Clinical Assessment

1. Check
   - the indication for venepuncture to determine equipment and specific bottles to use
   - if the child has fasted as required for specific tests
   - the clinical condition (acute/chronic/emergency) of the infants and children
   - the location and length of the vein
   - the condition of the vein (visual and palpation
   - area is warm prior to the venepuncture procedure (veins constrict if cold, making the procedure more difficult)
   - for allergies
   - for needle phobia
   - previous history of difficult venepuncture procedures
   - increased amounts of subcutaneous fat
   - for history of bleeding disorders or if receiving anticoagulation therapy.

2. Choose
   - most distal aspect of the vein
   - non-dominant hand
   - correct location, avoiding arteries and nerves
   - appropriate equipment to undertake procedure
   - appropriate topical anaesthetic agent as prescribed.

3. Avoid
   - hard, sclerosed, fibrosed, knotty, thrombosed veins or previous venepuncture sites/obvious scarring
   - sites with intravenous infusions in situ
   - sites where circulation is impaired
   - sites that may require peripheral intravenous central catheter (PICC) insertion or arterial monitoring
   - valves in the vein (if visible or palpable)
   - veins in the upper arm in babies less than 28 weeks as this could impede long line insertion
   - duplication of blood orders, especially in infants and children due to smaller blood volumes
   - thumb sucking hand in the infant/child
   - veins suitable for peripheral intravenous cannulation and treatment if an infant or child requires repeated treatments such as chemotherapy.

4. Do Not Use limb
   - with obvious infection or bruising
   - with a fracture
   - with an arteriovenous (AV) fistula
   - for affected by a stroke
   - for affected by lymphoedema
   - affected with burns.
5.2.8 Equipment

5.2.8.1 List of Equipment for Venepuncture in Infants/Children

When undertaking the venepuncture procedure, it is important that only the equipment required is brought to the bedside. This is to prevent cross contamination from occurring. The equipment required should be based on the assessment of the infant/child and the specific blood tests requested as outlined in Table 2.

Table 2: List of Equipment required for Venepuncture Procedure in the Infants/Children

<table>
<thead>
<tr>
<th>• A clean clinical tray</th>
<th>• Topical anaesthetic agent if prescribed</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Appropriate clinical waste discard bag (yellow)</td>
<td>• Required safety blood collection systems</td>
</tr>
<tr>
<td>• Sharps container (large enough to accommodate the blood collection system)</td>
<td>• Required blood specimen bottles</td>
</tr>
<tr>
<td>• Disposable non-sterile sheet (optional in case of blood spillage)</td>
<td>• Blood requisition forms (fully completed with infant details)</td>
</tr>
<tr>
<td>• Personal protective equipment (e.g., a pair of well-fitting non-sterile gloves, protective plastic apron, safety goggles/visor/mask with eye shield)</td>
<td>• A biohazard bag for transport of specimens</td>
</tr>
<tr>
<td>• Skin disinfectant infants/children as per local policy</td>
<td>• Sterile gauze (to apply pressure and absorb blood spillages)</td>
</tr>
<tr>
<td>• Alcohol hand rub (AHR)</td>
<td>• Sterile infant/child friendly plaster/band aid</td>
</tr>
<tr>
<td>• Clean single use tourniquet.</td>
<td>• Reward as agreed with infant/child and parent e.g. sticker, or certificate</td>
</tr>
<tr>
<td></td>
<td>• Spill Kit.</td>
</tr>
</tbody>
</table>

As per standard precautions the use of a plastic apron and/or face protection should be assessed by each healthcare worker based on the risk of blood splashing or spraying during the procedure.

5.2.9 Types of Safety Blood Collection Systems

The nurse/midwife should be familiar with the types of safety blood collection systems used in their organisation.

The blood collection bottles and tubes will vary depending on the safety blood collection system utilised.

5.2.10 Recommended Order of Draw

The order of blood draw is the sequence in which blood collection bottles should be filled. The needle which pierces the bottle can carry additives from one bottle into the next, and so the sequence of draw is standardised so that any cross-contamination of additives will not affect laboratory results.
The general principles applied to the order of blood draw are:

- 1st Sample - no additives
- 2nd Sample - anticoagulants
- 3rd Sample - additives

(UN 2010) see Appendix 5 (e) and refer to local policy for further guidance.

### 5.2.11 Venepuncture Procedure – Infants/Children

The venepuncture procedure follows the aseptic non-touch technique (ANTT®) as outlined within Section 3, see Appendix 5 (a).

#### Please note:

Two attempts ONLY should be made at the venepuncture procedure. If unsuccessful refer to another practitioner as outlined in Appendix 5 (c) and in accordance with the Decision Making Flowchart within the Scope of Nursing & Midwifery Practice Framework (NMBI 2015) see Appendix 5 (d).

### Prior to Procedure

1. Confirm indication for the procedure, checking requisition forms for specific blood tests required
2. Perform hand hygiene as per local guidelines
3. Preparation should be carried out in a designated clean area
4. Collect the appropriate equipment (as per Table 2) and inspect its integrity, including expiry dates
5. Clean and disinfect clinical tray as per local guidelines.

### At the Bedside: Patient Zone

1. Perform hand hygiene using an alcohol hand rub (AHR) as per Moment 1 “Before Patient Contact” (WHO 2009)
2. Confirm the identity of infant’s/child’s identification and check date of birth, confirming same with child/parent/legal guardian or family
3. Obtain informed verbal consent with parent or legal guardian
4. Check the child has received and followed any special instructions prior to taking bloods e.g. fasting, time of last medication dose ingested
5. Explain the procedure as appropriate to age and understanding
6. Check for allergies
7. Discuss pain relief (Pharmacological and non-pharmacological methods) as per local guidelines
8. Ensure the infant/child is comfortable, using minimal clinical holding or distraction therapies as required
9. Request assistance from other health care workers or family as required
10. Palpate the site to check for rebound elasticity - press lightly with two fingers and release
11. Choose the appropriate vein.
Please note:

(a) If at any time you think that a piece of equipment has been contaminated you must discard immediately and use a new piece.

(b) When applying a tourniquet to the upper arm on the chosen side, make sure it does not obstruct arterial flow. If the radial pulse cannot be palpated then the tourniquet is too tight (Weinstein and Plumer 2007). The position of the tourniquet may be varied; for example, if a vein in the hand is to be used it may be placed on the forearm. A sphygmomanometer cuff may be used as an alternative (Royal Marsden 2015).

Precautions When Using a Tourniquet: When applying a tourniquet to the upper arm on the chosen side, make sure it does not obstruct arterial flow. If the radial pulse cannot be palpated then the tourniquet is too tight (Weinstein and Plumer 2007). The position of the tourniquet may be varied; for example, if a vein in the hand is to be used it may be placed on the forearm. A sphygmomanometer cuff may be used as an alternative (Royal Marsden 2015). Do not allow the tourniquet to be applied for more than 1 minute. Extended application of the tourniquet may result in local stasis and the possible haematoma formation. If a tourniquet must be applied for the preliminary vein selection, it should be released and reapplied after a 2-minute rest period (Clinical and Laboratory Standards Institute 2007).

Preparation

1. Perform hand hygiene using AHR, allow to dry
2. Open equipment carefully by peeling back packaging, ensuring all Key-Parts remain uncontaminated and covered until use
3. Place disposable non-sterile sheet under the infant’s/child’s arm
4. Apply the tourniquet (5/6cms above chosen site) and tighten slowly (Do not leave on for longer than one minute to avoid restriction of blood flow)
5. Ask the child to open/close their fist and keep fist closed
6. Place arm below heart level to encourage venous filling
7. Palpate the site to check for rebound elasticity - press lightly with one finger and release
8. Choose the appropriate vein
9. Release tourniquet. Leave it in position, ready to re-use
10. Decontaminate hands using AHR, allow to dry Moment 2 “Before Aseptic/Clean Procedure” (WHO 2009)
11. Don non-sterile appropriate size gloves. Additional personal protective equipment, i.e. apron and/or goggles may be required following risk assessment of an increased exposure to blood
12. Disinfect the patients skin as per local policy for at least 30 seconds and allow to dry
13. Dispose of used skin disinfectant wipe appropriately by placing it in the clinical waste discard bag
14. Do not touch or re-palpate the site
15. If re-palpating is required, hand hygiene and skin disinfection must be performed again
16. Reapply the tourniquet (ensure a rest period of 2 minutes has elapsed) (Clinical and Laboratory Standards Institute 2007).

Venepuncture Procedure

1. Use your non-dominant hand to achieve skin traction below the puncture site and to stabilise vein
2. Hold the blood collection set between your thumb and index finger
3. Position the needle-facing bevel upwards
4. Insert the needle, directly above the vein, through the skin (angle 10-30 degrees) depending on the depth of the vein
5. When the needle punctures the vein, observe for flashback as appropriate. The flashback may not be evident, this will depend on the procedure and the safety blood collection system being used
6. Lower the angle between the needle and the skin
7. When multiple blood tests are required, ensure the blood tests are taken in the proper order of draw
8. Loosen and release the tourniquet while supporting the device in situ
9. Invert bottles gently to mix appropriately, in accordance with order of draw
10. Do not shake bottles
11. Apply sterile gauze over the puncture site. Do not apply pressure before you remove the needle, activating the needle safety device
12. Remove the needle and place the place the blood collection system into the sharps box
13. Maintain gentle digital pressure on the puncture site to prevent blood leakage
14. Infants/child’s arm can be elevated while applying pressure to prevent haematoma formation but do not bend the arm
15. Discard the blood contaminated gauze in the clinical tray
16. Apply sterile dressing or infant/child friendly plaster over the puncture site
17. Remove gloves and face protection, if applicable and discard in appropriate receptacle, as per local guidelines
18. Perform hand hygiene using an AHR as per Moment 3 “After Body Fluid Exposure”.

After Care
1. Inform the child/parents/legal guardian of potential complications and advise to report same
2. Ensure the infant/child is in a comfortable position and reassure, offering an infant/child friendly reward as appropriate
3. If further contact with the infant/child or the infant/child’s surroundings occurs, hand hygiene must be performed using an AHR as per Moment 4 “After Patient Contact” and Moment 5 “After Contact with Patients Surroundings”
4. Ensure blood collection bottles and requisition forms are correctly labelled at the patient’s bedside
5. Place all blood collection bottles and forms into the biohazard bag and send to the laboratory as per local policy
6. Document the procedure in the healthcare records, communication, and inform relevant staff of outcome.

Post Procedure: Designated Decontamination
1. Bring used clinical tray and equipment to the designated utility area
2. Dispose of healthcare risk and non-risk waste appropriately
3. Decontaminate the clinical tray/dispose if single use
4. Decontaminate re-usable personal protective equipment e.g. re-usable eye shield as per manufacturer’s instructions, if applicable
5. Remove gloves and apron and carry out appropriate Hand Hygiene using an AHR
6. Arrange for blood samples to be transported to the laboratory (where applicable).
### 5.2.12 Management of Potential Complications

Potential problems such as infant/child fear and anxiety, inability to draw blood and/or cessation of blood flow may arise and it is important to know how these may be overcome. Complications such as haematoma, phlebitis, nerve injury, arterial puncture, venous spasm and/or needle stick injury can occur and it is important that the nurse or midwife is able to recognise, treat and/or prevent them. It is critical for the nurse/midwife to detect and prevent complications arising. This is especially important for infants/children who may not be able to verbalise pain. Please see Table 3 and/or Appendix 5 (g) for more information on potential complications.

#### Table 3: Potential Complications for the Venepuncture Procedure in Infants/Children

<table>
<thead>
<tr>
<th><strong>Venous Spasm</strong></th>
<th>Venous spasm is a sudden involuntary contraction of the vein, resulting in temporary cessation of blood flow in the vein.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Cause</strong></td>
<td>• Venous spasm is caused by fear and anxiety and is usually stimulated by cold infusates and mechanical or chemical irritation.</td>
</tr>
</tbody>
</table>
| **Signs**        | • Expressions of pain (verbal or non-verbal) such as facial expressions or crying  
                   • Cramping  
                   • Numbness above the venepuncture site. |
| **Prevention**   | • Explain the procedure to reduce fear and anxiety. |
| **Treatment**    | • Gently massage or warm the limb and retry  
                   • Slow down the process of venepuncture (there is no need to remove the needle)  
                   • Wait for the vein to relax before proceeding. |

**Needle stick injury**  
A needle stick injury (percutaneous inoculation injury) is an inadvertent puncture of the skin with a potentially contaminated needle. Appendix 3 (a) Refer to: Management of BBV risk following exposure to needlestick/sharps in occupational or community setting. (Health Protection Surveillance Centre 2016) www.emitoolkit.ie

<table>
<thead>
<tr>
<th><strong>Cause</strong></th>
<th>Inadvertent puncture of the skin during the venepuncture procedure.</th>
</tr>
</thead>
</table>
| **Signs** | • Pain  
                  • Bleeding  
                  • A visible puncture of the skin of the nurse or midwife. |
| **Prevention** | The application of Infection Prevention & Control and Health and Safety will support safe practice. |
| **Treatment** | • Encourage the wound to bleed freely  
                  • Wash the affected area with liquid soap under running water. Do not scrub (EMI Guidelines 2012)  
                  • Apply a waterproof dressing over the affected area  
                  • Report the incident to your line manager  
                  • Record the incident accordingly by completing the relevant incident form  
                  • Submit the incident form to your risk manager or line manager  
                  • For follow-up and advice, contact your Occupational Health Dept. and/or the Emergency Dept. as per local organisational guidelines. |
### Nerve Injury

If a nerve is accidentally hit on insertion of the needle into the vein, this will result in pain and can lead to injury and possibly permanent damage (McCall & Tankersley 2012)

<table>
<thead>
<tr>
<th>Cause</th>
<th>Signs</th>
<th>Prevention</th>
<th>Treatment</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Inappropriate selection</td>
<td>• Pain described as an ‘electrical shock’</td>
<td>• Appropriate clinical</td>
<td>• Release the tourniquet, remove the cannula and apply gentle pressure</td>
</tr>
<tr>
<td>of the cannulation site</td>
<td>or a ‘pins and needles’ sensation</td>
<td>assessment</td>
<td>• Explain and reassure the child about what has occurred</td>
</tr>
<tr>
<td>• Poor technique.</td>
<td>• Crying</td>
<td>• Appropriate site selection</td>
<td>• Advise that any symptoms of altered sensation may persist for a few</td>
</tr>
<tr>
<td></td>
<td>• Loss of mobility or reluctance to move</td>
<td>• Skilled technique.</td>
<td>hours</td>
</tr>
<tr>
<td></td>
<td>the affected limb.</td>
<td></td>
<td>• Arrange a medical review, if required</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Monitor, treat as prescribed and document in the nursing care plan</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Finally, report the occurrence of this complication, as per local</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>organization.</td>
</tr>
</tbody>
</table>

### Haematoma

Haematoma is the leakage of blood into the tissues indicated by rapid swelling which occurs during the insertion procedure or after removal (Perucca 2010, McCall & Tankersley 2015)

<table>
<thead>
<tr>
<th>Cause</th>
<th>Signs</th>
<th>Prevention</th>
<th>Treatment</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Leakage of blood at the site of the</td>
<td>• Expressions of pain (verbal or non-verbal) such as facial expressions</td>
<td>• Selection of appropriate</td>
<td>• Release the tourniquet, remove the needle and apply pressure until</td>
</tr>
<tr>
<td>venepuncture, may collect as a haematoma</td>
<td>or crying, loss of mobility or reluctance to move the affected limb</td>
<td>equipment for the size of the</td>
<td>haemostasis has been achieved</td>
</tr>
<tr>
<td>• Inappropriate use of a small fragile</td>
<td>• Swelling, discoloration or coolness of the area adjacent to the</td>
<td>vein</td>
<td>• Elevate the limb and apply a cool compress if necessary, avoiding an</td>
</tr>
<tr>
<td>vein, or too large a needle</td>
<td>puncture site.</td>
<td></td>
<td>ice burn</td>
</tr>
<tr>
<td>• Excessive probing to find the vein</td>
<td></td>
<td></td>
<td>• Apply a pressure dressing if bleeding is persistent</td>
</tr>
<tr>
<td>• Removing the needle prior to releasing</td>
<td></td>
<td></td>
<td>• Explain what has happened and request that staff are informed if the</td>
</tr>
<tr>
<td>the tourniquet</td>
<td></td>
<td></td>
<td>area becomes more painful as the haematoma may be pressing on a nerve</td>
</tr>
<tr>
<td>• The needle going all the way through the</td>
<td></td>
<td></td>
<td>• Do not reapply the tourniquet to the affected limb</td>
</tr>
<tr>
<td>vein</td>
<td></td>
<td></td>
<td>• Request a medical review, if required</td>
</tr>
<tr>
<td>• The needle only partially entering the</td>
<td></td>
<td></td>
<td>• Monitor, treat as prescribed and document in the nursing care plan</td>
</tr>
<tr>
<td>vein, allowing leakage</td>
<td></td>
<td></td>
<td>• Report the occurrence of this complication, as per local organisation.</td>
</tr>
</tbody>
</table>

---

### Arterial Puncture

The inadvertent puncture of the artery is another complication associated with venepuncture.

| **Cause** | • Inappropriate selection of the venepuncture site  
| • Poor technique. |
| **Signs** | • Presence of bright red blood  
| • Expressions of pain (verbal or non-verbal) such as facial expressions or crying. |
| **Prevention** | • Explain the procedure to reduce fear and anxiety  
| • Appropriate clinical assessment – palpate artery  
| • Appropriate site selection  
| • Skilled technique. |
| **Treatment** | • Release the tourniquet, removing the needle immediately and apply pressure until haemostasis has been achieved  
| • Explain and reassure regarding what has happened  
| • Request that a member of staff is informed if bleeding recurs from the puncture site, if pain continues or if there is increasing swelling or bruising. |

### Phlebitis

Phlebitis is an acute inflammation of the intima of a vein (Dougherty 2008).

| **Cause** | • Localised infection or irritation of the vein caused by the introduction of the venepuncture needle (mechanical/bacterial phlebitis). |
| **Signs** | • Expressions of pain (verbal or non-verbal) such as facial expressions or crying  
| • Loss of mobility or reluctance to move the affected limb  
| • Redness, inflammation, or purulent ooze at the venepuncture site. |
| **Prevention** | • Early detection is crucial, with regular monitoring required  
| • In children, the site should be monitored more frequently as they are at increased risk due to their small vessels. |
| **Treatment** | • Observe and monitor the venepuncture site  
| • Assess the degree of phlebitis  
| • Take a swab of the site for culture and sensitivity  
| • Clean and apply a dressing, to the affected area and administer analgesia as prescribed  
| • Report the incident of this complication  
| • Treat as prescribed and document the care given. |
5.2.13 Documentation

The nurse or midwife must be familiar with the documentation required for the venepuncture procedure. A requisition form must accompany blood samples submitted to the laboratory. The requisition form must contain the proper information in order to process the specimen.

The essential elements of the requisition form include the:

- Surname, first name, and middle initial
- Date of birth and gender
- Identification number
- Diagnosis or symptoms
- Complete name of healthcare professional requesting test
- Date of venepuncture procedure
- Indication of the blood test(s) requested
- Location (for example, ward, department, address).

5.2.14 Implementation Plan

The Director of Nursing/Midwifery is responsible for the dissemination, implementation, ongoing evaluation and audit of this national clinical procedural guideline for Venepuncture within the HSE/HSE Funded Agency.

5.2.15 Evaluation and Audit

Evaluation will include a:

- Mechanism for recording, reviewing and acting on adverse venepuncture incidents
- System for maintaining practitioner competence
- Method for identifying further training needs
- Care bundle audit.
5.3 Procedural Guideline for Peripheral Intravenous Cannulation (PIVC) - Infants/Children

5.3.1 The indications for PIVC Procedure are to:

- Maintain hydration
- Restoring fluid and electrolyte balance
- Providing fluids for resuscitation
- Administer:
  - intravenous medication therapy, e.g. antibiotics, opioids
  - intermittent, continuous infusion or bolus medications
  - blood and blood products
  - an opaque medication and/or a diagnostic re-agent to assist with diagnosis.

5.3.2 Considerations When Undertaking the PIVC procedure

PIVC is an invasive procedure, it can be traumatic. It should only be ordered when necessary. The “Children First - National Guidelines for the Protection and Welfare of Children” (DOHC 2009) should be adhered to. A clinical assessment should be undertaken prior to the procedure, with special awareness to the following:

- The PIVC procedure should not be ordered for routine phlebotomy
- A clinical assessment of the infant/child should be undertaken prior to the insertion of a PIVC
- PIVC should be carried out as close to the time of use to reduce the risk of accidental dislodgement and related complications
- Where peripheral intravenous access is poor and cannulation is difficult, alternative methods of access should be considered and discussed with the appropriate medical team
- Infusion of markedly irritant or vesicant substances (e.g. total parental nutrition or some cytotoxic drugs) are best administered via a midline catheter or peripherally inserted central catheters (PICC) (RCN 2010, Dougherty & Lister 2015)
- A PIVC should not be sited in close proximity to another cannula, however, if two cannulae are in close proximity they should be secured with separate dressings
- PIVC is regarded as a minor surgical procedure and is carried out with a high standard of hand hygiene, site preparation and maintenance.

5.3.3 Informed Consent

Informed verbal consent should be obtained from parent/legal guardian prior to the procedure and as per local organisational policy.

Informed consent is obtained from the parent/legal guardian in the following circumstances:

- if a child is under the age of consent (16 years)
- if the child does not have the cognitive ability to understand/or make an informed decision (for further information on consent, please refer to the HSE National Consent policy (2014)).

5.3.4 Clinical Holding

Minimal holding should be used for the PIVC procedure. The holding should be appropriate to age, cognitive ability and behavior of the child. Please refer to local organisational policies on clinical holding and the restraining of children. For further information, please read “Restraining, Holding Still and Containing Children and Young People - Guidance for Nursing Staff” (Royal College of Nursing 2003) and “Children First - National Guidelines for the Protection and Welfare of Children” (DOHC 2009).
5.3.5 Psychological, Pharmacological and Non-Pharmacological Methods of Pain Relief

Anxiety associated with cannulation can be reduced by good communication skills, diversion, distraction and relaxation techniques. Children’s previous experiences with cannulation should also be taken into consideration and measures applied that previously relieved pain and anxiety (Lavery 2003). The need for local anaesthetic agents prior to peripheral intravenous cannulation should be decided on an individual basis (Scales 2005). Please refer to local guidelines and policies on pain scales and distraction techniques, pharmacological and non-pharmacological methods of pain relief. Pain scales used when appropriate should be developmentally, physically, emotionally and cognitively suitable for the infant/child. Sucrose is administered to all infants irrespective of gestation as per local policy.

5.3.5.1 Topical Anaesthetic Agents

The need for topical anaesthetic agents prior to the procedure should be considered on an individual basis, must be prescribed and used in accordance with the manufacturer’s instructions. Infants should be supervised when agents are applied in case of accidental ingestion.

5.3.6 Vein Selection in Infants/Children

Choosing the correct vein is important. When selecting the appropriate site for PIVC it is best practice to begin in the most distal aspect of the vein. This allows for further attempts above the selected vein which will not have been impeded. When undertaking PIVC in infants/children, the specific advantages and disadvantages of potential venous sites must be considered. These are outlined in Table 1.

Table 1: Summary of possible veins that may be used for PIVC in Infants/Children

<table>
<thead>
<tr>
<th>Veins</th>
<th>Location</th>
<th>Advantages and Disadvantages</th>
</tr>
</thead>
<tbody>
<tr>
<td>The Cephalic and Basilic Vein in the Forearm</td>
<td>Cephalic Vein – runs under the skin on the radial side of the forearm. Basilic Vein – runs up the ulnar side of the forearm.</td>
<td><strong>Advantages</strong> - larger veins, more rapid infusion hand can be freely used. Easily located. The first choice of vein for a neonate is a vein on the dorsal surface of the hand. <strong>Disadvantage</strong> of Basilic vein-It is situated closest to nerves and arteries and caution should be exercised if chosen.</td>
</tr>
<tr>
<td>Metacarpel Veins in the Dorsal Venous Network</td>
<td>on the dorsum of the hand</td>
<td><strong>Advantages</strong> • First choice of vein for neonates • Ideal for long term therapy • Splinted by metacarpal bones <strong>Disadvantages</strong> • Difficult to secure • Flow affected by wrist movement.</td>
</tr>
<tr>
<td>Median Cubital Vein in the Antecubital Fossa</td>
<td>situated in the antecubital fossa in the elbow.</td>
<td><strong>Advantages</strong> • Well supported by subcutaneous tissue (prevents vein rolling under needle) • Deeper and more tolerant to irritant substances <strong>Disadvantages</strong> • Difficult to locate in children with increased subcutaneous fat • Restricted movement, flexion of the arm can interfere with flow of infusion.</td>
</tr>
</tbody>
</table>
Anatomy of upper extremity veins:

Figure i (a) Superficial veins of the forearm.  b) Superficial veins of dorsal aspect of the hand

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Please note:
In some instances, vein viewing equipment may be available and need to be used in accordance with local Policies, Procedures, Protocols and Guidelines (PPPG’s).

Please note:
Infants/children may also require venepuncture in either the foot or in the leg. These are not very common sites and should only be carried out by suitably trained/experienced practitioners when all other sites are inaccessible. Refer to section 5.1.2 and Appendix 5(c) for more details.
5.3.7 Clinical Assessment

A clinical assessment should be carried out by the nurse/midwife prior to the PIVC procedure. Consideration must be given to the infant’s/child’s developmental, cognitive and mobility needs when selecting a site. A Four Step Approach to the clinical assessment is outlined as follows:

Four Step Approach to Clinical Assessment

1. Check
   - the indication for PIVC
   - if intravenous medication or fluids could be given by any other route, i.e.
     - is this the last dose of antibiotics?
     - is the infant almost on full feeds?
     - is the infant/child on fluids or diet?
   - purpose, duration and rate of the intravenous infusion
   - the clinical condition (acute/chronic/emergency) of the infant/child
   - type and volume of intravenous fluid or medication to be administered via the vein
   - the location and length of the vein
   - the condition of the vein (visual and palpation)
   - area is warm prior to cannulation procedure (veins constrict if cold, making the procedure more difficult)
   - allergies to medications, topical anaesthetic agents, dressings or plasters
   - for needle phobia
   - for previous history of difficult PIVC procedures
   - for factors relating to individual patients, i.e.
     - obese
     - malnutrition
     - fragile veins
   - child’s preference about the site, however vital to check both arms
   - for history of blood borne viruses
   - for history of bleeding disorders or if receiving anticoagulation therapy or long term steroids.

2. Choose
   - a suitable vein for peripheral cannula insertion, avoiding arteries and nerves
   - most distal aspect of the vein
   - non-dominant hand
   - appropriate equipment to undertake procedure
   - appropriate topical anaesthetic agent, as prescribed.

3. Avoid
   - hard, sclerosed, fibrosed, knotty, thrombosed veins or previous cannulation sites
   - areas with increased subcutaneous fat
   - sites with existing intravenous infusions in situ
   - sites where circulation is impaired
   - sites that may require peripheral intravenous central catheter (PICC) insertion or arterial monitoring
   - valves in the vein (if visible or palpable)
   - veins in the upper arm in babies less than 28 weeks as this could impede long line insertion
   - thumb sucking hand in infants/children
   - lower extremities sites especially when infants/children have just started walking.
4. Do Not Use Limb
   • with obvious infection or bruising
   • with a fracture
   • with an arteriovenous (AV) fistula
   • affected by a stroke/lymphoedema/burn.

5.3.8 Assessment on Transfer of Infants/Children
An infant/child with a PIVC inserted by a transferring hospital will require assessment of the cannula and the insertion site for inflammation, infiltration, extravasation, infection and leaking or pressure of the cannula on the surrounding tissues signs of phlebitis as per Visual Infusion Phlebitis (VIP) score within Appendix 5 (f) and must be removed and re-sited as indicated.

5.3.9 Equipment

5.3.9.1 List of Equipment for PIVC in Infants/Children
When undertaking the PIVC procedure, it is important that only the equipment required is brought to the bedside. This is to prevent cross contamination from occurring. The equipment required should be based on the assessment of the infants/children and the purpose of the PIVC as outlined in Table 2.

Table 2 List of Equipment for PIVC in Infants/Children

<table>
<thead>
<tr>
<th>Left Column</th>
<th>Right Column</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alcohol hand rub (AHR)</td>
<td>Intravenous cannula (Choose size appropriately)</td>
</tr>
<tr>
<td>A clean &amp; disinfected dressing trolley</td>
<td>Sterile Steri-Strips™ and sterile scissors</td>
</tr>
<tr>
<td>Appropriate clinical waste discard bag (yellow)</td>
<td>T - Connector</td>
</tr>
<tr>
<td>Sterile dressing pack</td>
<td>Ampoule of prescribed Sodium Chloride (NaCl 0.9%) flush, as per local policy</td>
</tr>
<tr>
<td>Sharps container</td>
<td>Sterile gauze (To absorb blood spillage)</td>
</tr>
<tr>
<td>Disposable non-sterile Sheet (optional-in case of blood spillage)</td>
<td>Sterile, semi-permeable transparent dressing</td>
</tr>
<tr>
<td>Personal protective equipment (e.g. a pair of well-fitting non-sterile gloves, protective plastic apron, safety goggles/visor/mask with eye shield)</td>
<td>Sterile infant/child friendly plaster/band aid (in case of unsuccessful attempt)</td>
</tr>
<tr>
<td>Skin disinfectant: as per local policy</td>
<td>Reward (as agreed with child/parent, e.g. sticker or certificate)</td>
</tr>
<tr>
<td>Clean single use tourniquet</td>
<td>Spill Kit.</td>
</tr>
<tr>
<td>Topical anaesthetic agent (if prescribed).</td>
<td></td>
</tr>
</tbody>
</table>

As per standard precautions the use of a plastic apron and/or face protection should be assessed by each healthcare worker based on the risk of blood splashing or spraying during the procedure.
5.3.10 Types of Cannulae used for Infants/Children

Cannulae range in type and size, depending on purpose. The correct size of the cannula will help to prevent damage to the vessel and ensure adequate blood flow. Usually, the smallest size (gauge) for the prescribed therapy is chosen to facilitate better flow and minimise trauma (RCN 2010 and Scales 2005). Small veins will not accommodate large volumes or irritant solutions, therefore the purpose of the cannula will determine the appropriate type and size. The nurse and midwife should be familiar with the types of cannulae used in their organisation.

5.3.11 PIVC Procedure - Infants/Children

The PIVC procedure follows the aseptic non touch technique as outlined within Section 3, Appendix 5 (b).

Please note:

Two attempts ONLY should be made at the peripheral intravenous cannulation procedure. If unsuccessful refer to another practitioner as outlined in Appendix 5 (c), the decision to use an alternative site must be made in cognisance with the Decision Making Flowchart within the Scope of Nursing & Midwifery Practice document (NMBI 2015) see Appendix 5 (d).

Prior to Procedure: Preparation in designated clean area
1. Confirm indication for the procedure
2. Perform hand hygiene as per local guidelines
3. Disinfect a clean trolley, as per local guidelines
4. Collect the necessary equipment and inspect packaging for damage and expiry dates.

At the Bedside: Patient Zone
1. Perform hand hygiene using an alcohol hand rub (AHR) as per Moment 1 “Before Patient Contact” (WHO, 2009)
2. Confirm the identity of the infant’s/child’s and date of birth, confirming same with child/parent/legal guardian or family
3. Obtain informed verbal consent with parent or legal guardian and clarify understanding
4. Explain the procedure as appropriate to age and understanding and check for allergies
5. Discuss pain relief (Pharmacological and non-pharmacological methods) as per local guidelines
6. If pain relief is required an anaesthetic agent must be prescribed and applied at least one hour before the procedure. The anaesthetic agent should be removed prior to the procedure according to manufactures instructions
7. Ensure the infant/child is comfortable, using minimal clinical holding or distraction therapies as required
8. Request assistance from other health care workers or family as required
9. Choose the appropriate vein
10. Open equipment carefully by peeling back packaging, ensuring all Key-Parts remain uncontaminated and covered until use
11. Decontaminate hands using AHR, allow to dry
12. Don non-sterile gloves, (apron and face protection if required)
13. Place disposable non-sterile sheet under the infant’s/child’s arm
14. Apply the tourniquet (5/6cms above chosen site) and tighten slowly (Do not leave on for longer than one minute)
15. Ask the child to open/close fist and keep fist closed
16. Place arm below heart level to encourage venous filling
17. Palpate the site to check for rebound elasticity - press lightly with one finger and release
18. Choose the appropriate vein
19. Release tourniquet. Leave it in position, ready to re-use
20. Open the sterile dressing pack and add the sterile dressing, appropriate cannula for selected vein and other sterile items onto the sterile field using a non touch technique. Attach yellow waste bag to trolley
21. If prefilled syringes not available draw up NACL 0.9% flush into syringe using needle or straw & prime T-connector. Place syringe on the sterile field but not touching any sterile items
22. Reapply the tourniquet (Do not leave on for longer than two minutes).

Please note:
(a) If at any time you think that a piece of equipment has been contaminated you must discard immediately and use a new piece.
(b) When applying a tourniquet to the upper arm on the chosen side, make sure it does not obstruct arterial flow. If the radial pulse cannot be palpated then the tourniquet is too tight (Weinstein and Plumer 2007). The position of the tourniquet may be varied; for example, if a vein in the hand is to be used it may be placed on the forearm. A sphygmomanometer cuff may be used as an alternative (Royal Marsden 2015).

Precautions When Using a Tourniquet: When applying a tourniquet to the upper arm on the chosen side, make sure it does not obstruct arterial flow. If the radial pulse cannot be palpated then the tourniquet is too tight (Weinstein and Plumer 2007). The position of the tourniquet may be varied; for example, if a vein in the hand is to be used it may be placed on the forearm. A sphygmomanometer cuff may be used as an alternative (Royal Marsden 2015). Do not allow the tourniquet to be applied for more than **1 minute**. Extended application of the tourniquet may result in local stasis and the possible haematoma formation. If a tourniquet must be applied for the preliminary vein selection, it should be released and **reapplied after a 2-minute rest period** (Clinical and Laboratory Standards Institute 2007).

Preparation
1. Perform hand hygiene using AHR, as per Moment 2 “Before Aseptic/Clean Procedure” (WHO 2009)
2. Don non-sterile, appropriate size gloves. Additional personal protective equipment i.e. apron and/or goggles may be required following risk assessment of an increased exposure to blood
3. Disinfect the patient’s skin and the selected vein for at least 30 seconds using 2% chlorhexidine gluconate in 70% isopropyl alcohol using back and forth strokes with friction on an area of 4 – 5 cms and allow to dry (Royal Marsden 2015)
4. Dispose of used skin disinfectant wipe appropriately by placing it in the clinical waste discard bag
5. Do not touch or re-palpate the site
6. If re-palpation is required, hand hygiene and skin disinfection must be performed again
7. After reapply the tourniquet, please include (ensure a rest period of 2 minutes has elapsed) (Clinical and Laboratory Standards Institute 2007)
PIVC Procedure in infants/Children

1. Remove needle guard and inspect the device for any faults (Dougherty & Lister 2015)
2. Use your non-dominant hand to achieve skin traction
3. Hold the cannula between your thumb and index finger and use thumb to anchor the cannula hub
4. Position the cannula-facing bevel upwards
5. Insert the cannula directly above the vein, through the skin (angle 10-30 degrees, depending on the depth of the vein)
6. When the cannula punctures the vein, observe for flashback in the cannula chamber as appropriate
7. Lower the angle between the cannula and the skin
8. Advance the cannula a further 2 mm along the lumen of the vein
9. Withdraw the introducer slightly with the dominant hand and a second flashback of blood will be seen along the shaft of the cannula (Dougherty & Lister 2015)
10. Slowly advance the cannula fully into the lumen of the vein
11. Gently pull the introducer backwards, while holding the cannula in position
12. Loosen and release the tourniquet while supporting the device in situ
13. Hold the sterile gauze by one corner and place under the cannula hub to absorb blood spillage. Ensure only section of gauze that is sterile is in touch with hub
14. Apply digital pressure to the vein above the cannula tip and remove the stylet gently, activating the needle safety device
15. Dispose of all sharps in the sharps bin at the point of care
16. If blood collection is required at this stage, connect with appropriate safe blood collection system and adhere to ANIT® and venepuncture, as per local policy
17. Attach the needle-free bung/primed t-connector/primed short extension set to the cannula hub
18. Discard the blood contaminated gauze into the yellow waste bag
19. Secure and anchor the cannula with a sterile transparent semi permeable dressing (Loveday et al. 2014, HPSC 2009)
20. Aspirate to check for blood flashback
21. Flush cannula with prescribed sterile sodium chloride (NaCl 0.9%) using a push pause technique (pulsatile) ending with a positive pressure (Dougherty & Lister 2015) to confirm patency, as per local policy
22. Observe the site for signs of swelling or leakage and ask the patient if they are experiencing any discomfort or pain
23. If required loop the t-connector tubing and secure with tape
24. Remove disposable sheet, gloves and disposable eye protection (if applicable) and discard appropriately as per local policy
25. Perform hand hygiene using an AHR as per Moment 3 “After Body Fluid Exposure”
26. Document date and time of insertion, site and size of cannula, number of attempts and sign in healthcare notes or care plan (Dougherty & Lister 2015).
After Care
1. Inform the child/parents/legal guardian of potential complications and advise to report same
2. Ensure the infant/child is in a comfortable position and reassure, offering an infant/child friendly reward as appropriate
3. If further contact with the infant/child or the patient’s surroundings occurs, hand hygiene must be performed using an AHR as per Moment 4 “After Patient Contact” and Moment 5 “After Contact with Patients Surroundings”
4. Document the procedure healthcare records, communicate and inform relevant staff of the outcome.

Post Procedure: Designated Decontamination
1. Bring used clinical tray and equipment to the designated utility area
2. Dispose of healthcare risk and non-risk waste appropriately
3. Decontaminate the clinical tray/dispose if single use
4. Decontaminate re-usable personal protective equipment e.g. re-usable eye shield as per manufacturer’s instructions, if applicable
5. Remove gloves and apron and carry out appropriate Hand Hygiene using an AHR
6. Arrange for blood samples to be transported to the laboratory (where applicable).

5.3.12 Care and Maintenance of an Indwelling PIVC
- Ensure that cannula is in correct position and a sterile semi-permeable transparent dressing is intact
- Ensure that the PIVC entry site is visible through the dressing
- The site should be kept clean and dry at all times. The dressing should only be changed if it becomes loose, wet or soiled. ANTT® should be used for dressing changes (RCN 2010)
- Use Visual Infusion Phlebitis (VIP) Score Appendix 5 (f) to inspect the cannula site on each shift (preferably every eight hours) for signs of tenderness, swelling, inflammation, discharge or thrombosis (INS 2011)
- Ensure a single lumen primed extension set is applied to the cannula and clamped when not in use
- Clean the hub of extension set with 2% Chlorhexidine gluconate solution in 70% isopropyl alcohol product and air dry prior to flushing the cannula
- Flush the cannula with prescribed sterile 0.9% Sodium Chloride (0.9% NaCl) solution daily or before and after each drug administration or infusion and ensure positive pressure is maintained by clamping the extension set prior to flushing the final 1 ml of saline (RCN 2010). Document administration in drug prescription sheet
- The IV site must also be observed while:
  - Bolus injections are administered
  - IV flow rates are being checked or altered
  - IV infusion/transfusion bags are being changed
  - The patient is showering or washing
- Advise the child to protect the PIVC before, during and after personal hygiene.
- Inspect the site on each shift for signs of tenderness, swelling, inflammation, discharge or thrombosis as per VIP score (INS 2011).
• Document inspection of PIVC site in PIVC care plan/care bundle. At the first signs of inflammation or infection:
  • Cannula should be removed.
  • Take a swab from the PIVC insertion site and send the swab to laboratory for culture & sensitivity testing.
  • Clean the insertion site with a 2% Chlorhexidine gluconate solution in 70% isopropyl alcohol product.
  • Notify medical team.
  • Document findings and action taken in the nursing progress notes.
  • Continue to observe PIVC insertion site.

Please note:
PIVC’s must be re-sited only if clinically indicated and not routinely (Loveday et al. 2014).

5.3.13 Management of Potential Complications

Specific complications that can arise following the procedure include infiltration, extravasation, venous spasm, phlebitis, thrombophlebitis, haematoma, nerve injury, arterial puncture, embolism and needle stick injury. Infants/children are at greater risk of complications due to the smaller size of their veins and reduced blood flow around the cannula tip (Bravery 1999). It is critical for the nurse/midwife to detect and prevent complications arising and to treat as required. Infants/children who cannot verbalise pain, depend on the nurse/midwife to detect and prevent complications related to PIVC, as outlined in Table 3 and/or Appendix 5 (h).

Table 3: Potential Complications for PIVC Procedure in Infants/Children

<table>
<thead>
<tr>
<th>Pain</th>
<th>Pain is an unpleasant sensory and emotional experience associated or described with actual or potential tissue damage (Shrestha M &amp; Adhikari R K 2012)</th>
</tr>
</thead>
</table>
| Cause | • tentative stop–start insertion (often associated with hesitant or new practitioners)  
• hitting an artery, nerve or valve  
• poor technique – inadequate anchoring causes skin to gather as the needle is inserted  
• alcohol is not allowed to dry adequately before insertion, resulting in stinging pain  
• using a frequently punctured, recently used or bruised vein  
• anxious patient, may have low pain threshold  
• use of large–gauge device  
• use of veins in sensitive areas (Dougherty 2008). |
| Signs | • Body language, verbal expression, facial expression. |
| Prevention | • Pain can be prevented by using methods to relax and relieve anxiety, or the use of local anaesthetic creams. |
| Treatment | • If the patient complains of pain, depending on the cause (e.g. nerve or artery), it may be necessary to remove the device immediately  
• Reassure the patient. |
<table>
<thead>
<tr>
<th>Venous Spasm</th>
<th>Venous spasm is a sudden involuntary contraction of the vein, resulting in temporary cessation of blood flow in the vein.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Cause</strong></td>
<td>• Venous spasm is caused by fear and anxiety and is usually stimulated by cold infusates and mechanical or chemical irritation.</td>
</tr>
</tbody>
</table>
| **Signs**    | • Expressions of pain (verbal or non-verbal) such as facial expressions or crying  
  • Cramping  
  • Numbness above the venepuncture site. |
| **Prevention** | • Explain the procedure to reduce fear and anxiety  
  • Give infusions at room temperature (commence infusions slowly). |
| **Treatment** | • Gently massage or warm the limb and retry  
  • Slow down the process of venepuncture (there is no need to remove the needle)  
  • Wait for the vein to relax and wait for blood to return into the flash chamber before proceeding  
  • During intravenous therapy, reduce the rate of infusion flow, especially in solutions known to be irritant. |

<table>
<thead>
<tr>
<th>Needle stick injury</th>
<th>A needle stick injury (percutaneous inoculation injury) is an inadvertent puncture of the skin with a potentially contaminated needle. Appendix 3 (a) Refer to: Management of BBV risk following exposure to needlestick/sharps in occupational or community setting. (Health Protection Surveillance Centre 2016) <a href="http://www.emitoolkit.ie">www.emitoolkit.ie</a></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Cause</strong></td>
<td>• Inadvertent puncture of the skin during the cannulation procedure.</td>
</tr>
</tbody>
</table>
| **Signs**            | • Pain  
  • Bleeding  
  • A visible puncture of the skin of the nurse or midwife. |
| **Prevention**       | • The application of Infection Prevention & Control and Health and Safety will support safe practice. |
| **Treatment**        | • Encourage the wound to bleed freely  
  • Wash the affected area with liquid soap under running water. Do not scrub (EMI Guidelines 2012)  
  • Apply a waterproof dressing over the affected area  
  • Report the incident to your line manager  
  • Record the incident accordingly by completing the relevant incident form  
  • Submit the incident form to your risk manager or line manager  
  • For follow-up and advice, contact your Occupational Health Dept. and/or the Emergency Dept. as per local organisational guidelines. |
### Nerve Injury
If a nerve is accidentally hit on insertion of the needle into the vein, this will result in pain and can lead to injury and possibly permanent damage (McCall & Tankersley 2012)

| **Cause** | • Inappropriate selection of the cannulation site  
• Poor technique. |
|-----------|---------------------------------------------------|
| **Signs** | • Pain described as an ‘electrical shock’ or a ‘pins and needles’ sensation  
• Crying  
• Loss of mobility or reluctance to move the affected limb. |
| **Prevention** | • Appropriate clinical assessment  
• Appropriate site selection  
• Skilled technique. |
| **Treatment** | • Release the tourniquet, remove the cannula and apply gentle pressure  
• Explain and reassure the child about what has occurred  
• Advise that any symptoms of altered sensation may persist for a few hours  
• Arrange a medical review, if required  
• Monitor, treat as prescribed and document in the nursing care plan  
• Finally, report the occurrence of this complication, as per local organisation. |

### Haematoma
Haematoma is the leakage of blood into the tissues indicated by rapid swelling which occurs during the insertion procedure or after removal (Perucca 2010, McCall & Tankersley 2015)

| **Cause** | • penetration of the posterior vein wall  
• incorrect choice of needle to vein size  
• fragile veins  
• patients receiving anticoagulant therapy  
• excessive or blind probing to locate the vein  
• failure to remove the tourniquet promptly or failure to release it before removing the needle  
• inadequate pressure on venepuncture site following removal of the cannula (Dougherty 2008, McCall & Tankersley 2012 & Moini 2013). |
|-----------|-------------------------------------------------------------------------------------------------------------------------------------|
| **Signs** | • Pain, loss of mobility or reluctance to move the affected limb  
• Swelling, discoloration or coolness of the area adjacent to the cannula. |
| **Prevention** | • Good vein and device selection and using a careful technique  
• The practitioner should always be aware of patients with fragile veins or those on anticoagulant therapy and inexperienced individuals should not attempt cannulation in these individuals (Perucca 2010)  
• A tourniquet should not be applied to a limb where recent venepuncture has occurred and the tourniquet should not be left in place for any longer than necessary  
• On removal of the cannula, adequate pressure should be applied to the site. Alcohol pads inhibit clotting and should not be used (Perucca 2010). |
| **Treatment** | • In the event of a haematoma occurring, tourniquet is released, the cannula should be removed immediately and pressure applied to the site for a few minutes (McCall & Tankersley 2012, Garza & Becan McBride 2013)  
• Elevate the extremity if appropriate and reassure the patient and explain the reason for the bruise  
• Apply a pressure dressing if required and an ice pack if bruising is extensive (Moini 2013). |
<table>
<thead>
<tr>
<th>Arterial Puncture</th>
<th>The inadvertent puncture of the artery is another complication associated with cannulation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cause</td>
<td>• Inappropriate selection of the cannulation site&lt;br&gt;• Poor technique.</td>
</tr>
<tr>
<td>Signs</td>
<td>• Presence of bright red blood&lt;br&gt;• Expressions of pain (verbal or non-verbal) such as facial expressions or crying.</td>
</tr>
<tr>
<td>Prevention</td>
<td>• Explain the procedure to reduce fear and anxiety&lt;br&gt;• Appropriate clinical assessment – palpate artery&lt;br&gt;• Appropriate site selection&lt;br&gt;• Skilled technique.</td>
</tr>
<tr>
<td>Treatment</td>
<td>• Release the tourniquet, removing the cannula immediately and apply pressure until haemostasis has been achieved&lt;br&gt;• Explain and reassure the child and their family regarding what has happened. &lt;br&gt;• Request that a member of staff is informed if bleeding recurs from the puncture site, if pain continues or if there is increasing swelling or bruising&lt;br&gt;• Arrange a medical review&lt;br&gt;• Monitor, treat as prescribed and document in the nursing care plan&lt;br&gt;• Report the occurrence of this complication, as per local policy.</td>
</tr>
<tr>
<td>Phlebitis</td>
<td>Phlebitis is an acute inflammation of the intima of a vein (Dougherty 2008)</td>
</tr>
<tr>
<td>Cause</td>
<td>Three types of phlebitis can occur in relation to PIVC:&lt;br&gt;• Mechanical phlebitis is related to irritation and damage to a vein by large-gauge cannulas, sited where there is movement, for example in the antecubital fossa, inadequate securing of PIVC or increased PIVC dwell time.&lt;br&gt;• Chemical phlebitis is related to chemical irritation from drugs such as antibiotics and chemotherapy&lt;br&gt;• Bacterial phlebitis is when the site becomes infected due to poor hand-washing or aseptic technique and has a potential to predispose a patient to septicaemia or catheter related blood stream infections (CRBSIs) (Lamb and Dougherty 2008, Morris 2011).</td>
</tr>
<tr>
<td>Signs</td>
<td>• Characterized by pain and tenderness along the cannulated vein, erythema, warmth and streak formation with/without a palpable cord (Washington G.T. &amp; Barrett R. 2012)&lt;br&gt;• Loss of mobility or reluctance to move the affected limb&lt;br&gt;• Redness, inflammation, or purulent ooze at the cannula site.</td>
</tr>
<tr>
<td>Prevention</td>
<td>• Regular monitoring using a VIP score&lt;br&gt;• Observe for thrombophlebitis. Veins of the lower extremities should not be routinely used in adults due to the risk of embolism and thrombophlebitis (RCN 2010, INS 2011).</td>
</tr>
</tbody>
</table>
| Treatment         | • Remove peripheral vascular catheters if the patient develops signs of phlebitis (warmth, tenderness, erythema or palpable vascular cord), infection or a malfunctioning catheter (O’Grady et al. 2011). Refer to peripheral intravenous cannulation removal guidelines in 4.3.13.
### Thrombophlebitis

**Thrombophlebitis is the inflammation of a vein with a thrombus formation**

| **Cause** | • Traumatic cannulation by an unskilled practitioner or multiple attempts  
• Use of too large a cannula for the size of the vein  
• Infusion of high pH solution or poor circulation with venous stasis. |
| **Signs** | • Local redness, hard and torturous feel of the vein, heat, painful to touch or move  
• Expressions of pain (verbal or non-verbal) such as facial expressions or crying. |
| **Prevention** | • Early detection is crucial with at least one hourly monitoring of the cannulation site  
• Appropriate site selection  
• Appropriate selection of equipment for size of vein  
• Skilled technique. |
| **Treatment** | • Discontinue infusion, remove the cannula, and elevate the extremity  
• Report the incident of this complication as per local organisation  
• Treat as prescribed and document the care. |

### Infiltration

**Infiltration is the “inadvertent administration of a non-vesicant (non-irritant) solution or medication into surrounding tissue instead of the intended vascular pathway” (RCN 2010, p.60; INS 2011)**

| **Cause** | • Cannula too large for the diameter of the vein  
• Puncture of distal wall of vein during cannulation  
• Poorly secured cannula  
• Over manipulation of cannula  
• Delivery of fluid at a high rate or pressure (Dougherty & Lister 2008). |
| **Signs** | • Swelling and oedema, pain, loss of mobility or reluctance to move the affected limb  
• Skin cool to touch  
• Skin blanching adjacent to cannula. |
| **Prevention** | • Monitoring of cannula as per local care bundle/care plan. Ensure the cannula is secured correctly. |
| **Treatment** | • Immediately remove the cannula and Refer to PIVC removal guidelines in 5.3.12  
• Apply sterile dressing as per ANTT®  
• Administer analgesia as prescribed. |
<table>
<thead>
<tr>
<th>Embolism</th>
<th>An embolism is an air bubble, fat particle or blood clot which travels, causing a blockage in the vein</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Cause</strong></td>
<td>• An embolism occurs when an air bubble, fat particle, or blood clot becomes detached and is carried by the venous flow to the heart and potentially into the pulmonary circulation.</td>
</tr>
</tbody>
</table>
| **Signs**                                                              | • Pain  
• Shortness of breath  
• Collapse  
• Shock. |
| **Prevention**                                                         | • Embolism can be prevented by stopping air from entering the system, ensuring that all connections are secure, careful flushing and by securing the cannula adequately. |
| **Treatment**                                                          | • Call for urgent medical attention and treat as prescribed. |

<table>
<thead>
<tr>
<th>Extravasation</th>
<th>Extravasation is the inadvertent administration of a vesicant (irritant) solution or medication into surrounding tissue instead of the intended vascular pathway” (RCN 2010, p.60; INS 2011)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Cause</strong></td>
<td>• Leakage of vesicant solutions into the tissues. Drugs capable of causing tissue damage and necrosis include but are not limited to cytotoxic drugs, potassium chloride, hypertonic solutions of sodium bicarbonate and drugs with a vaso constrictive action (Lamb &amp; Dougherty 2008).</td>
</tr>
</tbody>
</table>
| **Signs**                                                             | • Pain  
• Reluctance to move affected limb  
• Blistering (typically occurs 1–2 weeks post extravasation)  
• Peeling and sloughing of the skin (about 2 weeks post extravasation)  
• Tissue necrosis (2–3 weeks post extravasation) with resulting pain  
• Damage to tendons, nerves and joints  
• Functional and sensory impairment of affected area such as limb disfigurement. |
| **Prevention**                                                        | • Early detection and immediate action is crucial, with at least hourly monitoring of the cannulation site  
• Ensure the cannula is secured correctly. |
| **Treatment**                                                         | • Stop the infusion and inform the patient and member of the medical team  
• Immediately remove the cannula if indicated and apply a sterile dressing  
• Administer analgesia as prescribed  
• Complete adverse incident form as per local protocol. |
5.3.14 Removal of the PIVC

- When a PIVC is no longer required it should be removed as per care bundle guidelines.
- Removal of the PIVC should be an ANTT® procedure. The device should be removed carefully using a slow, steady movement and pressure should be applied until haemostasis is achieved. This pressure should be firm and not involve any rubbing movement.
- The site should be inspected to ensure bleeding has stopped and should then be covered with a sterile dressing (INS 2011).
- The cannula integrity should be checked to ensure the complete device has been removed (RCN 2010, INS 2011, Dougherty & Lister 2015).
- Discard all sharps as per local policy.
- Monitor and observe the PIVC site for a further 48 hours after device removal for signs and symptoms of post-infusion phlebitis.
- Document the date, time and reason for PIVC removal and care in the health care records and update/evaluate care plan (RCN 2010).
- If intravenous access is required following removal, an alternative site must be used.

5.3.15 Documentation

The nurse or midwife must be familiar with the documentation required for the Cannulation procedure. Documentation specific to PIVC should contain the following details:

- Date, time, and site of cannula insertion.
- Name of person performing procedure and that of the assistant.
- Name of vein cannulated and exact site e.g. right cephalic vein.
- Reason for cannulation procedure.
- Number of cannulation attempts.
- Size of the inserted cannula.
- Dressing type.
- Tolerance of the procedure.
- Monitoring of the PIVC site and patient by using local care bundle/care plan.
- Date, time and reason for cannula removal.
- Any complications arising and management of same.
- Care Bundle completed.
5.3.16 Implementation Plan
The Director of Nursing/Midwifery is responsible for the dissemination, implementation, ongoing evaluation and audit of this national clinical procedural guideline for PIVC within the HSE/HSE Funded Agency.

5.3.17 Evaluation and Audit
Evaluation will include a:
- Mechanism for recording, reviewing and acting on adverse PIVC incidents
- System for maintaining practitioner competence
- Method for identifying further training needs
- Care Bundle Audit.

Auditing of the insertion, use and maintenance of a PIVC should be in accordance with the Peripheral Vascular Catheter Care Bundle (HPSC 2014) see Appendix 3(a).
Appendix 5 (a) Aseptic Non Touch Technique (adapted from www.antt.org)
Appendix 5 (b) Aseptic Non Touch Technique (adapted from www.antt.org)

1. Preparation
   - Consent patient
   - Expose site

2. Clean hands with alcohol hand rub

3. Gather equipment
   - Sterile tourniquet
   - Sharps container
   - Gauze
   - Antiseptic solution

4. Clean tray
   - Using a sterile semi-fixed device, use a sterile semi-fixed device to cover the sterile field

5. Position arm
   - Position arm so that blood flow is assisted towards the puncture site

6. Set up the tourniquet
   - Position tourniquet just above the site of puncture

7. Perform venepuncture
   - Use a sterile needle
   - Apply firm pressure
   - Dispose of needles

8. Remove needle
   - Remove needle
   - Dispose of needle

9. Apply dressing
   - Apply sterile dressing
   - Dispose of dressing

10. Re-tighten tourniquet
    - Re-tighten tourniquet

11. Apply disposable gloves
    - Apply disposable gloves

12. Puncture site
    - Puncture site

13. Insert cannula
    - Insert cannula

14. Change gloves
    - Change gloves

15. Secure cannula
    - Secure cannula

16. Clean tray
    - Clean tray

17. Apply bandage
    - Apply bandage

18. Clean hands
    - Clean hands

19. Decontamination Zone
    - Decontamination Zone

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Appendix 5 (c) Algorithm when accessing Peripheral Venous Sites

Process to support staff when accessing peripheral venous sites for Venepuncture & Peripheral Intravenous Cannulation (PIVC)

This process is consistent with HSE National Guiding Framework for Education, Training and Competence Validation in Venepuncture and Peripheral Intravenous Cannulation – HSE, Office of Nursing & Midwifery Services Director (2017)

Also refer to Local Guidelines for Venepuncture & Peripheral Intravenous Cannulation (PIVC).

<table>
<thead>
<tr>
<th>Trigger</th>
<th>Process</th>
<th>Output</th>
</tr>
</thead>
<tbody>
<tr>
<td>Identifies commencement of the process</td>
<td>Considerations for Procedure</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Preparation for procedure</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Patient Choice/Shared Decision Making Process</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Informed Consent</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Reference local policies/ HSE National Consent Policy 2014</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Vein Selection</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Reference local guidelines/ National HSE, ONMSD Guiding Framework (2016)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Optimum site identified as per assessment &amp; in line with local guidelines</td>
<td></td>
</tr>
<tr>
<td></td>
<td>In the absence of Upper Limb selection, the decision to use an alternative site must be made in cognisance with this Algorithm and the Decision Making Flowchart within the Scope of Nursing &amp; Midwifery Practice Framework (NMBI 2015)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Initiate procedure as per local guideline</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Successful completion of procedure within 2 attempts? (per patient)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>NO</td>
<td>Refer to experienced practitioner and/or refer to local guidance</td>
</tr>
<tr>
<td></td>
<td>YES</td>
<td>Successful completion of procedure</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Procedure Completed</td>
</tr>
</tbody>
</table>
Appendix 5 (d) Scope of Practice Decision-Making Flowchart (NMBI 2015 p. 32, 33)

Scope of Practice Decision-Making Flowchart

Think about Your Nursing or Midwifery Role or Activity

PATIENT SAFETY FIRST

Is the role/activity you plan to undertake respectful of the patients’ rights and will they derive an overall benefit from your actions?

YES

Does the role/activity fit in with definitions and values that underpin nursing and midwifery as outlined in the Code of Professional Conduct and Ethics and Scope of Practice?

YES

Have you the necessary competence to carry out the role/activity?

YES

Ensure patient needs are met. This may be through collaboration or referral to other HCP.*

NO

STOP

You are outside your scope of practice.

NO

STOP

You are outside your scope of practice.

NO

STOP

You are outside your scope of practice.

NO

STOP

You are outside your scope of practice.

NO

STOP

You are outside your scope of practice.

NO

STOP

You are outside your scope of practice.

UNSURE/NO

STOP

You are outside your scope of practice.

YES

Is the role/activity supported in your practice setting?

For example through relevant legislation, national or local PPPGs* or evidence based resources.

YES

Are you willing to accept responsibility and accountability for your role or activity?

YES

Proceed

Carry out the role or activity and document the details.

NO

Ensure patient needs are met. This may be through collaboration or referral to other HCP.

Consider what measures you need to take to develop and maintain your competence.

Consider the reasons why you feel unable to accept responsibility and accountability and discuss with senior nurse or midwife manager/other HCP/NMBI.

Ensure patient needs are met. This may be through collaboration or referral to other HCP.

Discuss with senior nurse or midwife manager/other HCP/NMBI and consider what measures you need to take to develop and maintain your competence.

Discuss with senior nurse or midwife manager/other HCP/NMBI and consider what measures you need to take to develop and maintain your competence.

Discuss with senior nurse or midwife manager/other HCP/NMBI.

If PPPGs are not available consider what needs to happen to put the necessary PPPGs/supports in place.

*HCP – Healthcare Professional

PPPGs – Policies, Procedures, Protocols and Guidelines

Is the role/activity you plan to undertake respectful of the patients’ rights and will they derive an overall benefit from your actions?

Are you willing to accept responsibility and accountability for your role or activity?

For example through relevant legislation, national or local PPPGs* or evidence based resources.

Consider what measures you need to take to develop and maintain your competence.

Consider the reasons why you feel unable to accept responsibility and accountability and discuss with senior nurse or midwife manager/other HCP/NMBI.

Ensure patient needs are met. This may be through collaboration or referral to other HCP.

Discuss with senior nurse or midwife manager/other HCP/NMBI.

If PPPGs are not available consider what needs to happen to put the necessary PPPGs/supports in place.

<table>
<thead>
<tr>
<th>Order of use</th>
<th>Type of tube/usual colour</th>
<th>Additive</th>
<th>Mode of action</th>
<th>Uses</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Blood culture bottle (yellow-black striped tubes)</td>
<td>Broth mixture</td>
<td>Preserves viability of microorganisms</td>
<td>Microbiology – aerobes, anaerobes, fungi</td>
</tr>
<tr>
<td>2</td>
<td>Non-additive tube</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Coagulation tube (light blue top)</td>
<td>Sodium citrate</td>
<td>Forms calcium salts to remove calcium</td>
<td>Coagulation tests (protime and prothrombin time), requires full draw</td>
</tr>
<tr>
<td>4</td>
<td>Clot activator (red top)</td>
<td>Clot activator</td>
<td>Blood clots, and the serum is separated by centrifugation</td>
<td>Chemistries, immunology and serology, blood bank (cross-match)</td>
</tr>
<tr>
<td>5</td>
<td>Serum separator tube (red-grey tiger top or gold)</td>
<td>None</td>
<td>Contains a gel at the bottom to separate blood from serum on centrifugation</td>
<td>Chemistries, immunology and serology</td>
</tr>
<tr>
<td>6</td>
<td>Sodium heparin (dark green top)</td>
<td>Sodium heparin or lithium heparin</td>
<td>Inactivates thrombin and thromboplastin</td>
<td>For lithium level use sodium heparin, for ammonia level use either</td>
</tr>
<tr>
<td>7</td>
<td>PST (light green top)</td>
<td>Lithium heparin anticoagulant and a gel separator</td>
<td>Anticoagulants with lithium, separates plasma with PST gel at bottom of tube</td>
<td>Chemistries</td>
</tr>
<tr>
<td>8</td>
<td>EDTA (purple top)</td>
<td>EDTA</td>
<td>Forms calcium salts to remove calcium</td>
<td>Haematology, Blood Bank (cross-match) requires full draw</td>
</tr>
<tr>
<td>9</td>
<td>Blood tube (pale yellow top)</td>
<td>Acid-citrate-dextrose (ACD, ACDA or ACDB)</td>
<td>Complement inactivation</td>
<td>HLA tissue typing, paternity testing, DNA studies</td>
</tr>
<tr>
<td>10</td>
<td>Oxalate/flouride (light grey top)</td>
<td>Sodium fluoride and potassium oxalate</td>
<td>Antiglycolytic agent preserves glucose up to five days</td>
<td>Glucoses, requires full draw (may cause haemolysis if short draw)</td>
</tr>
</tbody>
</table>
### Appendix 5 (f) Visual Infusion Phlebitis (VIP) Score: Jackson A. (1997)

<table>
<thead>
<tr>
<th>Visual Infusion Phlebitis Score</th>
<th>Score</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>IV site appears healthy</td>
<td>0</td>
<td>No signs of phlebitis</td>
</tr>
<tr>
<td>One of the following is evident:</td>
<td>1</td>
<td>Possible first sign of phlebitis</td>
</tr>
<tr>
<td>- Slight pain at IV site</td>
<td></td>
<td>OBSERVE CANNULA</td>
</tr>
<tr>
<td>- Redness near IV site</td>
<td></td>
<td>OBSERVE CANNULA</td>
</tr>
<tr>
<td>Two of the following are evident:</td>
<td>2</td>
<td>Early stage of phlebitis</td>
</tr>
<tr>
<td>- Pain</td>
<td></td>
<td>RESITE THE CANNULA</td>
</tr>
<tr>
<td>- Erythema</td>
<td></td>
<td>RESITE THE CANNULA</td>
</tr>
<tr>
<td>- Swelling</td>
<td></td>
<td>RESITE THE CANNULA</td>
</tr>
<tr>
<td>All of the following signs are evident:</td>
<td>3</td>
<td>Medium stage of phlebitis</td>
</tr>
<tr>
<td>- Pain along the path of the cannula</td>
<td></td>
<td>RESITE THE CANNULA</td>
</tr>
<tr>
<td>- Erythema</td>
<td></td>
<td>CONSIDER TREATMENT</td>
</tr>
<tr>
<td>- Induration</td>
<td></td>
<td>CONSIDER TREATMENT</td>
</tr>
<tr>
<td>All of the following signs evident and extensive:</td>
<td>4</td>
<td>Advanced stage of phlebitis or start of thrombophlebitis</td>
</tr>
<tr>
<td>- Pain along the path of the cannula</td>
<td></td>
<td>RESITE THE CANNULA</td>
</tr>
<tr>
<td>- Erythema</td>
<td></td>
<td>CONSIDER TREATMENT</td>
</tr>
<tr>
<td>- Induration</td>
<td></td>
<td>CONSIDER TREATMENT</td>
</tr>
<tr>
<td>- Palpable venous cord</td>
<td></td>
<td>INITIATE TREATMENT</td>
</tr>
<tr>
<td>All of the following signs evident and extensive:</td>
<td>5</td>
<td>Advanced stage of thrombophlebitis</td>
</tr>
<tr>
<td>- Pain along the path of the cannula</td>
<td></td>
<td>RESITE THE CANNULA</td>
</tr>
<tr>
<td>- Induration</td>
<td></td>
<td>RESITE THE CANNULA</td>
</tr>
<tr>
<td>- Palpable venous cord</td>
<td></td>
<td>RESITE THE CANNULA</td>
</tr>
<tr>
<td>- Pyrexia</td>
<td></td>
<td>RESITE THE CANNULA</td>
</tr>
</tbody>
</table>

### Appendix 5 (g) Venepuncture Problem Solving Prevention and Resolution (source taken from Dougherty & Lister 2015)

<table>
<thead>
<tr>
<th>Problem</th>
<th>Cause</th>
<th>Prevention</th>
<th>Action Suggested</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pain</td>
<td>Use of vein in sensitive area (e.g. wrist).</td>
<td>Avoid using veins in sensitive areas wherever possible. Use local anaesthetic cream.</td>
<td>Complete procedure as quickly as possible.</td>
</tr>
<tr>
<td>Anxiety</td>
<td>Previous trauma. Fear of needles.</td>
<td>Minimize the risk of a traumatic venepuncture. Use all methods available to ensure successful venepuncture.</td>
<td>Approach patient in a calm and confident manner. Listen to the patient’s fears and explain what the procedure involves. Offer patient opportunity to lie down. Suggest use of local anaesthetic cream (Lavery and Ingram). All of the above and perhaps referral to a psychologist if fear is of phobic proportions.</td>
</tr>
<tr>
<td>Limited venous access</td>
<td>Repeated use of same veins.</td>
<td>Use alternative sites if possible. Ensure the room is not cold. Ensure correct device and technique are used.</td>
<td>Do not attempt the procedure unless experienced. Put patient’s arm in warm water. Apply glycerol trinitrate patch. May be necessary to rehydrate patient prior to venepuncture. Do not use these veins as venepuncture will be unsuccessful.</td>
</tr>
<tr>
<td>Needle inoculation of or contamination to practitioner</td>
<td>Unsafe practice. Incorrect disposal of sharps.</td>
<td>Maintain safe practice. Activate safety device. Ensure sharps are disposed of immediately and safely.</td>
<td>Follow accident procedure for sharps injury, for example make site bleed and apply a waterproof dressing. Report and document. An injection of hepatitis B immunoglobulin or triple therapy may be required.</td>
</tr>
<tr>
<td>Accidental blood spillage</td>
<td>Damaged/faulty equipment. Reverse vacuum.</td>
<td>Check equipment prior to use. Use vacuumed plastic blood collection system. Remove blood tube from plastic tube holder before removing needle.</td>
<td>Report within hospital and/or MHRA. Ensure blood is handled and transported correctly.</td>
</tr>
<tr>
<td>Problem</td>
<td>Cause</td>
<td>Prevention</td>
<td>Action Suggested</td>
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<tr>
<td>Missed vein</td>
<td>Inadequate anchoring. Poor vein selection. Wrong positioning. Lack of concentration. Poor lighting. Difficult venous access</td>
<td>Ensure that only properly trained staff perform venepuncture or that those who are training are supervised. Ensure the environment is well lit.</td>
<td>Repalpate, withdraw the needle slightly and realign it, providing the patient is not feeling any discomfort. Ensure all learners are supervised. If the patient is feeling pain, then the needle should be removed immediately. Ask experienced colleague to perform the procedure.</td>
</tr>
<tr>
<td>Spurt of blood on entry</td>
<td>Bevel tip of needle enters the vein before entire bevel is under the skin; usually occurs when the vein is very superficial.</td>
<td></td>
<td>Reassure the patient. Wipe blood away on removal of needle.</td>
</tr>
<tr>
<td>Blood stops flowing</td>
<td>Through puncture: needle inserted too far. Contact with valves. Venous spasm. Vein collapse. Small vein. Poor blood flow.</td>
<td>Correct angle. Palpate to locate. Results from mechanical irritation and cannot be prevented. Use veins with large lumen. Use a smaller device. Avoid use of small veins wherever possible. Use veins with large lumens.</td>
<td>Draw back the needle, but if bruising is evident, then remove the needle immediately and apply pressure. Withdraw needle slightly to move tip away from valve. Gently massage above the vein or apply heat. Release tourniquet, allow veins to refill and retighten tourniquet. May require another venepuncture. Apply heat above vein.</td>
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### Appendix 5 (h): PIVC Problem Solving Prevention and Resolution (source taken from Dougherty & Lister 2015)

<table>
<thead>
<tr>
<th>Problem</th>
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</thead>
<tbody>
<tr>
<td>Anxious patient</td>
<td>Previous traumatic experiences. Fear of needles or blood.Ignorance about what the procedure involves.</td>
<td>Approach the patient in a calm and confident manner. Listen to the patient’s previous experiences and involve them in site selection. Offer a local anaesthetic (by gel or injection). Explain what the procedure involves and show them the equipment if appropriate. Offer the patient the opportunity to lie down or recline during the procedure. Use all methods of improving venous dilation to ensure success on the first attempt.</td>
<td>Refer the patient for psychological support if anxiety and fear are of phobic proportions. It usually takes a few weeks to help a patient manage needle phobia.</td>
</tr>
<tr>
<td>Difficulty in locating a suitable vein</td>
<td>Excessive previous use. Shock or dehydration. Anxiety. Fragile, thready veins, for example in the elderly or in patients on anticoagulant therapy. Thrombosed veins as a result of treatment, for example cytotoxic therapy.</td>
<td>Alternate sites wherever possible to avoid overuse of certain veins. Use the methods described above to reduce anxiety.</td>
<td>Reassure the patient. Use all methods of improving venous access before attempting the procedure, for example use warm water/GTN to encourage venous dilation or vein illumination/ultrasound devices. Assess patient using an assessment tool to ascertain degree of difficulty and refer for CVAD if necessary. Do not attempt the procedure unless experienced.</td>
</tr>
<tr>
<td>Missing the vein on insertion of the cannula</td>
<td>Inadequate anchoring. Collapse of the vein. Incorrect position of practitioner or patient. Inadequate palpation. Poor vein choice. Lack of concentration. Failure to penetrate the vein properly due to incorrect insertion angle.</td>
<td>Ensure good position and lighting. Better preparation and concentration. Use correct technique and accurate vein selection.</td>
<td>Withdraw the needle and manoeuvre gently to realign it and correct the angle of insertion. Check during manoeuvring that the patient is not feeling any pain. If the patient complains of pain, remove the needle. If unsuccessful then remove the needle. Where necessary, pass to a colleague with more experience.</td>
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<tr>
<td>Blood flashback seen and then stops</td>
<td>Venospasm. Bevel of needle up against a valve. Penetration of the posterior vein wall by the device. Possible vein collapse.</td>
<td>Try to locate valves prior to insertion and insert the device just above the valve. Carefully level off once in the vein to prevent penetration of posterior wall. Use a good angle of approach to the vein to prevent through puncture.</td>
<td>Release and tighten the tourniquet. Gently stroke the vein above the needle to relieve venous spasm. Withdraw the needle slightly to move the bevel away from the valve. If the vein wall is penetrated, remove the device.</td>
</tr>
<tr>
<td>Difficulty in advancing the cannula</td>
<td>Releasing the tourniquet too soon, causing the vein to collapse. Removing the stylet too far and being unable to advance the cannula which is now no longer rigid enough to be advanced. Encountering a valve. Not releasing the cannula from the needle prior to insertion according to manufacturer’s instructions. Poor anchoring or stretching of the skin.</td>
<td>Ensure the tourniquet remains sufficiently tight until insertion is completed. Ensure the cannula is released from the stylet prior to insertion, to allow for smooth advancement. Ensure that a sufficient length of the cannula is inserted into the vein before stylet withdrawal. Use good technique. Assess the vein accurately, observing for valves, and avoid them where possible.</td>
<td>In the event of early stylet removal or encountering a valve, connect a syringe of sodium chloride 0.9%, flush the cannula and advance at the same time in an effort to ‘float’ the device into the vein. Tighten the tourniquet and wait for vein to refill.</td>
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<tr>
<td>Difficulty in flushing once the cannula is in situ</td>
<td>Sometimes, the cannula has been successfully inserted, but on checking patency by flushing, the practitioner has difficulty because: • the cannula tip is up against the valve • the cannula has pierced the posterior wall of the vein • the cannula tip is resting on the wall of the vein • there is an occlusion.</td>
<td>Avoid areas along the vein where there may be valves. Ensure careful insertion to prevent puncturing the posterior wall of the vein.</td>
<td>Withdraw the cannula slightly to move it away from the vein wall or valve and attempt to flush. If the vein wall is pierced and any swelling is observed, remove the cannula. Attempt to withdraw the clot and clear the occlusion.</td>
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