

# CORE TRAINING FOR DOCTORS

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# Blood-taking procedures in children

## Introduction

Many aspects of a visit to the hospital may be frightening for young patients. This distress may be the result of stranger anxiety or unfamiliar and sometimes painful procedures. Doctors can help children with coping strategies to alleviate this distress, which will not only help with successfully performing procedures, but also improve their experience of medical care, particularly in the future (Eldridge and Kennedy, 2010).

This article discusses how to approach blood-taking procedures in children and young people, particularly venous cannulation and capillary blood sampling.

For children who may not be able to understand the reasons for blood tests and/or control their fears, venepuncture may be a terrifying experience with long-lasting psychological implications. It is important to carefully prepare children for procedures, particularly children with complex health needs or disabilities who need repeated exposure to health-care interventions so that they do not become procedure phobic (Willock et al, 2004).

## Coping with procedures

Younger children perceive pain as a physical experience and are generally unable to develop their own psychological coping mechanisms (Willock et al, 2004). These children need the support of their carers and health professionals to help them cope by providing distraction and comfort. Older children start to have an understanding of the reasons for blood tests and are often able to develop their own coping mechanisms.

Children who are well prepared for health-care interventions display significantly less distress before and during venepuncture than those who have not been prepared (Kolk et al, 2000). Talking

to the child to assess his/her developmental age will help guide your approach in preparing the child for the procedure.

Explain what the procedure will entail – a play specialist can help demonstrate this using dolls and safe medical equipment. Avoid medical jargon (Doellman, 2003), using instead, for example, ‘tight hug’ to describe a tourniquet or ‘plastic straw’ to describe a cannula. Parents and carers will also need information about the procedure and how to support the child, particularly if they themselves are anxious because of previous bad experiences. Having a parent or carer present during the procedure can be an important way of helping children to cope with a procedure (Ross and Ross, 1984).

## Pain relief

A Cochrane review concluded that oral sucrose solution is safe and effective in providing relief for neonates during short painful procedures such as venepuncture and heel lancing (Stevens et al, 2013). Breast-feeding has also been shown to be effective, and no significant difference between the effect of breast-feeding and that of oral sucrose administration has been demonstrated (Carbajal et al, 2003).

Topical anaesthetics such as EMLA (lidocaine 2.5% and prilocaine 2.5%) and Ametop (tetracaine 4%) have been shown to reduce pain associated with needle insertion (Lander et al, 2006). Applying topical anaesthetic in a few suitable places gives you some options. It is usually effective in 30–45 minutes and the anaesthetic effects last for 4–6 hours. Avoid use if there is a history of reaction or skin sensitivity. Make sure the anaesthetic is removed within 1 hour to prevent local irritation.

Ethyl chloride (Cryogestic) is a surface anaesthetic spray which quickly cools the skin, masking the sensation of pain for a few seconds. This is useful in older children, particularly if urgent venepuncture is required, or in children who have a history of reaction to topical anaesthetics.

In rare cases, nitrous oxide can be used as pain relief during blood-taking procedures (Tobias, 2013). The advantages are a rapid onset of beneficial effects and a short

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recovery time. However, it is important to note the side effects of nitrous oxide – commonly it can cause vomiting and dysphoria, but it can also affect vascular tone and myocardial output and should therefore be used with caution in patients with comorbidities.

### Play specialists

The play specialist is a key member of the paediatric multidisciplinary team. They are skilled at coaching a child before and during a procedure using age-appropriate methods. A play specialist might distract a child's focus from a painful procedure using games and toys, videos, music or telling a story. In older children, controlled breathing and guided imagery (providing distraction through enabling a child's imagination) can also be effective. Studies using functional magnetic resonance imaging have shown that distraction can modulate activity in the areas of the brain associated with pain response and anxiety (Valet et al, 2004).

### Venepuncture

Ask an experienced medical professional to supervise you to help you improve your technique.

1. Gather equipment, including gloves and blood bottles (Figure 1). In young children, use specific paediatric blood bottles which require less blood for analysis. Think about the order in which samples should be collected, as some reagents may contaminate other samples
2. With the help of the play specialist, prepare the child and carer for the procedure, using age-appropriate methods (Table 1)

3. Take time to identify a site suitable for venepuncture, to help ensure that you will be successful on the first attempt
4. Clean the site and let it dry
5. Encourage the child to hold still, as this is key to a successful procedure. If necessary, a child may need to be held gently but firmly by an experienced assistant, such as a paediatric nurse, but only after preparing both child and carer
6. Use a butterfly needle or cannula to gain venous access
7. Blood samples can be collected using a syringe or via vacuum blood collection bottles, although a vacuum system may cause smaller veins to collapse, stopping the flow of blood. If the blood flow is slow, it may be more appropriate to collect blood drop by drop directly into blood bottles
8. During the procedure, support the child using age-appropriate methods (Table 1)

9. Once the required blood is collected, remove the needle or secure the cannula in place
10. Apply pressure to the site
11. Praise the child and offer him or her a reward if possible – colourful plasters, certificates and stickers are popular rewards.

### Capillary heel blood sampling

Properly performed, capillary heel blood sampling provides a reliable, minimally intrusive means of obtaining samples from neonates and infants (Folk, 2007). Investigations that are not appropriate for capillary heel sampling are those which need to be collected aseptically (blood cultures) or require a large volume (such as coagulation screens).

Ask an experienced medical professional to supervise you to help you improve your technique.

Figure 1. Examples of blood sampling equipment such as paediatric blood bottles, heel prick and a small bore cannula.

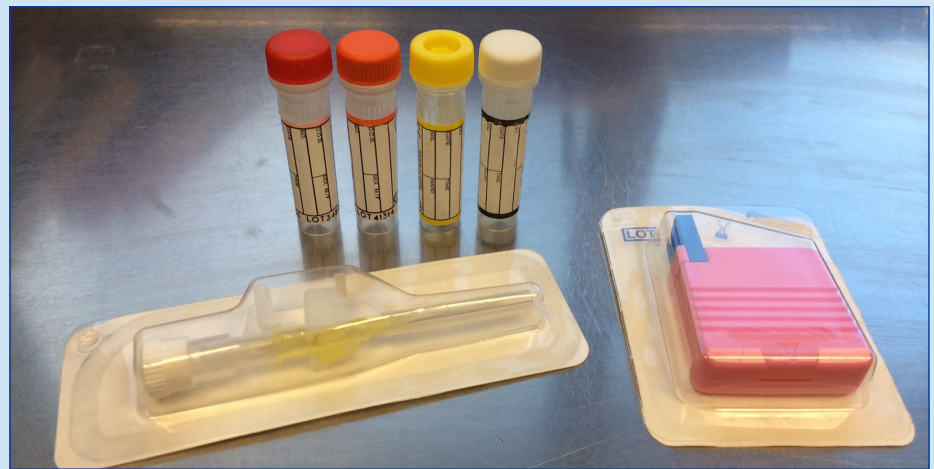


Table 1. Age-appropriate care of the child having blood tests

Developmental age	Preparation	During the procedure	Emotional care
Infants (0–1 year)	If over 3 months old topical anaesthetic	Distraction, swaddling, cuddling, music, giving feed or sucrose	Carer presence, comfort items, such as pacifier dummy or blanket
Toddlers (1–3 years)	Topical anaesthetic, playing with safe medical equipment	Distraction, play, cuddling, music	Carer presence, comfort items, pacifier dummy or toy, simple explanations
School age (4–12 years)	Topical anaesthetic, playing with safe medical equipment, age-appropriate information about reasons for tests, discuss anxieties and explore coping mechanisms	Distraction, play such as blowing bubbles or telling stories, music, guided imagery	Carer presence, encourage choices where possible, encourage participation, simple accurate explanations, positive reinforcement and praise
Adolescent (13–17 years)	Topical anaesthetic, age-appropriate information about reasons for tests, discuss anxieties and exploring coping mechanisms	Distraction, conversation, guided imagery, relaxation techniques	Carer presence if requested, encourage choices where possible, encourage active participation, simple accurate explanations, positive reinforcement and praise

Adapted from Willock et al (2004)

1. Gather equipment, including gloves and blood bottles. Think about the order in which samples should be collected, as some reagents may contaminate other samples
2. Select a suitable sized lancet for heel pricking (small size for premature infant, larger for term infant). Use lancets designed specifically for capillary heel sampling, as the blade slices rather than stabs. This controls the depth of incision, while exposing the capillary bed to provide free flowing blood
3. Swaddle and position the baby, administering sucrose with parental consent
4. Identify a site suitable for heel pricking – not oedematous, injured or infected areas (Figure 2)
5. Clean the site and let it dry
6. Flex the foot with your thumb while holding the calf in the palm of your hand and activate the lancet
7. Wipe away the first drop of blood to prevent platelet aggregation and clot formation
8. Apply gentle pressure to the calf and heel to facilitate blood flow. Excessive pressure can cause unnecessary pain and injury to the infant and also compromise sample results
9. If applicable, use capillary tubes to collect blood for blood gas and bilirubin analysis, holding the tube horizontally to ensure that air bubbles are not introduced, which may alter results
10. Collect free-flowing drops of blood, avoiding repeated 'scooping' of blood

as small clots can form in blood on the skin, which can stimulate platelet aggregation and alter lab results

11. Ensure that you fill bottles to the correct volume – your local laboratories will indicate minimum volumes required for analysis
12. If the blood stops flowing, wipe the site to remove any clots, ensure time for capillary refill, and then reposition and reapply pressure. If blood does not flow, choose another site and repeat the procedure
13. After completing blood sampling, apply pressure to the incision site with a cotton ball or gauze.

### Emergency venous access

In an emergency, it may not be appropriate to attempt peripheral venous access. If venous access is difficult or emergency central venous access is required, it may be more appropriate to insert an interosseous needle or umbilical venous catheter. These procedures should only be performed by experienced medical professionals and are beyond the scope of this article.

### Conclusions

Blood-taking procedures can be distressing for children and young people. A multidisciplinary paediatric team can help children use coping strategies to allow a successful procedure while improving the child's experience of medical care.

It is important that note that even with effective support for painful procedures,

blood-taking can still be frightening for children and therefore should only be performed if the results are likely to alter management. **BJHM**

*Conflict of interest: none.*

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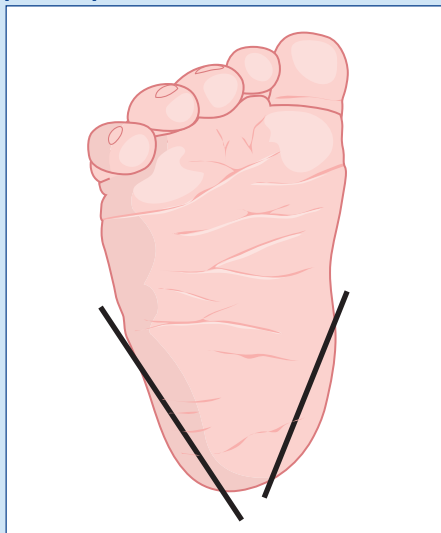
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**Figure 2. Safe incision areas are the sides of the plantar aspects of the heels.**



### TOP TIPS

- Before you start, briefly assess the developmental age of your patient, as this will help guide how you prepare and support the patient during the procedure.
- Make the most of the skills of the paediatric multidisciplinary team, particularly the play specialists.
- Ask an experienced medical professional to observe and support you through the procedure.
- When performing capillary heel blood sampling, use the sides of the plantar aspects of the heels.

### KEY POINTS

- Support children during blood-taking procedures in order to help improve their experience of medical care.
- Prepare the child and carer for the procedure using age-appropriate methods – pain relief and distraction are effective ways of supporting children throughout the procedure.
- Review the clinical indication for the blood test – only perform blood tests in children and young people if the results will alter management.