Tips for finding veins

• It is usually worth while asking the patient “Do you have a good vein?” They may have had plenty of experience of having cannulation attempts and could be aware of where operators tend to have success or difficulty

• Tight tourniquet
  – The purpose of the tourniquet is to impede the flow of blood out of the limb. Since it is unlikely that it will be tight enough to stop arterial inflow, the net result is increased volume of blood in the venous system which expands the veins

• Make sure the patient’s arm is below the level of the heart (reduces ease of venous return and thus distends vein)

• Clench and unclench fist. Muscular activity increases demand for blood, increasing arterial inflow and hence venous distention.

• Usually visible as a blue line, but sometimes only palpable. You will need to become adept at cannulating veins that you cannot actually see. It is useful to remember that veins are bouncy to the feel, tendons are hard.

• Rub skin where you think vein is
  – why can this help to make the vein more visible or palpable?

• Bathing hands in warm water can help if all else fails

• Applying the tourniquet for a minute and then letting it down, waiting about 30 secs and then re-applying it also helps distend poor veins.

Difficult veins

• Can become very fragile in old age – liable to “blow” leading to extravasation and haematoma. Cannulation works as a safe technique because the vein wall forms a tight seal around the needle shaft as it pierces it. Elderly veins can be very depleted in connective tissue and smooth muscle meaning they are less able to form a tight seal, causing leaking or even rupture. Use finest bore cannula possible.
Chemotherapy causes veins to thin, sclerose (harden) and become hard to find. Check with patient to determine where success is most likely.

**Cannulation – general procedure**

- Identify correct patient.
- Explain procedure and obtain verbal consent
- Obtain any relevant medical history
  - History of reaction. If you intend to inject something into the patient such as a contrast agent or radiopharmaceutical and they have had some sort of reaction to the same or similar agent in the past, it is necessary to seek medical advice before proceeding.
  - Axillary lymph node dissection. Patients who have had breast cancer will often have undergone breast surgery with removal of the axillary lymph nodes which is a common site for breast cancer spread. The lymphatic system drains accumulated tissue fluid back to the systemic circulation. Removal of the lymph nodes can severely impede the lymphatic drainage of the limb (which is why these patients often lymphoedema). If the injection you give results in extravasation of the agent, it is likely to be slow to clear from the area, and may cause localised tissue damage.
- Wash and glove hands. It is important to minimise the risk of introducing bacterial or other infection into the bloodstream. Washing hands does not remove all bacteria and it is not necessary to wear sterile gloves for peripheral cannulation, however these precautions reduce the levels of bacterial contamination and consequently the risk to the patient. Gloves also protect the operator from possible blood-borne infectious agents especially viruses such as HIV and Hepatitis B.
- Tourniquet applied. **Why?**
- Identify vein - should be straight proximal to the site of insertion
• Skin cleaned with alcohol
  – allow to dry. Why?
• Apply traction to skin distal to insertion point with thumb. This helps to immobilise the selected vein.
• Introduce needle or cannula at an angle of about 15-30° depending on depth of vein
  – too steep – likely to pass right through vein
  – too shallow – risk subcutaneous needle tip so that it is impossible to withdraw blood sample or injected fluids would collect in the soft tissue around the vein; or vein dissection, where needle tip cuts along wall of vein causing haemorrhaging
• May feel slight pop as vessel wall penetrated
• Should see blood flush back into end of venflon or tubing of butterfly
• If using butterfly immobilise device with tape. If venflon – see below.
• Check with saline injection that the needle tip is properly sited within vessel lumen and freely flushes.

**Thinking point**
Saline is sodium chloride solution at a concentration of 0.9% w/v. What does this mean and why is it used?
Injection procedure for venflon

- Introduce venflon into vein following general principles above.
- When “flashback” of blood is seen in the end of the hub, advance the needle tip a few millimetres more to ensure the needle tip is well into the vein lumen.
- Now advance only plastic cannula off stylet further into vein (hold stylet still) up to hub
- Press on arm proximal to insertion site to block vein and remove stylet (discard into sharps)
- Screw bung onto end
- Check correctly sited with saline
- Apply immobilising dressing to venflon

N.B. the stylet should NEVER be re-introduced into the plastic sheath. This risks the stylet cutting off the sheath tip within the vein and causing a plastic embolus. If the deployment of the venflon fails, remove the entire set and start with a fresh one.

Aseptic technique

Aseptic technique refers to the avoidance of contamination of sterile equipment either by touching or by allowing to come into contact with non-sterile surfaces. All cannulation procedures should be performed aseptically,
and this forms an important part of infection control. Any cannulation equipment such as venflons and butterflys should be taken from unopened and in-date sterile packs. As soon as they are removed from their sterile packaging they can no longer be regarded as truly sterile themselves since air-borne organisms can settle on them. However aseptic technique minimises the likelihood of serious contamination with micro-organisms such as bacteria, viruses or fungi. Any contamination of the equipment that does occur increases the possibility of local or systemic infection with potentially serious implications.

The following are recognised ways of minimising the risk of infection to the patient and operator.

- Wash hands. There is lots of evidence implicating the hands of healthcare workers in the transmission of hospital acquired infections to patients. Washing reduces risk
- Wear gloves. Sterile gloves are not considered necessary for peripheral cannulation techniques. The main benefit of gloves is to the operator by reducing the risk of contamination from blood spillages. There is some loss of tactile sensitivity in the fingers, but this is outweighed by the increased safety of the procedure for the operator.
- Do not touch any part of devices entering patient or connected to syringe. Do not allow to come into contact with non-sterile areas e.g table top. If a cannulation device must be put down after removing from packaging it should be onto the sterile surface such as that provided by an opened “basic pack”.
- Do not bend needle! Unnecessary and contaminates needle shaft. Some operators have become accustomed to bending the needle prior to insertion. The overt contamination of a device which will enter into the patient is completely indefensible.
- Clean area with alcohol wipe. Reduces the level of contamination of the skin surface by bacteria and other organisms.
- Clean up blood spills with wipes suitable for viral decontamination.
- Wash hands after procedure. Reduces risk of contamination spread to you from patient.
Removal of intravenous cannulae

- Place sterile cotton swab over puncture site
- Withdraw needle or venflon smoothly
- Immediately press swab onto puncture site
  - hold for 2-3 minutes to achieve haemostasis
- Check whether bleeding has stopped
  - who might bleed for longer?
- Apply dressing
- Dispose of sharps safely

What are the procedures for needlestick injuries?

Patient aftercare

Before patient leaves your care
- Ask if feeling OK. If not monitor; get medical assistance if they do not recover
- Check puncture site for bleeding or haematoma
- If bleeding or haematoma developing achieve haemostasis by further pressing with cottonwool
Risks in intravenous cannulation

- **Haematoma** – this term refers to the collection of blood outside of the vein in the soft tissues. It may result from cannulation technique that causes trauma to the vessel wall, or inadequate haemostasis after cannula removal. Apart from being unsightly, this can be painful for the patient and make further cannulation attempts in this region impossible. If this is over one of the few points of venous access that the patient has it may compromise the effectiveness of their care.

- **Extravasation** – refers to the inadvertent injection of substances into the soft tissues around the vein rather than the vein itself. This will usually lead to non-diagnostic results if the purpose was for a radiological investigation, or ineffective pharmaceutical effect if the intent was medicinal. Potentially there is the risk of compartment syndrome which refers to the increased pressure within a fascial compartment (such as the musculature of the anterior forearm). This may result from fractures, but also from large volume contrast injections such as a 100ml bolus for many CT investigations. If extravasated into the anterior forearm compartment this could cause ischaemia and nerve damage. All cannulation sites should be checked for evidence of extravasation before injection by observation of the tissues around the injection site as fluid is injected or more reliably with a saline flush.

- **Sepsis.** Infection may be introduced locally to the cannulation site or systemically resulting in a bacteraemia (septicaemia) which is potentially fatal. If a venflon is to be left in situ for any left of time, the skin around it should be checked for reddening indicative of thrombophlebitis. The risk of both this and systemic bacteraemia are reduced by good aseptic technique.

- **Vessel dissection.** This can occur if the needle tip cuts along the vessel wall instead of penetrating through it. It will result in haematoma if haemostasis is not achieved quickly. Avoid introducing the needle tip at too shallow an angle.
• Arterial puncture! Not very likely to happen since arteries are located quite deep with the limb, but possible. Haemostasis is harder to achieve due to the higher pressure of the blood, but is essential if serious haemorrhaging is to be avoided

• Nerve damage

• Air or other embolus. It is imperative that any devices connected to the patient for intravenous injection are filled only with the intended injection material and no air. Patients have died from inadvertent injection of air during radiological procedures

• Maladministration
  – wrong substance
  – wrong amount
  – out of date

As the person administering an intravenous injection YOU are responsible for checking that you know you are giving the appropriate substance, at the right concentration, and at the right time, and have been authorised to do so under local protocols.

**Needle phobia**

Few people like having injections, but some are terrified. This obviously calls for a sympathetic approach on the part of the radiographer. Here are a few ideas to help with these patients.

• Get them to lie down
• Get them to look away
• Don’t lie, but you can play down the pain
  – “like a sharp scratch”
• If they look likely to faint, get them to put their head between knees if sitting on chair
• If you don’t feel confident get someone else to do it. The last thing a needle phobic needs is a novice digging around to find a vein. It is likely to compound their fear for the next time they need an injection.
• Use of anaesthetic creams can be effective for reducing the pain of injections. This is particularly useful in children, whose continuing cooperation needs to be cultivated.

• Both EMLA and Ametop are able to numb the skin over the injection site. The cream is applied over the skin where a visible or palpable vein looking suitable for cannulation is situated. A transparent dressing is then placed over the top.

• Ametop is often used in preference to EMLA now, since it is faster acting and anaesthesia lasts longer after removal.

• Rapid cooling of the skin by Ethyl Chloride spray can provide some numbing, but its effectiveness is limited and may be more beneficial psychologically than by providing real anaesthesia.