Chapter 13: Diagnostic tests

13.1 Venepuncture

Essential equipment

- Personal protective equipment
- Clean tray or receiver
- Disposable tourniquet or sphygmomanometer and cuff
- 21 swg multiple-sample safety needle or 21/23 swg winged safety infusion device and multiple-sample Luer adapter
- Plastic tube holder, standard
- Appropriate vacuumed specimen tubes

- Swab with chlorhexidine 2% in 70% alcohol, or isopropyl alcohol 70%
- Low-linting gauze swabs
- Sterile adhesive plaster or hypoallergenic tape
- Specimen request forms
- Sharps bin

Pre-procedure

Action

1. Introduce yourself to the patient, explain and discuss the procedure with them, and gain their consent to proceed.

   Rationale
   To ensure that the patient feels at ease, understands the procedure and gives their valid consent (NMC [165]

(https://www.rmmonline.co.uk/manual/c13-bibl-0001#c13-bib-0165), ***C***).

2. Check that the identity of the patient matches the details on the request form by asking for their full name and date of birth and checking their identification bracelet (where appropriate). If the patient is unable to communicate then check the identity band for full name, date of birth and hospital number.

   Rationale
   To ensure the sample is taken from the correct patient (NPSA ***[166]*** (https://www.rmmonline.co.uk/manual/c13-bibl-0001#c13-bib-0166), ***C***; *RCN* ***[202]*** (https://www.rmmonline.co.uk/manual/c13-bibl-0001#c13-bib-0204), ***C***).

3. Allow the patient to ask questions and discuss any problems that have arisen previously.

   Rationale
   Anxiety results in vasoconstriction; therefore, a patient who is relaxed will have dilated veins, making access easier. ***E***

4. Consult the patient as to any preferences and problems that may have been experienced at previous venepunctures.

   Rationale
   To involve the patient in the treatment, and to acquaint the nurse fully with the patient's previous venous history and identify any changes in clinical status (e.g. mastectomy), as both may influence vein choice (Dougherty ***[53]***

(https://www.rmmonline.co.uk/manual/c13-bibl-0001#c13-bib-0054), ***E***).

5. Check whether the patient has any allergies.

   Rationale
   To prevent allergic reactions, for example to latex or chlorhexidine (McCall and Tankersley ***[138]*** *(https://www.rmmonline.co.uk/manual/c13-bibl-0001#c13-bib-0138)*, ***E***; *MHRA* ***[145]*** *(https://www.rmmonline.co.uk/manual/c13-bibl-0001#c13-bib-0145)*, ***C***).

6. Assemble the equipment necessary for venepuncture.

   Rationale
   To ensure that time is not wasted and that the procedure goes smoothly without unnecessary interruptions. ***E***

7. Wash hands using bactericidal soap and water or alcohol-based handrub, and dry before commencement.

   Rationale
   To minimize risk of infection (NHS England and NHSI ***[155]*** *(https://www.rmmonline.co.uk/manual/c13-bibl-0001#c13-bib-0155),* ***C****).*

8. Check own hands for any visibly broken skin, and cover any such areas with a waterproof dressing.

   Rationale
   To minimize the risk of contamination to the practitioner (DH ***[46]*** *(https://www.rmmonline.co.uk/manual/c13-bibl-0001#c13-bib-0047),* ***C****; Fraise and Bradley* ***[62]***

(https://www.rmmonline.co.uk/manual/c13-bibl-0001#c13-bib-0063), ***E***).

9. Check all packaging before opening and preparing the equipment on the chosen clean receptacle.

   Rationale
   To maintain asepsis throughout and check that no equipment is damaged. ***E***

Procedure

10. Take all the equipment to the patient, exhibiting a confident manner.

    Rationale
    To help the patient feel more at ease with the procedure. ***E***

11. Support the chosen limb on a pillow.

    Rationale
    To ensure the patient's comfort and facilitate venous access. ***E***

12. Apply a tourniquet to the arm on the chosen side, making sure it does not obstruct arterial flow. If the radial pulse cannot be palpated then the tourniquet is too tight (Weinstein and Hagle **[252]** (https://www.rmmonline.co.uk/manual/c13-bibl-0001#c13-bib-0254)). The position of the tourniquet may be varied; for example, if a vein in the hand is to be used, the tourniquet may be placed on the forearm.

A sphygmomanometer cuff may be used as an alternative.

Rationale
To dilate the veins by obstructing the venous return (Dougherty ***[53]*** *(https://www.rmmonline.co.uk/manual/c13-bibl-0001#c13-bib-0054)*, ***E****).*

To increase the prominence of the veins. ***E***

To slow down blood flow and therefore distend the veins (Garza and Becan-McBride ***[66]*** *(https://www.rmmonline.co.uk/manual/c13-bibl-0001#c13-bib-0067)*, ***R****).*

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13. If the tourniquet does not improve venous access, the following methods can be used. If venous access appears possible, skip to step 19.

Either:

The arm may be placed in a dependent position. The patient may be asked to clench their fist.

Or:

The veins may be tapped gently or stroked.

Or:

Remove the tourniquet and apply moist heat (e.g. a warm compress), soak the limb in warm water or, with prescription, apply glyceryl trinitrate ointment/patch (Weinstein and Hagle **[252]** (https://www.rmmonline.co.uk/manual/c13-bibl-0001#c13-bib-0254)).

Rationale

*To improve venous access (Dougherty **[53]** (https://www.rmmonline.co.uk/manual/c13-bibl-0001#c13-bib-0054), **E**).*

14. Select the vein by careful palpation to determine size, depth and condition (**Action figure 13.7** (https://www.rmmonline.co.uk/manual/c13-fea-0003#c13-fig-0001)).

    Rationale
    *To prevent inadvertent insertion of the needle into other anatomical structures (Witt **[263]** (https://www.rmmonline.co.uk/manual/c13-bibl-0001#c13-bib-0265), **E**).*

15. Release the tourniquet.

    Rationale

To ensure patient comfort. ***E***

16. Select the device, based on vein size, site and volume of blood to be taken. Use a 23 swg winged infusion device for small veins, metacarpal or feet veins.

    Rationale
    To reduce damage or trauma to the vein and prevent haemolysis (Dougherty ***[53]*** *(https://www.rmmonline.co.uk/manual/c13-bibl-0001#c13-bib-0054)*, ***E****).*

17. Wash hands with bactericidal soap and water or alcohol-based handrub and allow to dry.

    Rationale

To maintain asepsis and minimize the risk of infection (NHS England and NHSI ***[155]*** *(https://www.rmmonline.co.uk/manual/c13-bibl-0001#c13-bib-0155)*, ***C****)*

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18. Reapply the tourniquet.

Rationale
To dilate the veins by obstructing the venous return (Dougherty ***[53]*** *(https://www.rmmonline.co.uk/manual/c13-bibl-0001#c13-bib-0054)*, ***E****).*

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19. Put on gloves.

Rationale
To prevent possible contamination of the practitioner (NHS England and NHSI ***[155]*** *(https://www.rmmonline.co.uk/manual/c13-bibl-0001#c13-bib-0155)*, ***C****).*

20. Clean the patient's skin carefully for 30 seconds using an appropriate preparation, for example chlorhexidine 2% in 70% alcohol, and allow to dry. Do not repalpate or touch the skin (**Action figure** 13.8 (https://www.rmmonline.co.uk/manual/c13-fea-0003#c13-fig-0002)).

Rationale
To maintain asepsis and minimize the risk of infection (DH ***[46]*** *(https://www.rmmonline.co.uk/manual/c13-bibl-0001#c13-bib-0047)*, ***C***; *Fraise and Bradley* ***[62]*** *(https://www.rmmonline.co.uk/manual/c13-bibl-0001#c13-bib-0063)*, ***E***; *Loveday et al.* ***[128]***

(https://www.rmmonline.co.uk/manual/c13-bibl-0001#c13-bib-0128), ***R***).

21. Remove the cover from the needle and inspect the device carefully.

    Rationale
    To detect faulty equipment, for example bent or barbed needles. If these are present, place them in a safe container, record batch details and return to manufacturer (MHRA ***[144]*** (https://www.rmmonline.co.uk/manual/c13-bibl-0001#c13-bib-0144), ***C***).

22. Anchor the vein by applying manual traction on the skin a few centimetres below the proposed insertion site (**Action figure** 13.9 (https://www.rmmonline.co.uk/m

anual/c13-fea-0003#c13-fig-0004)).

Rationale
To immobilize the vein and to provide counter-tension to the vein, which will facilitate a smoother needle entry (Dougherty ***[53]*** *(https://www.rmmonline.co.uk/manual/c13-bibl-0001#c13-bib-0054)*, ***E****).*

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23. Insert the needle smoothly at an angle of approximately 30°. However, the angle will depend on the size and depth of the vein (**Action figure 13.9** (https://www.rmmonline.co.uk/manual/c13-fea-0003#c13-fig-0004)).

Rationale

To facilitate a successful, pain-free venepuncture. ***E***

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24. Reduce the angle of descent of the needle as soon as a flashback of blood is seen in the tubing of a winged infusion device or when puncture of the vein wall is felt.

Rationale
To prevent advancing too far through the vein wall and causing damage to the vessel (Dougherty ***[53]*** *(https://www.rmmonline.co.uk/manual/c13-bibl-0001#c13-bib-0054),* ***E****).*

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25. Slightly advance the needle into the vein, if possible.

Rationale

To stabilize the device within the vein and prevent it becoming dislodged during withdrawal of blood. ***E***

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26. Do not exert any pressure on the needle.

Rationale
To prevent a puncture occurring through the vein wall. ***E***

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27. Withdraw the required amount of blood using a vacuumed blood collection system (**Action figure 13.10** (https://www.rmmonline.co.uk/manual/c13-fea-0003#c13-fig-0005)). Collect blood samples in the draw order shown in Table **13.4** (https://www.rmmonline.co.uk/m

anual/c13-sec-0072#c13-tbl-0004).

Rationale
*To minimize the risk of transferring additives from one tube to another and bacterial contamination of blood cultures (manufacturer's guidelines, **C**).*

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28. Release the tourniquet. This may be necessary at the beginning of sampling as inaccurate measurements may be caused by haemostasis, for example when taking blood to assess calcium levels.

Rationale
*To decrease the pressure within the vein. **E***

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29. Remove the tube from the plastic tube holder.

Rationale

To prevent blood spillage caused by vacuum in the tube (Hoeltke ***[88]*** *(https://www.rmmonline.co.uk/manual/c13-bibl-0001#c13-bib-0088)*, ***E****).*

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30. Place a low-linting swab over the puncture point.

Rationale

To apply pressure. ***E***

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31. Remove the needle, but do not apply pressure until the needle has been fully removed.

Rationale

To prevent pain on removal and damage to the intima of the vein. ***E***

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32. Activate the safety device and then discard the needle

immediately in a sharps bin.

Rationale
To reduce the risk of accidental needle stick injury (HSE ***[96]*** *(https://www.rmmonline.co.uk/manual/c13-bibl-0001#c13-bib-0097)*, ***C****).*

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33. Apply digital pressure directly over the puncture site. Pressure should be applied until bleeding has ceased; approximately 1 minute or longer may be required if the patient's current disease or treatment interferes with clotting mechanisms.

Rationale
To stop leakage and haematoma formation. To preserve the vein by preventing bruising or haematoma formation. ***E***

34. The patient may apply pressure with a finger but should be discouraged from bending the arm if a vein in the antecubital fossa is used.

    Rationale
    To prevent leakage and haematoma formation (McCall and Tankersley ***[138]*** *(https://www.rmmonline.co.uk/manual/c13-bibl-0001#c13-bib-0138)*, ***E****).*

35. Gently invert as guided by the manufacturer's instructions.

    Rationale
    To prevent damage to blood cells and to mix with additives (manufacturer's guidelines, ***C****).*

36. Label the bottles with the relevant details at the

patient's side. Never pre-label bottles.

Rationale
To ensure that the specimens from the right patient are delivered to the laboratory, the requested tests are performed and the results are returned to the correct patient's records (NMC ***[165]*** *(https://www.rmmonline.co.uk/manual/c13-bibl-0001#c13-bib-0165)*, ***C***; *NPSA* ***[166]*** *(https://www.rmmonline.co.uk/manual/c13-bibl-0001#c13-bib-0166)*, ***C****).*

Post-procedure

37. Inspect the puncture point before applying a dressing.

Rationale
To check that the puncture point has sealed. ***E***

38. Confirm whether the patient is allergic to adhesive plaster.

Rationale
To prevent an allergic skin reaction. ***E***

39. Apply an adhesive plaster or alternative dressing.

Rationale
To cover the puncture and prevent leakage or contamination. ***E***

40. Ensure that the patient is comfortable.

Rationale
To ascertain whether the patient wishes to rest before leaving (if an outpatient) or whether any other measures need to be taken. ***E***

41. Remove gloves and discard waste and sharps according to local policy.

Rationale
To ensure safe disposal and avoid laceration or other injury of staff (DH ***[48]*** *(https://www.rmmonline.co.uk/manual/c13-bibl-0001#c13-bib-0049)*, ***C***; *Fraise and Bradley* ***[62]*** *(https://www.rmmonline.co.uk/manual/c13-bibl-0001#c13-bib-0063)*, ***E***).

42. Follow hospital procedure for collection and transportation of specimens to the laboratory.

Rationale
To make sure that specimens reach their intended destination. ***E***

43. Document the procedure in the patient's records.

Rationale

To ensure timely and accurate record keeping (NMC ***[165]*** *(https://www.rmmonline.co.uk/manual/c13-bibl-0001#c13-bib-0165)*, ***C****).*

(https://www.rmmonline.co.uk/illustration/c13-fig-0001)

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Download (https://www.rmmonline.co.uk/media/manual/c13/image_n/c13uf002.jpg@B?save=true&fileName=c13_c13uf002)

Figure 13.7 Palpating the vein.

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Figure 13.8 Cleaning the skin.

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Download (https://www.rmmonline.co.uk/media/manual/c13/image_n/c13uf004.jpg@B?save=true&fileName=c13_c13uf004)

Figure 13.9 Anchoring the skin.

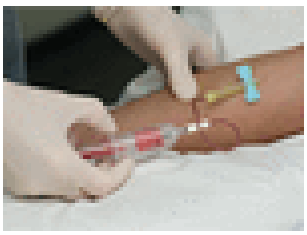

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Figure 13.10 Attaching the sample bottle to the holder.

(https://www.rmmonline.co.uk/illustration/c13-fig-0001)

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Figure 13.7 Palpating the vein.

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Figure 13.8 Cleaning the skin.

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Figure 13.9 Anchoring the skin.

(https://www.rmmonline.co.uk/illustration/c13-fig-0005)

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Download (https://www.rmmonline.co.uk/media/manual/c13/image_n/c13uf005.jpg@B?save=true&fileName=c13_c13uf005)

Figure 13.10 Attaching the sample bottle to the holder.