PERIPHERAL VENOUS CANNULATION IN CHILDREN AND YOUNG PEOPLE

A WORKBOOK TO ASSIST PRACTITIONERS IN DEVELOPING COMPETENCE
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How to use this workbook
The workbook has its basis in some of the key learning outcomes described in the document *Peripheral intravenous cannulation in children and young people: a competency framework* (Royal College of Nursing, 2005). In each section there is a brief introduction to the issues followed by self-directed activities for the student to undertake.

### Introduction

This workbook should assist practitioners in developing the knowledge that underpins safe practice in performing peripheral intravenous cannulation in children and young people. It should be used in conjunction with the document *Peripheral venous cannulation in children and young people: a competency framework* (RCN, 2005), and form part of a programme of learning.

### Age groups

In view of the considerable differences between children of varying ages we recommend practitioners develop their competence within specific age bands according to their area of practice - 0-1 year, 1-5 years, 5 years and above.

### Aims and objectives

- To assist practitioners to develop the underpinning knowledge to perform peripheral venous cannulation in children and young people competently.
- To assist practitioners in identifying gaps in their knowledge where further study is needed.
- Facilitate educators in assessing knowledge and competence.

### PROFESSIONAL AND LEGAL ISSUES
The ability of a nurse to insert a peripheral venous cannula is, in many circumstances, beneficial to the patient. It can result in care being less fragmented and treatment given in a timely manner.

Before training to perform this enhanced role you must ensure that other aspects of the care you give to children and young people will not be compromised. The Code of Professional Conduct (Nursing and Midwifery Council, 2004), Guidelines for Records and Record-keeping (NMC, 2002) and your trust’s policies and procedures will assist you in understanding and exercising your professional accountability as you develop your skills in peripheral venous cannulation.

**Activity 1**

Read the following documents –
- Code of Professional Conduct (NMC, 2004)
- Guidelines for Records and Record-keeping (NMC, 2002)
- Your trust’s policy for peripheral intravenous cannulation.

What do you understand by the terms “competence” and “accountability” in nursing?

What legal, professional and employer issues do you need to consider before inserting a peripheral intravenous cannula in a child or young person.

**Gaining consent**

Any informed and competent person can authorise a medical procedure once the implications, side effects and alternatives have been appropriately explained. The age of the patient is not necessarily a major factor for informed consent (BMA\(^1\), 2001). If a child is competent to give consent, you should seek consent directly from them (DH\(^2\), 2001b). It should not be assumed that children with learning disabilities are not competent to make decisions; many children will be competent if information is presented in an appropriate way (DH, 2001b). In most situations it is desirable to have the parent’s consent in addition to the child’s consent.

Consent can be verbal, written or implied by the child’s actions, such as holding out an arm ready for intravenous medicines to be given. Children may sometimes refuse a treatment because of anxieties over pain during the procedure, the side effects of the medicines or concern that the needle may prick them.

Genuine refusal of treatment is based on awareness of the implications (BMA, 2001), rather than short term discomfort. Where the refusal appears consistent, valid and informed, but would be likely to result in serious and

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\(^1\) British Medical Association  
\(^2\) Department of Health
avoidable damage to the young person’s health, legal advice should be sought (BMA, 2001). It is also important to think about the ethical implications – which course of action will cause the least harm and the most benefit for the child.

For a child to be able to consent to a treatment, he or she must be allowed to participate in decision making. Encouraging children to make decisions by giving them information and explanations, and respecting their thoughts takes more time than just telling them what’s going to happen, and the time factor is often used as an excuse for not adequately preparing children. However, the procedure itself may take longer and cause more distress if the child is not prepared, and their wishes have not been taken into account (Runeson et al., 2001).

You should explain to the child and carer why the medicine needs to given. Ensure verbal or implied consent has been given. The Oxford Reference Dictionary (1986) defines consent as “to express willingness or agree (to), to give permission, voluntary agreement”. Consent must be given willingly, without duress, force or fraud (Dimond, 1996).

For children to willingly allow someone to do something uncomfortable or painful to them, they must be able to control their anxiety, and trust the person performing the procedure. Preparing children for procedures and telling them the truth decreases their anxiety (Price, 1995). Conversely, withholding information regarding illness and treatment does not protect the child as they tend to come to conclusions on their own (Perry, 1994). This can be more frightening than reality (Action for Sick Children, 1994). In order to prepare a child for a procedure, they must be given honest factual information about the procedure so that they have an understanding of what will happen to them, and what their role is.

Children younger than eight years of age can understand and make logical decisions about life-changing therapy (Alderson & Montgomery, 1996). In keeping with the philosophy of partnership in decision making with the child, and in encouraging their developing autonomy, the child should be informed of treatment plans, and his or her decisions should be taken seriously (Brykczynska 1987). ‘Even where younger children do not have the required understanding, they should be provided with as much information as possible and their wishes ascertained and taken into account’ (DH, 1991).
Activity 2

Think about a child in your care who needs insertion of a peripheral venous cannula.

What steps would you take to confirm the child and parent were giving informed consent to this procedure?

How would your record this?

PREPARING SELF, CHILD & FAMILY

Play and distraction

‘It is perfectly normal for children to dislike needles (many adults don’t like them either)’ (Action for Sick Children, 1994)

Adequate preparation can assist the child and family to cope with peripheral intravenous cannula insertion. Generally, younger children respond to painful procedures with more distress than older children (Broome, 1990). They perceive pain as a physical experience and need parents and health care professionals to help them to cope by providing distraction and topical analgesia. Older children, usually from school age, have some understanding of the reasons for a procedure, greater physical control and are able to develop psychological coping mechanisms (Twycross, 1998).

‘If a procedure is painful a truthful explanation is essential. Fears should be acknowledged and coping techniques identified, so that the child is given the confidence to deal with the procedure.’ (DH, 2003a)

‘Where procedures are planned, and pain can be predicted, the opportunity should be taken to prepare children through play and education, to plan pain relief for use during the procedure. The use of psychological therapies, including distraction, coping skills and cognitive-behavioural approaches, provides some benefit.’ (DH, 2003a)

Activity 3

Make an appointment to meet with a Hospital Play Specialist.

Ask her/him to tell you about their role in preparing children for cannulation.

How would you assess the need for assistance from a play specialist?
Pain relief

Other than in emergency situations where time is important, local anaesthetic cream should be offered to all children and young people. Ametop gel and Emla cream are two preparations providing local anaesthesia. They act by causing a reversible block to conduction along the nerve fibres. Both should be applied in accordance with the manufacturer’s instructions.

Emla is not licensed for use in children under 1 year, whereas Ametop is licensed for use in children over who are 1 month older than their expected date for delivery.

For both Emla cream and Ametop gel a thick layer should be applied to intact skin and covered with an occlusive dressing, preferably by the person performing the procedure in order that the appropriate sites can be identified. Side effects can include erythema, itching and oedema of the site.

Emla cream should be applied at least 60 minutes before the cannula is inserted. It is effective for up to 5 hours, but this only lasts for 10 - 20 minutes after removing the cream.

Ametop gel should be applied 30 minutes before anaesthesia is required for venepuncture. It must be removed after 45 minutes, although its effect will last for 4 - 6 hours.

Vein, site and device selection

Cannulae that are sited and cared for correctly last longer, are safer and more comfortable for the child. The risks of phlebitis and extravasation can be reduced if the correct procedure is used.

Cannulation ideally requires a long straight healthy vein that is full and bouncy, and rapidly fills after compression.

The vein should feel soft and bouncy when the tourniquet is tightened and equally should not be as palpable when the tourniquet is released. Veins are not always visible, particularly in babies. However ensuring the patient is warm and stretching the skin upwards can often help when trying to identify veins. It is always worthwhile taking time to assess all potential sites before carrying out the procedure as this may reduce the number of attempts required.

Areas of infection or damage should be avoided, for patient comfort and cannula survival. Bony prominences should also be avoided. The procedure is more difficult if the vein is bruised from previous attempts and should only be performed in the bruised area if the vein can be palpated.

Due to their superior blood flow, the veins in the upper limb are more suitable for cannulation than the lower limb. Many patients prefer to use the hand veins in preference to the antecubital fossa, as a splint applied to the elbow
can be uncomfortable. Suitable veins for cannulation are often found on the forearm, an area that is frequently overlooked, and as splinting is unnecessary in this area, it is quite comfortable for the patient. Veins of the lower extremities should be considered when inserting a peripheral cannula into a baby, in particular the great saphenous vein whose size and position is advantageous. However, it should be avoided where possible in older children due to the increased risk of thrombi forming and migrating.

Once a vein has been identified the cannula or device can then be chosen. Non-winged cannulae are preferable in children due to the increased risk of pressure areas forming under the wings. The size of the device is also important and should be decided according to the size of the vein i.e. the cannula should fit in the vein, but also allow a good blood flow around the outside of the cannula to reduce the risk of complications.

In order to prolong cannula survival time, promote patient comfort and prevent complications, it is important to limit movement of the cannula within the vein and maintain asepsis. The cannula should be connected to an extension tube which allows remote access without movement of the cannula, e.g. T Piece. To minimise the incidence of phlebitis, the use of a transparent, sterile, semi-permeable dressing is recommended for cannulae that are expected to remain in place for 24 hours or more. (Campbell H & Carrington M, 1999)

**Other factors affecting vein selection**

It is important to be aware of factors, other than temperature, that can influence venous dilation or constriction as this could help in identifying veins.

- Anxiety can often cause the patient to be tense therefore affecting the tunica interna i.e. muscle layer of the vein, leading to vasoconstriction. This is something that can be overcome with explanations and tailoring the procedure to meet the patient's needs.

- The clinical status of the child or young person can also have a negative effect on the veins for example dehydration and hypovolaemia can make venepuncture difficult.

- Mechanical or chemical irritation can often make the veins go into spasm or constrict. Poor technique may cause the vein to collapse or go into spasm and EMLA cream can often act as a vasoconstrictor.
CHARACTERISTICS OF GOOD AND BAD VEINS IN RELATION TO CANNULATION

<table>
<thead>
<tr>
<th>GOOD VEINS</th>
<th>BAD VEINS</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Soft</td>
<td>• Tortuous/mobile</td>
</tr>
<tr>
<td>• Bouncy</td>
<td>• Sclerosed, fibrosed, thrombosed, hard</td>
</tr>
<tr>
<td>• Refills when depressed</td>
<td>• Inflamed / painful</td>
</tr>
<tr>
<td>• Well supported by subcutaneous fat</td>
<td>• Bruised</td>
</tr>
<tr>
<td>• Visible</td>
<td>• Thin / fragile</td>
</tr>
<tr>
<td>• For cannulation - long straight veins</td>
<td>• Near bony prominences</td>
</tr>
<tr>
<td>• No valves or junctions</td>
<td>• Adjacent to areas of infection</td>
</tr>
<tr>
<td></td>
<td>• Under patches of eczema / other skin rash/conditions (burns, grazes etc)</td>
</tr>
</tbody>
</table>

Activity 4
Revise your knowledge of the anatomy and physiology of blood vessels and circulation
Find a text book describing cannulation in children and young people
Identify the veins used for peripheral venous cannulation and how you would assess the suitability of a child or young person’s veins?

Activity 5
Identify the peripheral intravenous cannulae and dressings commonly used on your ward.
Describe the situations where they are used.
What factors influence the choice of cannula and dressing?
INSERTING THE CANNULA

Restraint

If a child is wriggling and screaming, you can assume they have not consented to the procedure. Restraining a child means forcefully holding them against their will, whereas “holding still is a method of helping children, with their permission, to manage a painful procedure quickly and effectively” (RCN, 2003a). Being restrained can be more distressing for a child than the pain involved in the procedure (Collier & Robinson, 1997).

When the rights of the child are considered it becomes clear that alternatives to restraining should be available and used (RCN, 2003a). Only when the child’s safety and well-being may be compromised by delay should restraining be the preferred option.

Adequate preparation can help the child in keeping still during cannula insertion. This includes explaining the procedure, applying local anaesthetic and using distraction techniques. Keeping the equipment hidden from view as long as possible can also reduce anxiety. Very young children can be held securely, but not too tightly. Wrapping a young child or infant in a light blanket while cuddling and talking to them may be comforting as well as providing effective restraint.

Afterward the child can be offered the chance to discuss events so that they may be able to begin to make sense of what has occurred.

Activity 6

Read the document Restraining, holding still and containing children and young people: guidance for nursing staff (RCN, 2003). You can find this at www.rcn.org.uk

Describe the difference between “restraining” and “holding still”.

What actions would you take to keep a 5 year old still during cannulation?
Troubleshooting

There are many situations where cannulation can prove difficult, even to the experienced practitioner. It is important to recognize when you are experiencing difficulties and to summon assistance from someone else. Your hospital should have a policy outlining the number of failed attempts, usually two or three, that you can have before asking someone else to perform the procedure.

Potential problems include:

**Improper tourniquet placement** – too high/low/loose/tight leading to insufficient engorgement of the vein.

**Failure to release the tourniquet** when the cannula has been inserted may cause bleeding outside the vein.

**A “stop start” approach** – when beginner’s lack confidence. This can injure the vein and cause bruising.

**Inadequate vein stretching** – allowing the cannula to push the vein aside.

**Opposite wall penetration** – may not be immediately obvious. If you suspect this has happened act quickly in an attempt to save the vein. Without removing the tourniquet, retract the cannula slightly until blood flashback appears again indicating the cannula is in the vein lumen. Quickly advance the cannula into the vein and remove the cannula. Vescicant medicines should not be given in these circumstances as extravasation can occur through the puncture vein wall.

**Lack of backflow** – suggests vasospasm. This is common in young patients who are anxious.

**Haematoma or leaking from the insertion site** – a common problem that may require you to stop the procedure. This occurs in infants with small veins.

Occasionally the patient, especially teenagers, and parents may experience light headedness. They may even faint. It is possible that you may be so focused on the procedure that you don’t realise. Even when you are learning, try to check how the child is reacting to the procedure.

**Activity 7**

In your clinical area observe 5 cannulae being inserted by experience practitioners.

Make a note of any difficulties the practitioner experienced during the procedure and the action they took in response to these.
Record-keeping

Record keeping is an essential part of professional practice. When performed well it provides written evidence of the care process, particularly any identified problems and actions taken to address them. Children’s medical records can be kept for up to 25 years. Consequently, they should be a clear, accurate and reliable source of information.

When documenting care the information should be factual and consistent. Black ink should be used and any alterations dated, signed and timed. Your signature should also be clear.

When recording care concerning cannulation you should specifically document:

- the date and time of the procedure
- the type of peripheral venous access device used and serial number.
- site of insertion
- number of attempts
- any problems and actions taken
- type of dressing used
- date and time of removal

Activity 8

Read your trust’s policy or guidance on record-keeping in relation to peripheral intravenous cannulae.

Devise a questionnaire for checking whether the standards are being met.

Use this to audit five sets of patient records.

CANNULA CARE AND REMOVAL

Your hospital should have a policy detailing the frequency with which observations of a peripheral venous cannula site should be made and recorded. Some hospitals have specific forms for this purpose. As a minimum this should include checking the insertion site regularly for signs of redness or swelling. The patient should also be asked to comment.

After inserting a peripheral intravenous cannula, you should ensure the nurse caring for the child or young person has an appropriate care plan and understands any specific care needs resulting from the procedure.

Cannulation can result in inflammation of the vein (phlebitis). Mechanical phlebitis can be caused by trauma or irritation from the cannula, particularly if
it is not secured effectively. It can be minimised by avoiding cannulation over bony prominences and joints and applying a stabilising dressing. **Chemical phlebitis** is caused by medicines or infusions.

The risk of infection leading to sepsis can be reduced by ensuring good hand hygiene; always using gloves; maintaining asepsis and using alcohol wipes to clean the site. The cannula should be removed if there are any signs of infection or inflammation.

Removing the cannula can be painful and some children can be distressed by this. Preparation is important and gaining the assistance of the child in removing tape from the site can be helpful. After turning off the infusion, remove the tape, pull the cannula out of the vein and exert firm pressure at the site until any bleeding stops. (Pressure on the cannula during removal is painful and should be avoided). To remove transparent dressings, pull opposite edges to loosen the bond. Apply a dry dressing or plaster to the puncture site. (Hockenberry, Wilson, Winkelstein and Kline, 2003). You should then inspect the tip to ensure the cannula is intact.

**Activity 9**

From your previous experience of caring for children with a cannula in place list the factors that would indicate a peripheral venous cannula should be removed.

Find an article on cannulation and check your list.

How long does your department or ward recommend a cannula should remain in place?

**RISKS AND HAZARDS**

Like many other clinical interventions, there are risks and hazards associated with peripheral intravenous cannulation. You have a role to play in preventing complications and minimizing risks to the patient, others in the vicinity and yourself.

Those that occur most frequently include the following:

**Infection** – this is risk if an aseptic technique is not rigorously adhered to during siting of the cannula. It can be prevented by washing and drying your hands thoroughly and by cleansing and drying the proposed cannula site.
Activity 10
Find the Wipe it Out campaign on the Royal College of Nursing website rcn.org.uk.
Read the section on hand hygiene and check your hand-washing technique.

Accidental arterial puncture – this can result from a poor cannulation technique causing pain and spasm. If the artery has been punctured the blood will be brighter, fast flowing and may spurt. You should remove the cannula immediately, apply pressure for 5 minutes, assess and dress the site and observe the limb frequently.

Blood spillage – You should follow your hospitals’ policy.

Needlestick injuries – can be prevented by correctly disposing of sharps at the point of source and never re-sheathing a needle.

Activity 11
Read chapters 3 and 9 of the document Good Practice in Infection Prevention and Control (RCN, 2005). You can find it at www.rcn.org.uk/publications

What precautions should you take to prevent being exposed to blood borne infections when inserting a peripheral intravenous cannula?

Risk Management
Risk is the chance of an untoward event happening that may either cause harm or have an impact on the trust’s patients, staff, contractors, visitors (including the general public), assets and/or reputation. Clinical risk management is an approach to improving the safe delivery of healthcare by:

- Placing special emphasis on identifying circumstances that put patients at risk of harm
- Acting to prevent or control those risks

All medical, nursing and allied health professionals have a responsibility for assessing risks related to the clinical care they provide. They must ensure children, young people and their families are given sufficient information to make
informed choices regarding their treatment and any potential risks or side-effects. They must ensure records meet the standards of the relevant professional body.

You should report all adverse/serious or near miss incidents in accordance with your hospital policy. You must ensure immediate action is taken or instigated, if required, to ensure patient/visitor/staff safety.

FURTHER LEARNING

Your expertise in peripheral intravenous cannulation in children and young people will develop gradually and you will become more confident in your practice. From your learning so far, including any supervised practice you have undertaken, you should have a good understanding of the knowledge and skills you will need to practice safely in this area.

Activity 11

Reflect on your learning and knowledge so far and undertake the following;

Identify the areas where you feel your knowledge is at a level where you can practice safely.

Identify areas where you need more information and support in developing your knowledge and skill.

Consider what actions you will take to continually develop your skill in peripheral intravenous cannulation.

The RCN fully supports members in raising concerns regarding the care of children and young people, and the protection of their rights as individuals.

If you feel compromised - for example if training provided by your employing organisation is inadequate and you are not getting the help you need - contact RCN Direct on 0845 772 6100 or ring your local RCN Office (contact numbers can be found in your RCN Diary and Members Handbook).
REFERENCES AND FURTHER READING


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Tingle JH (1993) The extended role of the nurse; legal implications, *Care of the Critically Ill*, 9, pp. 30-34.


USEFUL WEBSITES

www.actionforsickchildren.org.uk  Action for Sick Children
www.dfes.gov.uk  Department for Education & Skills
www.dh.gov.uk  Department of Health (England)
www.epic.tvu.ac.uk  Evidence-based practice in Infection Control
www.hse.gov.uk  Health and Safety Executive
www.icna.co.uk  Infection Control Nurses Association
www.npsa.nhs.uk  National Patient Safety Agency
www.nahps.org.uk  National Association of Hospital Play Staff
www.nmc-uk.org  Nursing and Midwifery Council
www.nes.scot.uk  NHS Education for Scotland
www.rcn.org.uk  Royal College of Nursing
www.skillsforhealth.org.uk  Skills for Health
www.rcpch.org.uk  Royal College of Paediatrics and Child Health