Centre for Medical Sciences & Research

PHLEBOTOMY TRAINING

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Contents

INTRODUCTION

The Venepuncture Workbook is a Part 1 phlebotomy course workbook designed for the purpose of developing your knowledge and understanding with regards to the theory of important topics relating to Venepuncture. Many aspects of venepuncture are covered. However, this book **has not** been designed as a definitive text and should be read in conjunction with other published material, for which some references are provided.

The workbook is to be used in conjunction with attending the practical skills session, where your knowledge of the skills obtained from Part 1 material will be continually taught and assessed. The pre-course questionnaire must be completed prior to the skills session (Part 2) and be brought with you on the day of your Practical Skills training day**.** This workbook is intended to be used as a guide, reference tool and assessment record.

Failure to provide this evidence may result in you being asked to rebook your Skills Teach for another time.

Additional information and competencies are available in Appendix 2 and on our website (www.cfmsr.org.uk).

You are reminded that issues relating to accountability and competence encompass all aspects of health care, not just Venepuncture. You are strongly advised to read the Nursing & Midwifery Council's or your own professional body's Code of Professional Conduct.

THE ASSESSMENT STRATEGY VENEPUNCTURE

This workbook is designed as a guide through Part 1 venepuncture training as well as self-study document for practitioners to work through at your own pace.

Near the end of the book is in Appendix -1, all of questions **must** be completed.

These will be marked by your assessor on completion of part 2 training. Questions must be answered correctly. In addition, your assessor will question you verbally to assess your knowledge and competence in your work area.

At the end of this document is a competency section that needs to be completed with your assessor after a period of supervised practice (Appendix 2). However, it is your professional responsibility to ensure that you maintain your skills and theoretical knowledge. If you have any queries regarding the assessment process you should contact our Centre for Medical Sciences & Research Team or discuss with your assessor for advice.

SECTION 1. GUIDELINES FOR PROFESSIONAL PRACTICE

Professional responsibility

All staff who perform venepuncture must have had supervised practice and documented training.
The onus is also on individuals to ensure that their knowledge and skills are maintained, both from a theoretical and practical perspective.
All practitioners must operate within the Policies, Protocols and Guidelines of their respective organisations.

Accountability

Venepuncture should only be carried out by an accountable practitioner. These include for example: Medical Staff, Registered Nurses, Midwives, Other non-registered staff (after approved training and competencies)

The description of accountability used by the Department of Health is:

'the obligation of one party to provide a justification and to be held responsible for its actions by another interested party'

These 'interested parties' can include yourselves, Professional Regulating Bodies i.e. Nursing & Midwifery Council (NMC), the patient/client, employer and general public.

Professional and Legal Issues

The Code of Professional Conduct (NMC 2004), Guidelines for Records and Record Keeping (NMC 2005) and your employers' policies and guidelines will assist you in understanding your professional accountability.

Health and Safety at Work Act

Your most important responsibilities as an employee are:

- to take reasonable care of your own health and safety
- to take reasonable care not to put other people - fellow employees, patients and members of the public - at risk by what **you do** or **don't** during the course of your work
- to co-operate with your employer, making sure you get proper training and you understand and follow the organisations Health and Safety Policies
- Do not interfere with or misuse anything that's been provided for your health, safety or welfare

- to report any injuries or accidents that you suffer as a result of doing your job (for example, reporting needle-stick injuries)

IGNORANCE IS NOT A DEFENCE

It is your responsibility to keep up to date with current practices, and changes to evidence in practice.

Consent

Informed consent must be obtained from your patients.

What does this mean? How will you do this……?

Summary

Never carry out a procedure that you have not been trained to do, not have been signed off or do not feel confident to do.

Registered and non-registered staff have responsibilities to act professionally & lawfully

Ensure you keep up to date with current evidence-based practice

SECTION 2. A BRIEF HISTORY OF PHLEBOTOMY

The Background of Phlebotomy

Today, we know that phlebotomy is the practice of opening a vein by incision or puncture to collect blood or introduce fluid as a treatment. Around 2000 B.C., it was known as bloodletting. The draining of blood from a patient this procedure was thought to cure a vast array of ailments, ranging from the plague to acne.

Bloodletting in ancient times

To understand the evolution of phlebotomy and its uses today, it is necessary to trace back its origins to bloodletting. This ancient practice first emerged in Egypt, later spreading to the Greeks and Romans and enjoying widespread popularity in Europe throughout the medieval era. This was due, in part, to the views put forth by Greek physician Hippocrates, who outlined the composition of the human body in terms of four humors: blood, phlegm, yellow bile and black bile. Physicians believed good health depended on a proper balance of all four, with any illness indicating an imbalance within the body. During the Roman Empire, Greek physician Galen also believed that blood did not circulate; as such, it ran the risk of 'stagnating' in the extremities. Bloodletting was therefore seen as a method for maintaining proper levels and movement of humor.

Bloodletting in the Middle Ages

Beyond antiquity, particularly in the Middle Ages, bloodletting was no longer administered by true physicians like Hippocrates but by barber-surgeons who, in addition to pulling teeth and performing amputations, specialized in bloodletting. The recognizable red stripe on barber poles actually originated as a result of the barbers' secondary professions as bloodletters. Somewhere around the 16th century, as surgery techniques became more sophisticated, when bloodletting was performed by true physicians.

Bloodletting in the 1800s

By the 1800s, the practice of bloodletting had peaked in popularity. Bloodletting was used to treat nearly every disease. In one British medical journal, bloodletting was recommended for acne, asthma, cancer, cholera, coma, convulsions, diabetes, epilepsy, gangrene, gout, herpes, indigestion, insanity, jaundice, leprosy, ophthalmia, plague, pneumonia, scurvy, smallpox, stroke, tetanus, tuberculosis and many more diseases and conditions.

Various methods were used, including venesection and arteriotomy, which involved making incisions in either veins or arteries, respectively. Other processes included scarification and cupping (extracting air through suction by placing a dome-shaped glass over the skin to 'blister' the skin so it could be bled through these blisters). Leeches were also used as they were able to suck up to ten times their body weight in blood.

Use of leech's in bloodletting:

Bloodletting tools

Menacingly named instruments like "spring-loaded lancets" and "fleams," sets of blades specialized for bloodletting, were used. These instrument were used in complement with leeches who, in addition to being capable of gorging on amounts of blood several times their body weight.

The decline of bloodletting

As the field of medicine developed rapidly, bloodletting was widely acknowledged by more progressive physicians and other medical experts as ineffective, or worse, fatal. In the 21st century bloodletting is used only to treat conditions it has been proven to alleviate.

Modern-Day Bloodletting: Phlebotomy

Today, phlebotomists work in almost every area of medicine. Members of this popular and rapidly growing workforce are employed across various medical fields. They assist doctors and surgeons as well as run blood drives across the country. Phlebotomists in some countries and states are required to have specific licenses, but most simply pursue specialized phlebotomy training, which is occasionally offered through employers. Phlebotomists use procedures, especially venepuncture, to collect blood samples from patients. While doctors, nurses and other medical professionals are typically equipped to perform these procedures. Employing one phlebotomist helps medical facilities streamline and improve their blood collection practices. To this end, most hospitals and clinics have recently begun hiring phlebotomists to improve the quality of work and ease the nurses' workload. Employing these professionals increases both safety and efficiency since they know how to draw blood. Phlebotomists also work in science labs, where their individualized skills have proven to be extremely effective.

World Health Organisation (WHO) defines Phlebotomy as:

The act of drawing or removing blood from the circulatory system through an incision or puncture to obtain a sample for analysis and diagnosis.

SECTION 3. INFECTION PREVENTION AND CONTROL

Venepuncture is an invasive procedure involving a breach in the skin's integrity. The breach extends from the skin surface to the bloodstream, so the potential for infection is always there and skilled and conscientious care is required to prevent infection

Objectives

- Reducing health care associated infections
- Aseptic non touch technique
- Safe disposal of sharps & waste
- What to do in the event of a sharp injuries

Why is Infection, Prevention and Control so important in the practice of venepuncture?

National Institute for Clinical Excellence (NICE,2003) states that: "Gloves must be worn for invasive procedures, contact with sterile sites and non-intact skin or mucous membranes, and for all activities that have been assessed as carrying a risk of exposure to blood, body fluids, secretions, excretions or sharp contaminated instruments".

NICE (2003) also states that "Disposable plastic aprons should be worn when there is a risk that clothing may become exposed to blood, body fluids, secretions or excretions, with the exception of sweat". Therefore, ensure you take adequate precautions for venepuncture.
Good hand hygiene is the single most important way of preventing the spread of infection (Josephson, 2004). Please familiarise yourself with the 7 stages of handwashing. For more information from the World Health Organisation for hand washing refer to the document attached to this workbook.

NHS

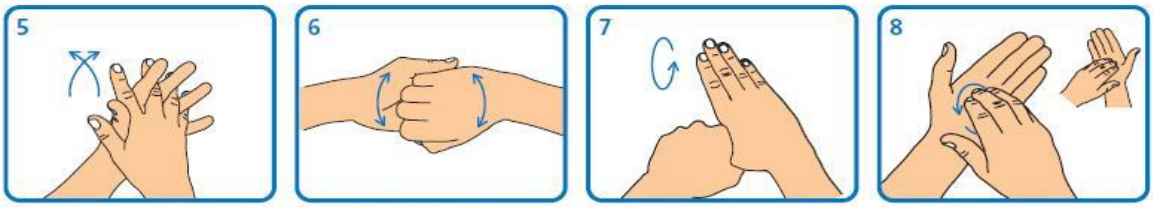
Hand-washing technique with soap and water

Wet hands with water

Apply enough soap to cover all hand surfaces

Rub hands palm to palm

Rub back of each hand with palm of other hand with fingers interlaced

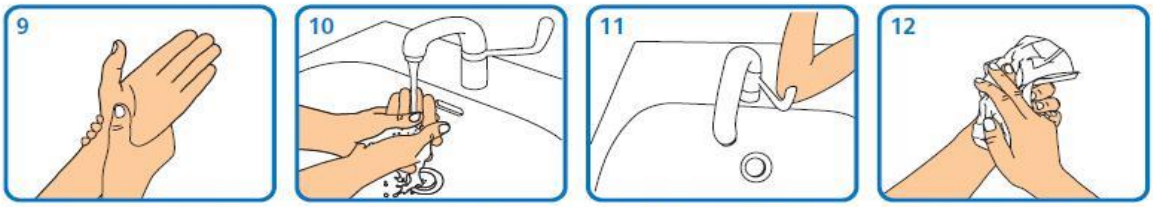


Rub palm to palm with fingers interlaced

Rub with back of fingers to opposing palms with fingers interlocked

Rub each thumb clasped in opposite hand using a rotational movement

Rub tips of fingers in opposite palm in a circular motion



Rub each wrist with opposite hand

Rinse hands with water

Use elbow to turn off tap

Dry thoroughly with a single-use towel

Hand washing should take 15–30 seconds

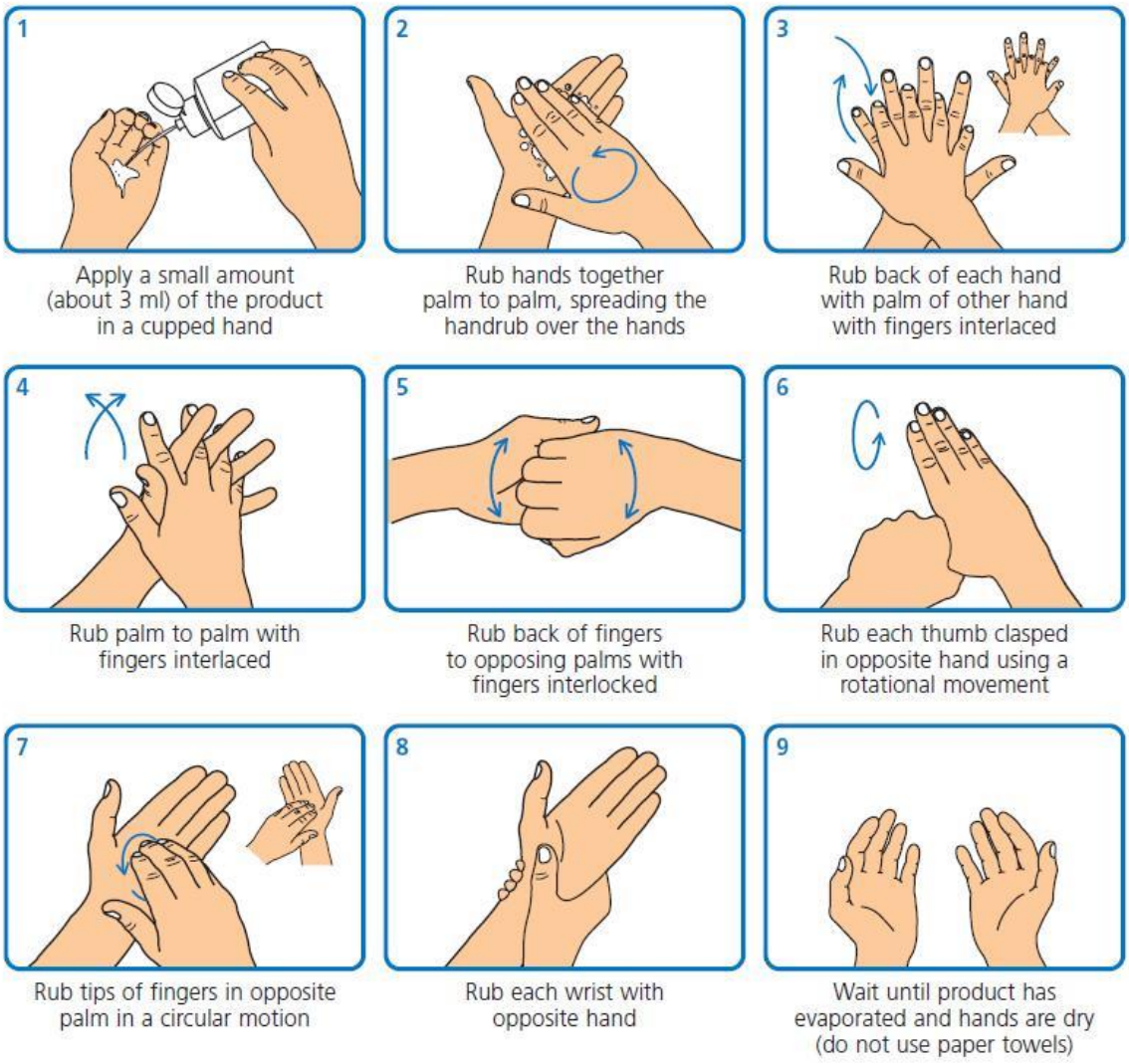
cleanyourhands campaign

NHS
National Patient Safety Agency

Adapted from World Health Organization *Guidelines on Hand Hygiene in Health Care*

NHS

Alcohol handrub hand hygiene technique – for visibly clean hands



cleanyourhands® campaign

NHS National Patient Safety Agency

Adapted from World Health Organization *Guidelines on Hand Hygiene in Health Care*

Centres for Disease Control and Prevention (2002b) states that:

"Wearing clean gloves rather than sterile gloves is acceptable for the insertion of peripheral intravascular catheters if the access site is not touched after the application of skin antiseptics".

During invasive clinical procedures, patients depend upon healthcare workers to protect them from harmful microorganisms. This critical clinical competency is termed:

Aseptic Technique

This is the most commonly adopted infection prevention skill in health care. The aseptic non-touch technique is an initiative aimed at ensuring the essential actions of aseptic technique occur every time. Venepuncture skill requires this technique in order to protect the patient from harmful microorganisms.

The 3 main sources of microbiological contamination during aseptic technique

Sources of contamination	Routes of contamination
The air environment	Airborne Contamination
The Health Care Worker	Hand touch contamination
The proceeding workplace	Direct and indirect contamination

Be Clear… what do we mean by aseptic?

Sterile	Clean	Asepsis
Free from all microorganisms	Free from marks and stains	Free from pathogens and organisms, in sufficient numbers to cause infection
This is not achievable in the health care setting	This is not a satisfactory standard for invasive clinical procedures or maintenance of clinical devices	This is achievable in typical health care settings

A lack of respect for microorganisms transference via equipment utilization. Examples within Venepuncture Include:

A disposable tray is a good example of equipment of lower risk of infection

A non-disposable tourniquet is an example of equipment of higher risk of infection

ANTT®
Aseptic Non Touch Technique

NHS

Peripheral Venepuncture / Phlebotomy

for the ANTT practice principles see www.the-antt.org

Preparation zone


1

Clean hands
with soap & water or alcohol hand rub


2

Clean tray
according to local policy creating an aseptic field
And whilst it dries . . . . .


3

Gather all
equipment that may be needed


4

Prepare equipment
protecting key parts
using non touch technique

Patient zone


5

Apply disposable
tourniquet & palpate vein


6

Clean hands
with soap & water or alcohol hand rub


7

Apply non-sterile gloves


8

Clean skin
2% chlorhexidine/70% alcohol applicator, back & forth & left to right strokes for 30 seconds. Allow to dry.


9

Access patient's vein
protecting key parts & sites
using a non-touch technique

if attempt to draw blood is unsuccessful return to step 5

Decontamination zone


10

Dispose of sharps
& equipment


11

Clean tray
according to local policy


12

Dispose of gloves
then immediately...


13

Clean hands
with soap & water or alcohol hand rub

If going immediately to another patient proceed to step 3

CENTRE FOR MEDICAL SCIENCES & RESEARCH

Protecting YOU every time with...
4 Actions for Safe Aseptic Technique

The ANTT-Approach

Aseptic Technique describes the measures we take to protect you from contamination by microorganisms during invasive clinical procedures such as surgery, insertion of medical devices and the administration of intravenous medications

1 **Hand Cleaning**
We clean our hands immediately prior to commencing your procedure, and use protective equipment like gloves

2 **Using Aseptic Fields**
We protect procedure equipment from microorganisms by using a procedure tray and individual equipment covers or, for more complex procedures, use a sterilized drape

3 **Using Non-Touch Technique**
We avoid touching the 'Key-Parts' of procedure equipment & any open wound or procedure skin site. If we must touch them we wear sterilized gloves.

4 **Preventing Cross Infection**
We remove our gloves and wash our hands immediately after we have tidied up your procedure

If you have any questions or concerns about aseptic technique please inform the Nurse in Charge

ANTT

Protect patients every time with...
6 Actions for Safe Aseptic Technique

The ANTT-Approach

1 **Risk Assessment**
Select Standard or Surgical-ANTT according to the technical difficulty of achieving asepsis

2 **Manage the Environment**
Avoid or remove contamination risks

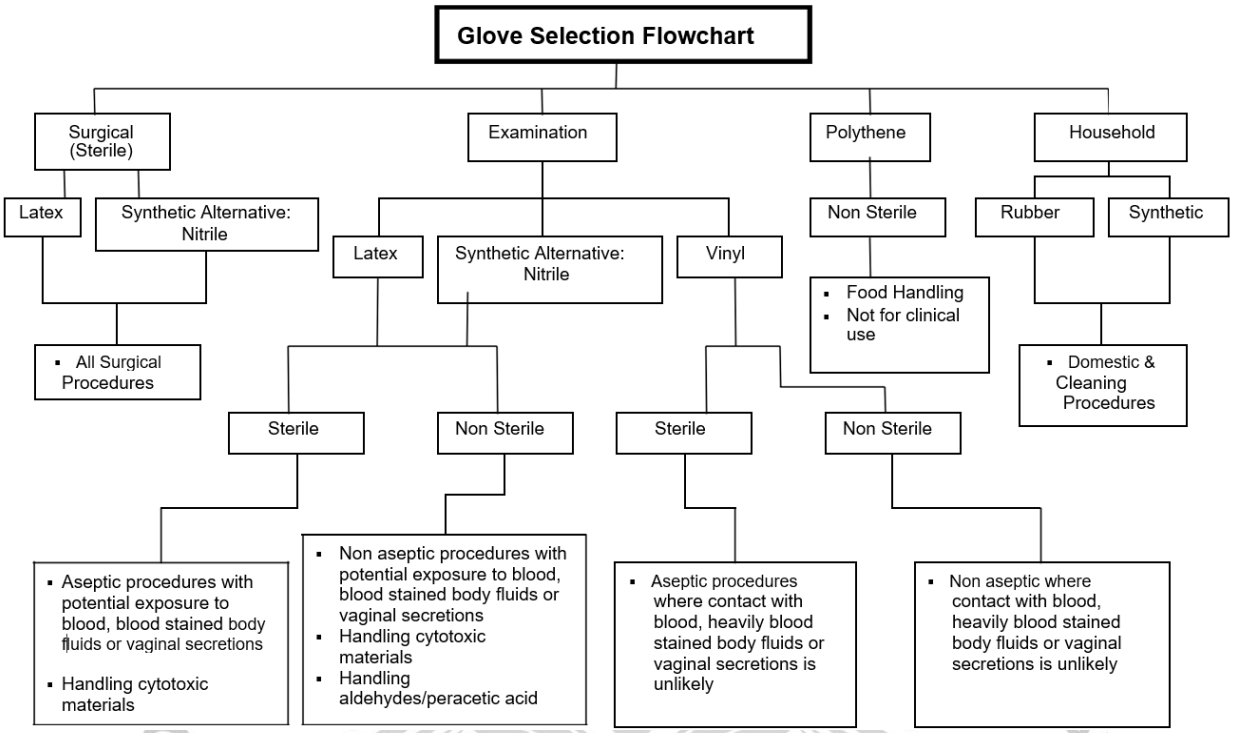
3 **Decontaminate & Protect**
Hand cleaning, personal protective equipment (PPE), disinfecting equipment, surfaces and Key-Parts

4 **Use Aseptic Fields**
General, Critical and Micro Critical Aseptic Fields protect Key-Parts & Key-Sites

5 **Use Non-Touch Technique**
Key-Parts must only come into contact with other Key-Parts & Key-Sites

6 **Prevent Cross Infection**
Safe equipment disposal, decontamination & hand cleaning

ANTT



Key Principles for Sharps

- Take sharps bin to patient
- Sharps must be disposed of immediately
- Fill to line only
- Never re-sheath needles
- Report sharps injuries as per employers' policy
- Seal the lid when the bin is 2/3 full

NEVER

1. Never attempt to use a sharp without preparation for its disposal
2. Never re-sheath a needle (even a clean one)
3. Never carry loose sharps in your hand- always use a plastic tray
4. Never expect someone else to dispose of your sharps
5. Never leave sharps to dispose of later
6. Never underestimate the implications of a sharp's injury
7. Never put your finger inside the sharp bin

ALWAYS

1. Wear appropriate personal protective equipment
2. Assemble devices with care
3. Be especially vigilant during emergency situations and procedures
4. Ask for assistance when taking blood from uncooperative patients
5. Dispose of sharps as soon as possible
6. Report all incidents involving contaminated sharps
7. Report all near misses and examples of bad practice
8. Prohibit hand to hand passing of sharps devices.

Needle stick Accidents – What Should I Do if I Injure Myself with a Used Needle?

If you pierce or puncture your skin with a used needle, follow this first aid advice immediately:

- encourage the wound to bleed, ideally by holding it under running water; (running away) 2 mins squeeze above wound to encourage bleeding
- wash the wound using running water and plenty of soap
- don't scrub the wound while you're washing it
- don't suck the wound
- dry the wound and cover it with a waterproof plaster or dressing

You should also seek urgent medical advice:

- go to the nearest accident and emergency (A&E) department, or
- contact your employer's Occupational Health service, if you injure yourself at work

Needle-stick injuries

Injuries from needles used in medical procedures are sometimes called needle-stick or sharps injuries. Sharps can include other medical supplies, such as syringes, scalpels and lancets, glass vial and glass from broken equipment.

Once someone has used a needle, viruses in their blood such as hepatitis B, hepatitis C or HIV may contaminate it. This includes needles used to inject illegal drugs. Blood can also contaminate sharps.

For more information, see What infections can used needles or sharps pass on?

Assessing your injury

The healthcare professional treating you will assess the risks to your health and ask about your injury – for example, how and when it happened, or who had used the needle.

Samples of your blood may need to be tested for hepatitis B and C or HIV.

Although rare, there is also a small risk of other infections being transmitted via contaminated blood, such as cytomegalovirus (CMV) and Epstein-Barr virus.

Your healthcare professional may also arrange to test samples of the other person's blood, if they give their consent.

Will I need any treatment?

If your healthcare professional thinks you're at low risk of infection, you may not need any treatment.

- If there's a higher risk of infection, you may need:
- antibiotic treatment – for example, if you have cellulitis (infection of the skin)
- vaccination against hepatitis B
- treatment to prevent HIV

If there's a high risk of infection with HIV, your healthcare professional may consider treatment called post-exposure prophylaxis (PEP).

SECTION 4. BLOOD

Blood is a combination of plasma (slightly viscous liquid) and cells. It is a specialized body fluid that supplies essential substances and nutrients, such as sugar, oxygen, and hormones to our cells, and carries waste away from those cells. The waste is eventually flushed out of the body in urine, faeces, sweat, and lungs (carbon dioxide). Blood also contains clotting agents.

Blood facts

- Approximately 8% of an adult's body weight is made up of blood.
- Females have around 4-5 litres, while males have around 5-6 litres. This difference is mainly due to the differences in body size between men and women.
- Its mean temperature is 38 degrees Celsius.
- It has a pH of 7.35-7.45, making it slightly basic (less than 7 is considered acidic).

- Whole blood is about 4.5-5.5 times as viscous as water, indicating that it is more resistant to flow than water. This viscosity is vital to the function of blood because if blood flows too easily or with too much resistance, it can strain the heart and lead to severe cardiovascular problems.
- Blood in the arteries is a brighter red than blood in the veins, due to of the higher levels of oxygen found in the arteries.
- An artificial substitute for human blood has not been found. Current research is promising in relation to plasma substitutes.

Functions of Blood

Blood has three main functions: transport, protection and regulation.

Transport

Blood transports the following substances:

- Gases, namely oxygen (O2) and carbon dioxide (CO2), between the lungs and rest of the body
- Nutrients from the digestive tract and storage sites to the rest of the body
- Waste products to be detoxified or removed by the liver and kidneys
- Hormones from the glands in which they are produced to their target cells
- Heat to the skin so as to help regulate body temperature

Protection

Blood has several roles in inflammation:

- Leukocytes, or white blood cells, destroy invading microorganisms and cancer cells
- Antibodies and other proteins destroy pathogenic substances
- Platelet factors initiate blood clotting and help minimise blood loss

Regulation

Blood helps regulate:

- pH by interacting with acids and bases
- Water balance by transferring water to and from tissues

What Is Blood Made Up Of?

Blood cells

These can be seen under a microscope and make up about 40% of the blood's volume. Blood cells are made in the bone marrow by blood 'stem' cells. Blood cells are divided into three main types:

- **Red cells** (erythrocytes). These give blood a red colour. One drop of blood contains about five million red cells. A constant new supply of red blood cells is needed to replace old cells that break down. Millions of red blood cells are made each day. Red cells contain a chemical called haemoglobin. This binds to oxygen and takes oxygen from the lungs to all parts of the body.
- **White cells** (leukocytes). There are different types of white cells which are called neutrophils (polymorphs), lymphocytes, eosinophils, monocytes and basophils. They are part of the immune system. Their main role is to defend the body against infection. Neutrophils engulf germs (bacteria) and destroy them with special chemicals. Eosinophils and monocytes also work by swallowing up foreign particles in the body. Basophils help to intensify inflammation. Inflammation makes blood vessels leaky. This helps specialised white blood cells get to where they are needed. Lymphocytes have a variety of different functions. They attack viruses and other germs (pathogens). They also make antibodies which help to destroy pathogens.
- **Platelets**. These are tiny and help the blood to clot and heal wounds.

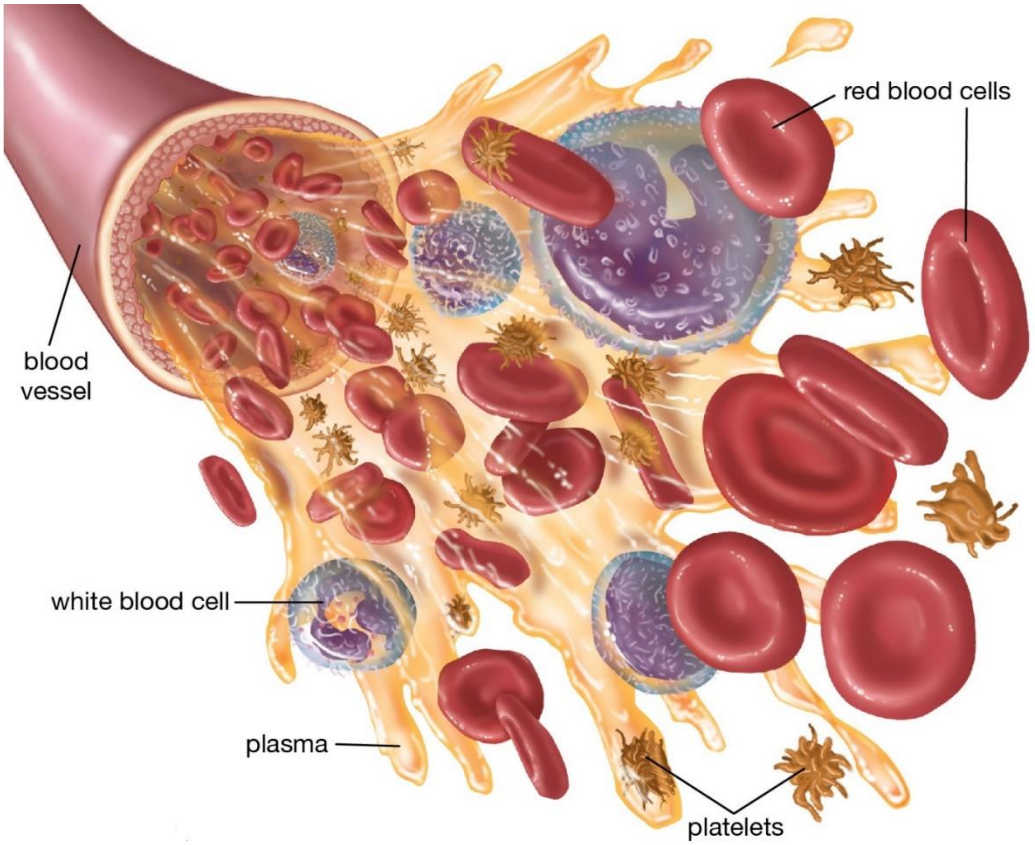
Plasma

This is the liquid part of blood and makes up about 60% of the blood's volume. Plasma is mainly composed of water, it also contains many different proteins, minerals and other chemicals, such as:

- Hormones.
- Antibodies.
- Enzymes.
- Glucose.
- Fat particles.
- Salts.

In order to constantly make blood cells, haemoglobin and the constituents of plasma, you need a healthy bone marrow and nutrients from food.

When blood spills from your body (or a blood sample is taken into a plain glass tube) the cells and certain plasma proteins clump together to form a clot. The remaining clear fluid is called serum.



SECTION 5. VENOUS ANATOMY AND PHYSIOLOGY

Objectives: To be able to...

- Differentiate between an artery and a vein
- Identify and name the commonly used veins for venepuncture
- Understand the blood functions and composition
- Be aware of nerves in the arm
- Understand how to choose an appropriate vein for venepuncture avoiding hazardous anatomical structures

Always use veins in the upper extremities before considering lower extremity sites for venepuncture. Veins of the lower limbs should only be used in exceptional circumstances and by a trained and competent practitioner. The most common site for venepuncture is the antecubital fossa. The antecubital fossa is located at the anterior aspect of the elbow. At this point the median cubital, cephalic and basilica veins lie close to the surface of the skin, this makes them easily accessible and visible. Research has also found that puncture of these veins minimise discomfort.

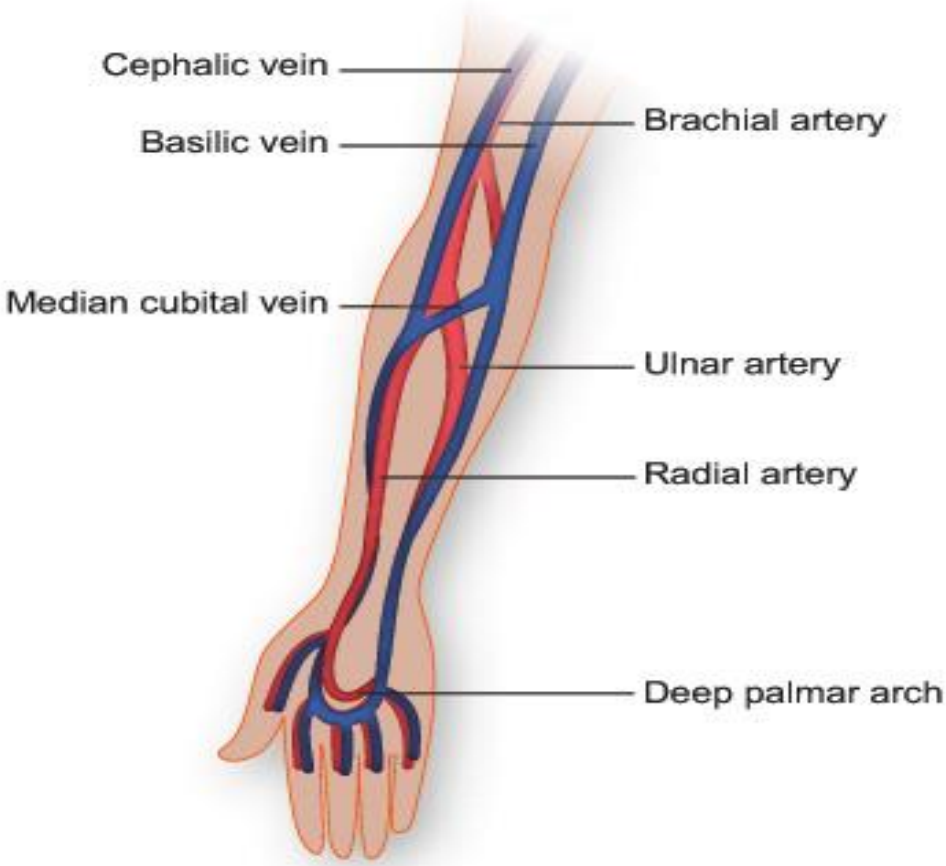
The **Cephalic** vein travels along the radial surface of the forearm. The Accessory Cephalic is located on the posterior aspect of the forearm joining the cephalic below the elbow. It is fairly easily palpated if not visible.

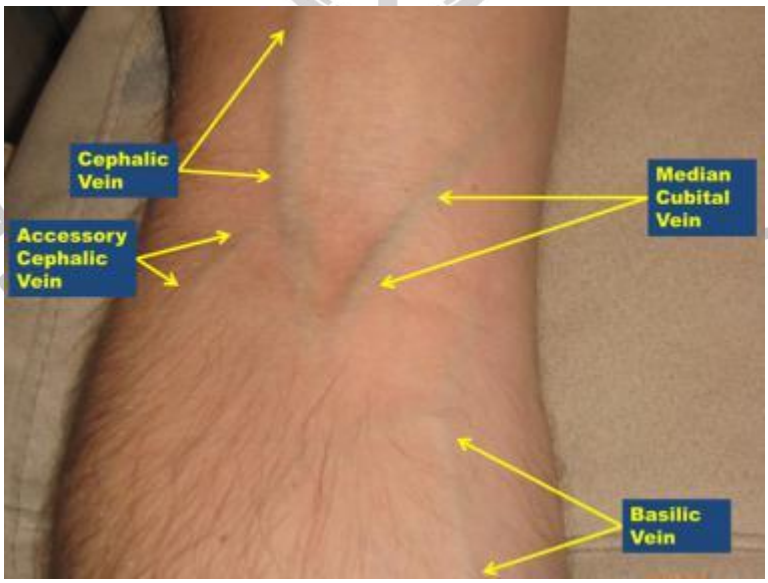
The **Basilic** vein journeys up the ulnar surface of the forearm joining with both the median cubital and median antebrachial vein below the elbow.

Metacarpal veins located on the dorsum of the hand are often readily visible. For venepuncture, these veins are used as a last resort, except for small infants.

Study the picture on page 22 and try to identify your own veins at the antecubital fossa. Attempt to locate your own vein without looking, only by palpation.

Studying the pictures below, note how close the arteries are to the veins.
Think about how you may differentiate between veins and arteries?
Why do you think it is important to differentiate between the two?





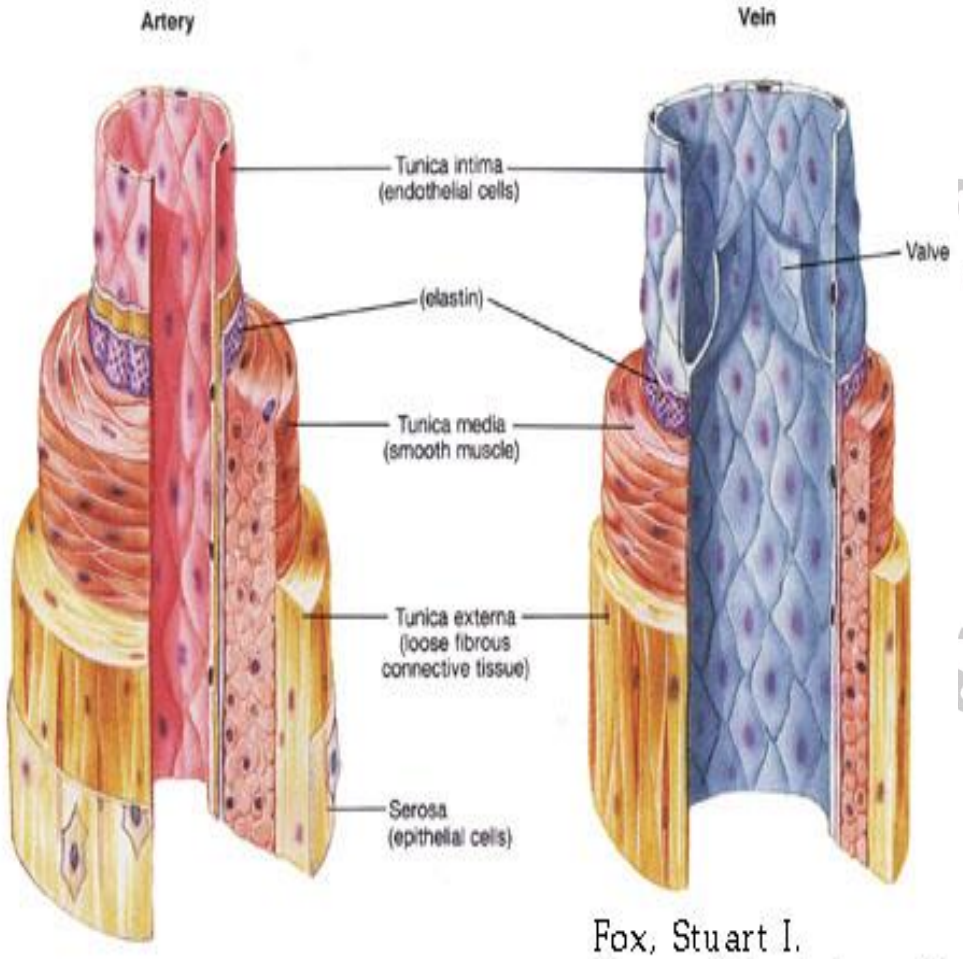
Veins and arteries consist of three main layers;

The Tunica Externa (the outer layer) – A fibrous layer of connective tissue, collagen and nerve fibres that surrounds and supports the vessel.

The Tunica Media (the middle layer) – A muscular layer containing elastic tissue and smooth muscle fibres.

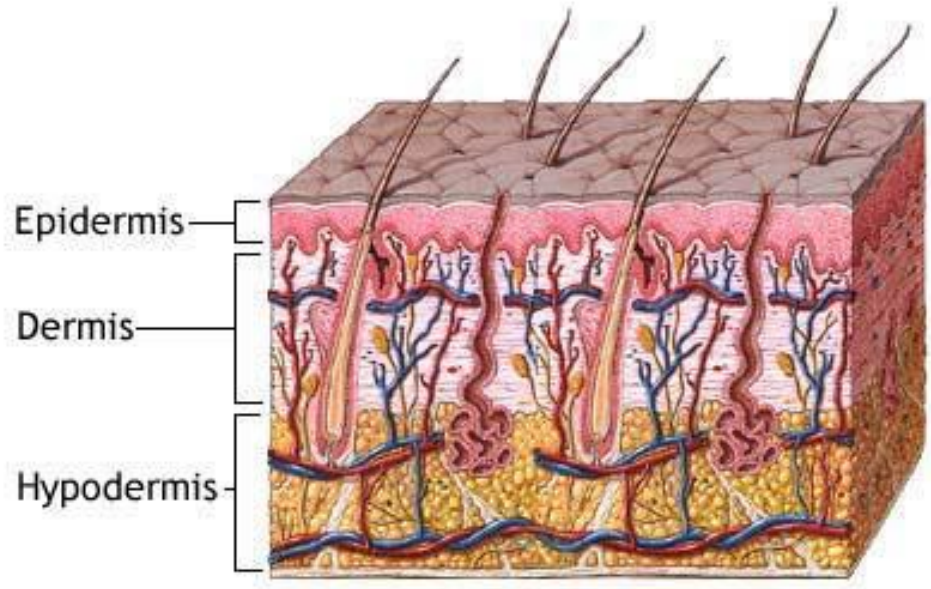
The Tunica Intima (the inner layer) – A thin layer of endothelium that facilitates blood flow and prevents adherence of blood cells to the vessel wall.
Trauma to the endothelium encourages platelet adherence and thrombus formation.

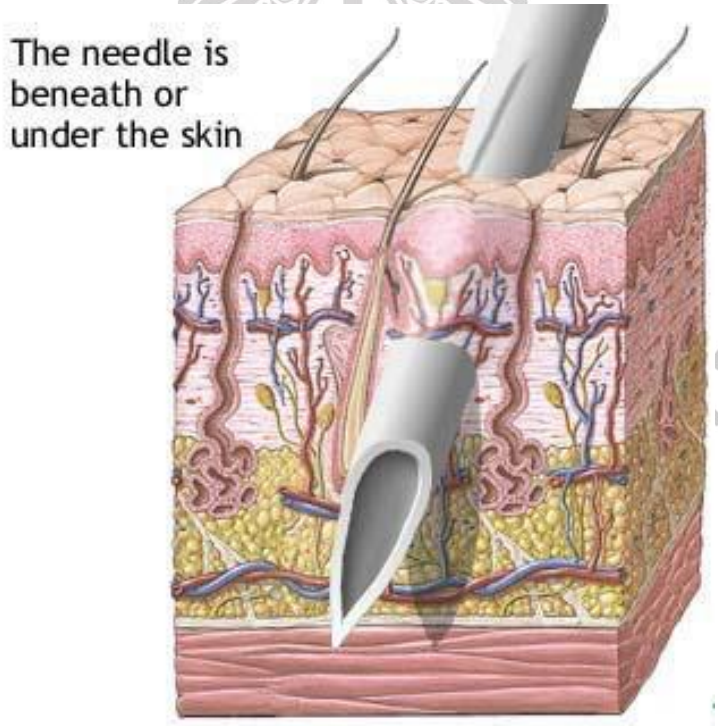
The walls of veins are thinner and less elastic than the corresponding layers of arteries. Veins include valves which aid the return of blood to the heart by preventing blood from flowing in the reverse direction because of gravity pull.



Fox, Stuart I.
Human Physiology 4th
Brown Publishers

Layers of the skin





Differences Between Arteries and Veins

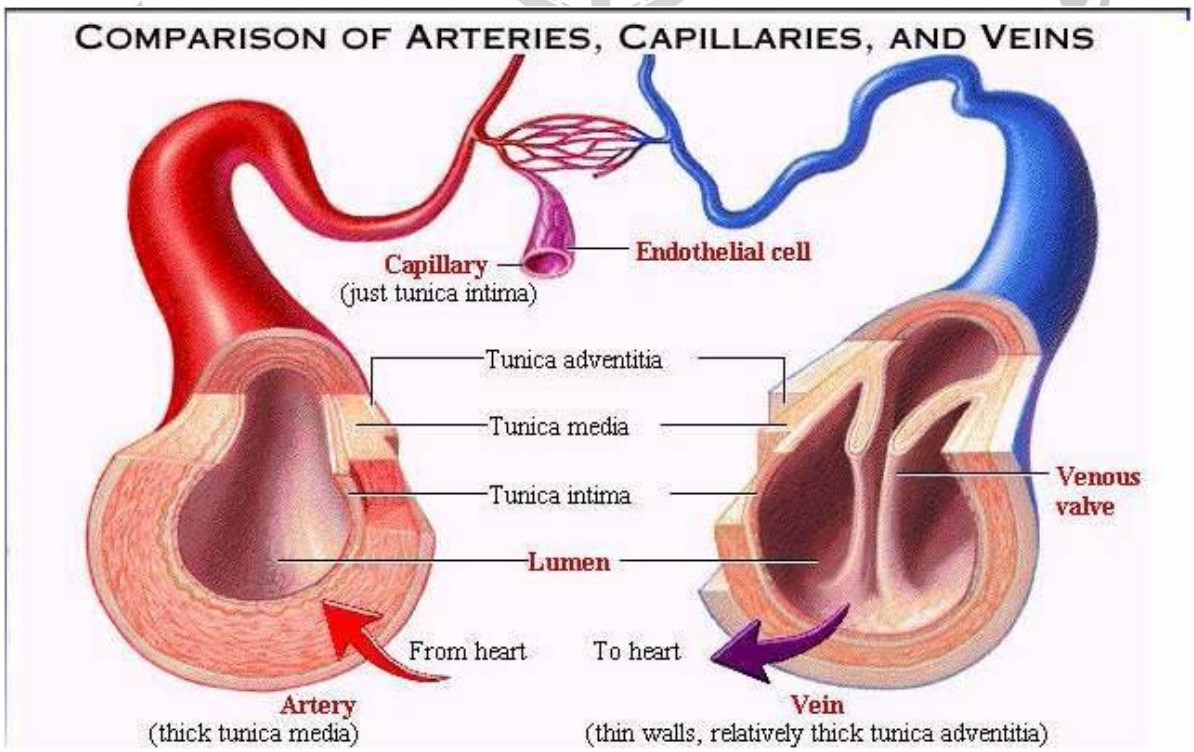
ARTERIES

Take oxygenated blood away from the heart to tissues
Have thick walls
Small lumen
Elastic
No valves
Deep seated (Usually)
Do not collapse
High pressure

VEINS

Take deoxygenated blood from the tissues to the heart
Thin walls
Large lumen
Less elastic
Have valves to prevent any backflow of blood
Lie closer to the skin
Tendency to collapse

It is important to check for and locate the patients pulse to ensure that you are not attempting to take blood from an artery. **Veins do not have a pulse**.



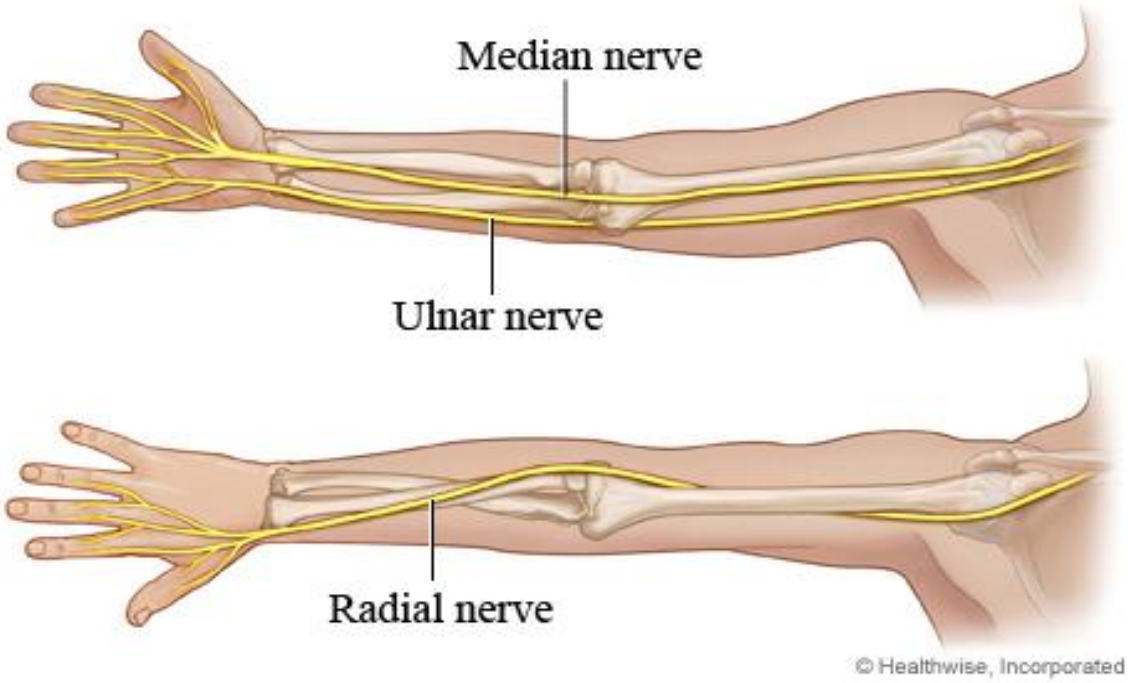
Nerves of the Arm

Three main nerves run past the elbow and wrist to the hand.

The **Median Nerve** passes down the inside of the arm and crosses the front of the elbow. The median nerve supplies muscles that help bend the wrist and fingers. It is a main nerve for the muscles that bend the thumb. The median nerve also gives feeling to the skin on much of the hand around the palm, the thumb, and the index and middle fingers. When the median nerve is compressed over a long period it can cause carpal tunnel syndrome.

The **Ulnar Nerve** passes down the inside of the arm. It then passes behind the elbow, where it lies in a groove between two bony points on the back and inner side of the elbow. The ulnar nerve supplies muscles that help bend the wrist and fingers, and that help move the fingers from side to side. It also gives feeling to the skin of the outer part of the hand, including the little finger and the outer half of the back of the hand, palm, and ring finger. When the elbow is bumped over the ulnar nerve, it's often called hitting the "funny bone."

The **Radial Nerve** passes down the back and outside of the upper arm. The radial nerve supplies muscles that straighten the elbow, and lift and straighten the wrist, thumb, and fingers. The radial nerve gives feeling to the skin on the outside of the thumb and on the back of the hand and the index finger, middle finger, and half of the ring finger.



Selecting a Suitable Vein

- It is important to select a vein carefully for blood collection.
- A patient who has had previous blood tests will often indicate which arm has the most accessible veins.
- One arm usually has better veins than the other and most often it is the one that is predominantly used.
- Sometimes a slight rotation of the patient's hand will show up a vein in the antecubital fossa.
- The antecubital fossa in front of the elbow joint is the area where Median Cubital, Cephalic and Basilic veins pass through.
- The larger and fuller medium cubital and cephalic veins are used most frequently.

Figure 1: Inspect the site for potential veins to use, and palpate to further locate a vein and to test for firmness.

How to Palpate a Vein

Place two fingertips over the vein and press lightly. Release pressure to assess for elasticity and rebound filling. When you depress and release an engorged vein, it should spring back to a rounded full state.

To acquire a developed sense of touch, palpate veins prior to each Venepuncture. Through this practice, you will gain valuable experience, as well as an increased confidence in the assessment and venepuncture of more difficult veins later on in your practice.
Veins that may appear suitable on inspection can prove otherwise upon palpation.

Accurate vein assessment is essential in matching your skill level with the patient's condition. It is not appropriate for the new trainees (some veins are not so visible or palpable) to attempt venepuncture on patients with fragile or difficult veins. It is expected that the novice would become confident and competent before attempting to access more difficult veins. Discuss vein and patient assessment with your assessor.

Veins should be:

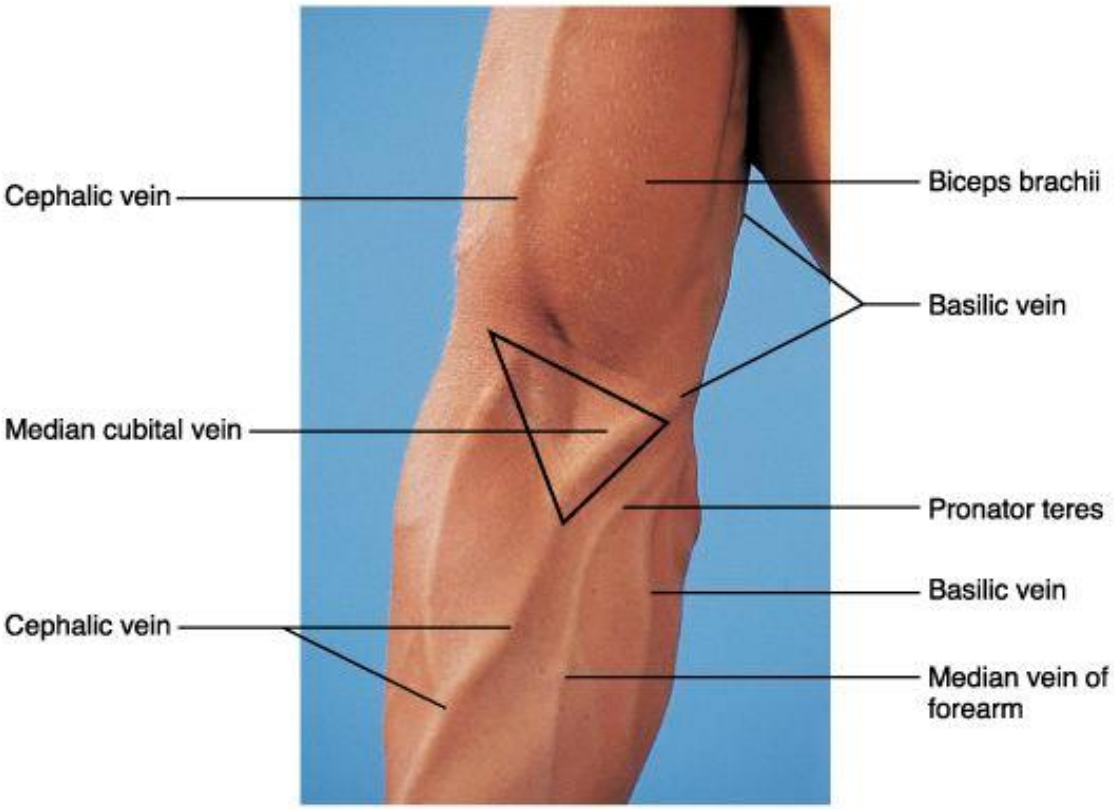
- Visible
- Palpable
- Bouncy
- Soft
- Well supported
- Refills when depressed
- Straight and non-tortuous

Sites to avoid include:

- Evidence of venous fibrosis;
- Evidence of haematoma/oedema formation;
- Evidence of localised infection/inflammation;
- Any vascular access device;
- Fistulae or vascular grafts.
- Limbs with fractures
- Small, visible but impalpable veins
- The affected side in patients post mastectomy or post-cardiovascular accident.

Anatomy and Physiology Summary

- Only perform venepuncture on healthy tissue
- Be aware of the artery at the Antecubital Fossa
- Be aware of the nerves at the Antecubital Fossa
- In some individuals, the artery lies over the vein so remember to check if there is a pulse.



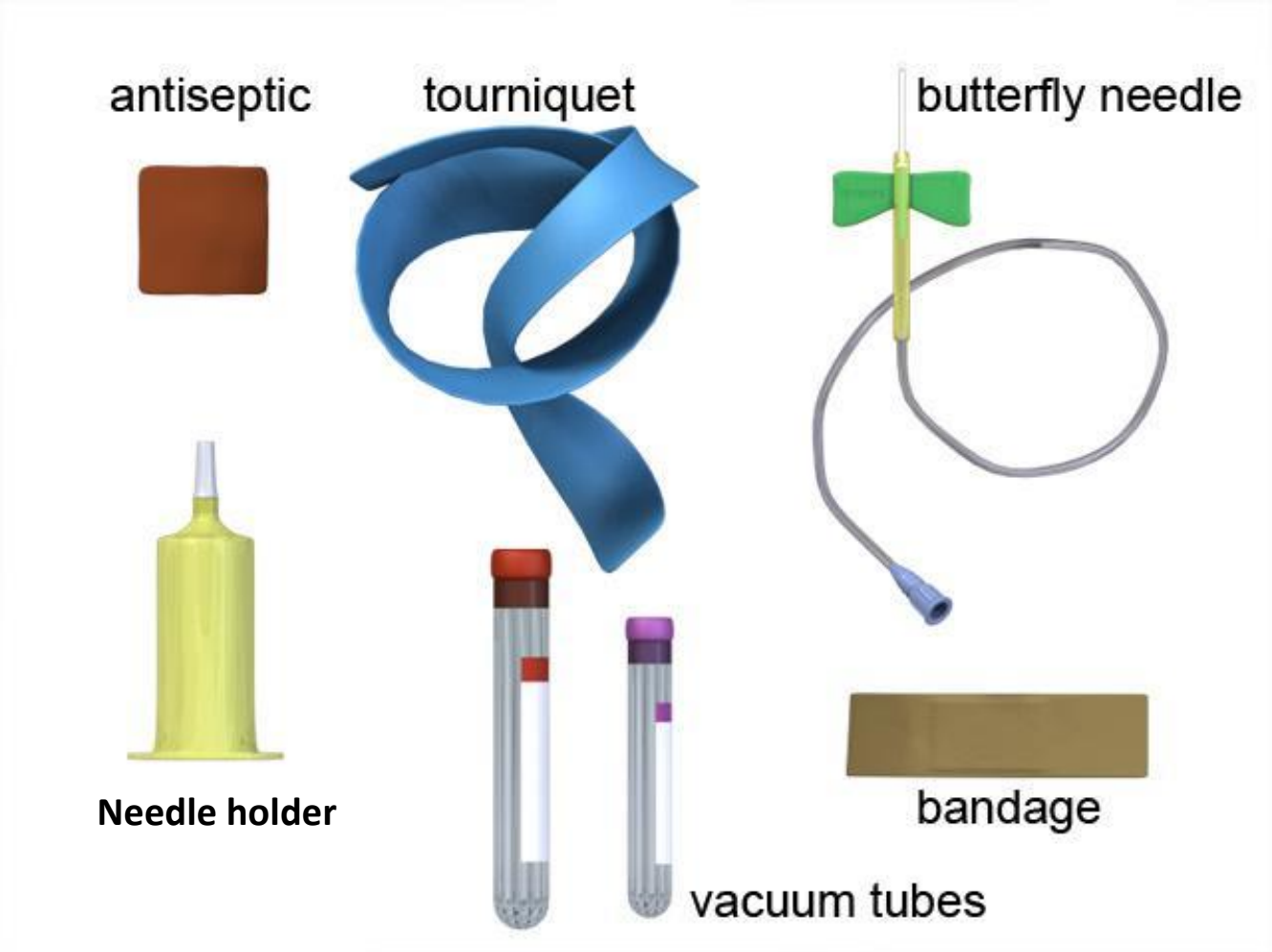
SECTION 6. PHLEBOTOMY (VENEPUNCTURE)

Learning to perform Venepuncture for the purpose of obtaining blood samples involves acquiring challenging skills that require knowledge, perseverance, patience and practise. Good preparation and practice is essential and will ensure that you become competent. Your confidence will then soon grow. Confidence and proficiency improve with performing real procedures on real patients with different and varied types of veins. Be patient, you will get it.

There is no set number of successful attempts prior to sign off. Skill development will differ with experience, exposure and manual dexterity.

Refer to section 5 with regards to choosing the most appropriate vein.

Phlebotomy Supplies



Safety straight needle

sharps container

Lock (secure) the needle after use

Dispose safety in the sharps bin

Needles - Gauges

The point of the needle is specially bevelled and sharpened to glide through the skin and into the vein easily, and to prevent coring (removal of a portion of the vein and tissue). The needle surface is coated with a silicone lubricant to allow the needle to slide smoothly and easily through tissue.

bevel – always up

The 21-gauge (green with the Vacutainer® system) is the most common needle used for the cubital fossa. A 23-gauge butterfly needle is used for smaller veins such as those in the hand and foot. Other gauge needles (generally 16 or 18, but may be as small as a 21-gauge) are used when transferring blood from syringe to specimen tubes and for blood donor collection.

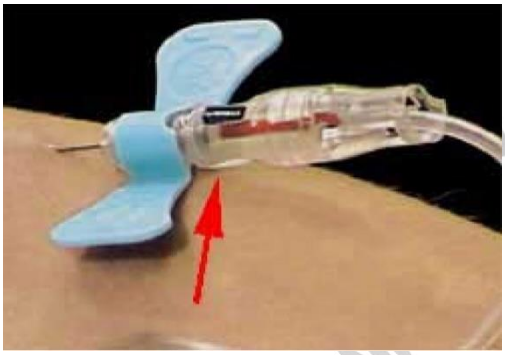
21G needle fitted to vacutainer holder

Winged-infusion set

A winged infusion set (more commonly referred to as a butterfly) consists of a ½ to ¾ inch stainless steel needle connected to a 5 to 12 inch length of tubing. It is commonly referred to as a butterfly because of its wing-shaped plastic extensions used for gripping the needle; however, the Butterfly® brand is a registered trade name. Two types of butterfly attachments are available: one for use with syringes, and the second for use with the evacuated tube system (multiple-sample luer adapter). The luer adapter converts the syringe attachment for use with the evacuated tube system.

butterfly needle attached to vacutainer holder

The winged infusion set allows more flexibility than a needle and syringe, and is very useful for collecting blood from small or difficult veins (hands, paediatric patients, and elderly patients). Butterflies come in a variety of sizes: 23-gauge is the most common. Use of needles with bores smaller than 23-gauge may result in haemolysed specimens.



flashback

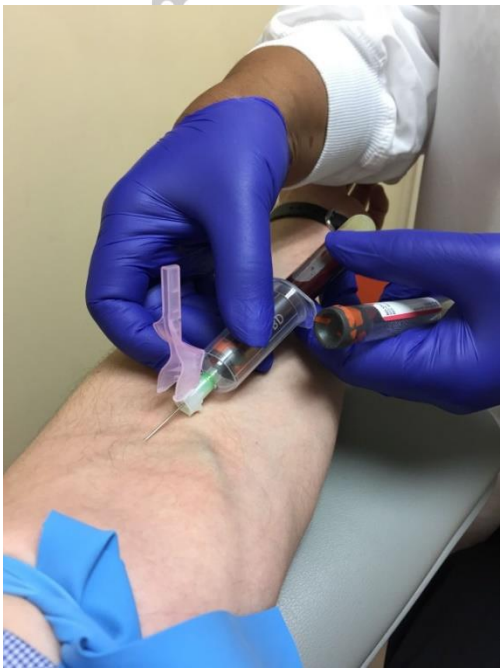
Holders

The needle and tube holder or adapter is a clear plastic cylinder with a small opening at one end into which the needle is threaded. The large opening at the other end holds the tubes as they are fed onto the needle. The plastic side extensions (flanges) on the tube end of the holder aid in tube placement and removal. There are two sizes of holders: one for regular-diameter tubes and a smaller one for small diameter tubes used for paediatric collections. Adapters can also be obtained from most manufacturers that allow regular size holders to be used for small tubes as well.

Needle Sizes

Needles are available in a wide variety of outer diameters described by gauge numbers. Smaller gauge numbers indicate larger outer diameters.

GAUGE	HUB COLOUR	SIZE	DIAMETER
16G	White	1x1/2"	1.60 mm
18G	Pink	1x1/2"	1.20 mm
19G	Cream	1x1/2"	1.10 mm
20G	Yellow	1", 1x1/4", 1x1/2"	0.90 mm
21G	Green	1", 1x1/4", 1x1/2"	0.80 mm
22G	Black	1", 1x1/4", 1x1/2"	0.70 mm
23G	Blue	1", 1x1/4", 1x1/2"	0.60 mm
24G	Medium Purple	1", 1x1/4", 1x1/2"	0.55 mm
25G	Orange	1", 1x1/4", 1x1/2"	0.55 mm
26G	Brown	½", 1x1/2"	0.45 mm



Venepuncture procedure using vacutainer system

Safe Disposal of Sharps

Use a sharps bin (a specially designed rigid box with a lid). Sharps bins are available on prescription (FP10 prescription form) from your GP or pharmacist and can be collected by your local authorities or returned to the doctor who prescribed them for disposal when full.

Needles

Used needles must not be bent or broken before disposal and you must never try to recap a needle.
.

Using your sharps bin

You can use your sharps bin to dispose of medical supplies such as:

- needles
- syringes
- lancets used with finger-pricking devices
- clippers

After you've used needles or similar medical supplies, put them into the sharps bin immediately. Do not try to take them out again.

Boxes must only be filled to the manufacturers' line and should be disposed of every three months, even if they are not full.

While your sharps bin is in use or waiting to be collected, keep it in a safe place so it's not a risk to other people and is out of the reach of children.

Disposing of your full sharps bin

Arrangements for disposing of full sharps bins vary from area to area.
When your sharps bin is full, you may be able to return it to your GP surgery or local pharmacy. Some GP surgeries and pharmacies run free collection services.

How and Where to Apply Correctly the Tourniquet

Tourniquets are single patient use only and are latex free. Do not use your own material tourniquet. **This is not acceptable**. Remember **3 minutes** is **maximum time** for tourniquet application. **Organization is the key to being successful within the given time frame.**

Figure 1: Wrap the tourniquet around the arm 3–4 inches above the venipuncture site. Keeping the tourniquet flat to the skin will help minimize the discomfort felt by the patient.

Figure 2: Stretch the tourniquet tight, and cross the ends.

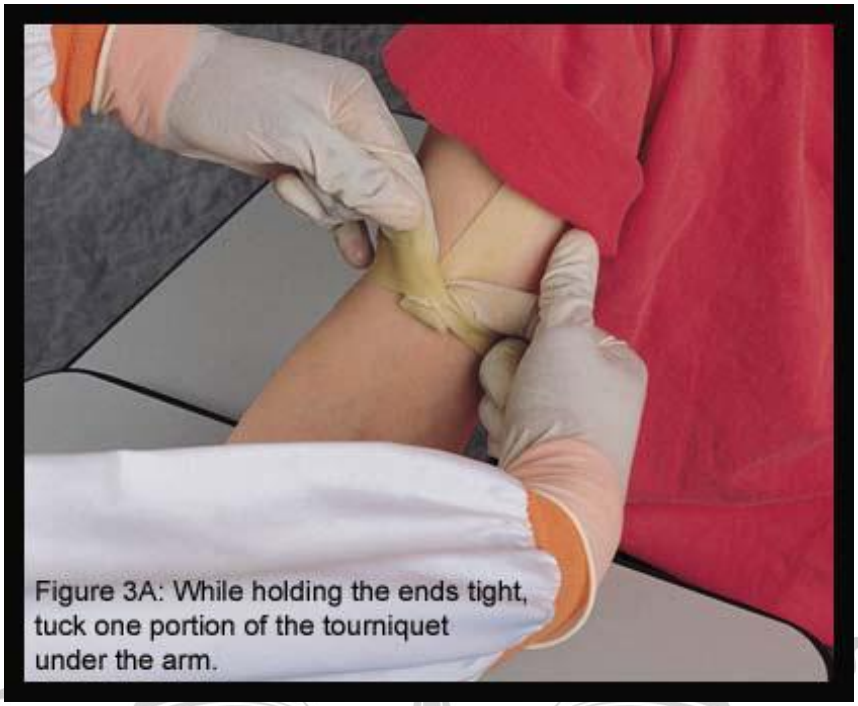


Figure 3A: While holding the ends tight, tuck one portion of the tourniquet under the arm.

Figure 3B: Check that the tourniquet will not come loose. The ends of the tourniquet should be pointed upward and not hang into the intended venipuncture site.

Phlebotomy Blood Collection

Objective Draw specimens correctly to provide the lab with a quality specimen, the physician with meaningful test results, & the patient with a minimum of sticks.

Patient Identification

DO:

• Properly perform 2 patient ID: Compare name and hospital number on ID bracelet with EACH label and when possible have patient state name and DOB

DON'T:

• State patient's name and wait for the patient to nod

Tourniquet Application

DO:

• Apply tourniquet 3-5 inches from intended site

• Dispose of tourniquet after each collection

DON'T:

• Leave the tourniquet on longer than 1 minute – (hint: not longer than you can hold your breath)

Vein Selection

DO:

• Choose appropriate site to perform venepuncture

DON'T:

• Draw specimen above IV site

• Draw through an existing hematoma

Dilating the Vein

DO:

• Ask patient to tighten their fist to dilate vein

DON'T:

• Allow patient to pump fist

Site Cleansing

DO:

• Use alcohol to clean site and allow to air dry

DON'T:

• Blow, fan or stick while alcohol is still wet

Needle Selection

DO:

• Use appropriate gauge needle - 21 or 23 gauge

• Use butterflies only for hard sticks and blood cultures

DON'T:

• Use a small gauge needle, such as 25 gauge

Order of Draw

DO:

• Draw blood in appropriate tube in correct order: 1. Blood Culture 2. Blue Top 3. Red Top 4. Green Top 5. Lavender Top

DON'T:

• Collect blood in wrong order

Vacutainer Collection

DO:

• Large veins only

• Allow tube to fill to capacity - premeasured vacuum

DON'T:

• Use on small veins

• Under-fill tubes

Tube Inversion

DO:

• Invert tubes immediately after collection

DON'T:

• Shake tubes

• Not invert tubes

Specimen Delivery

DO:

• Label specimens at patient bedside

• Recheck patient ID and labelled specimens

• Bag specimens and barcode label in Bio Hazard bag

• Tube the specimen bag to the lab in a timely manner

DON'T:

• Label patient's specimens at the nursing station

• Bag multiple specimens and barcode labels in one bag

• Delay tubing specimen to the lab

Conclusion Specimens drawn correctly provide the laboratory with a quality specimen, the physician with meaningful test results, and the patient a required outcome.

Routine Venepuncture Guidelines

MATERIALS

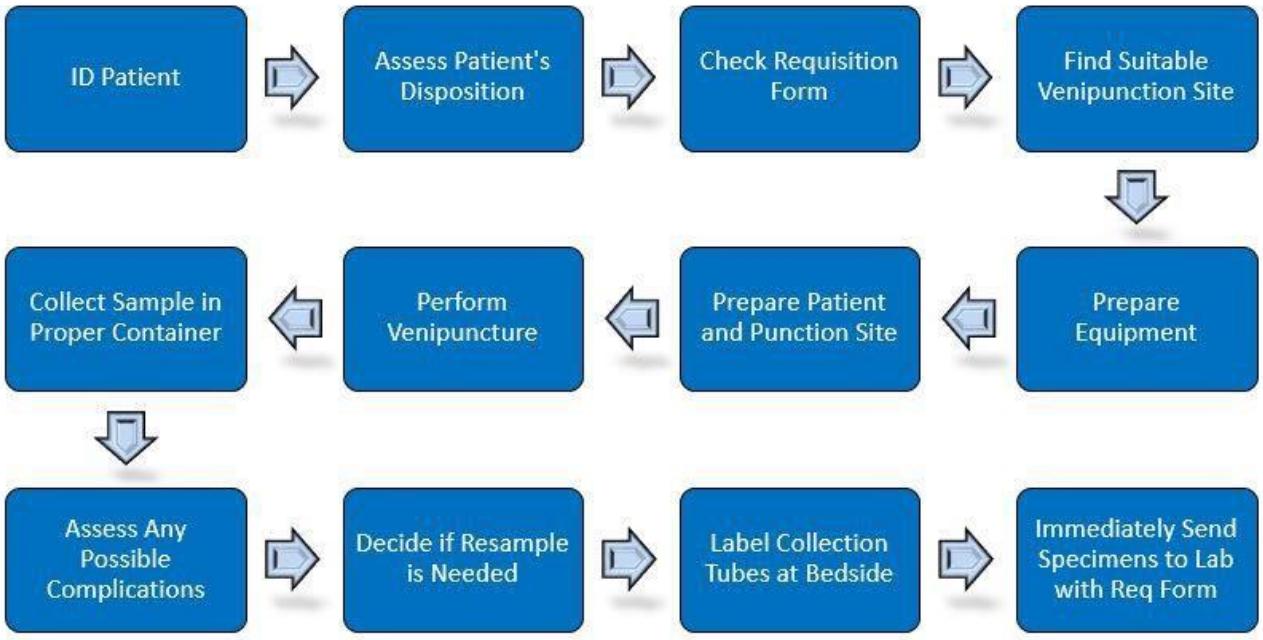
1. Safety Needles, 22g or less
2. Butterfly needles. 21g or less
3. Blood Collection Tubes. The vacuum tubes are designed to draw a predetermined volume of blood. Tubes with different additives are used for collecting blood specimens for specific types of tests. The color of the rubber stopper is used to identify these additives. See Selecting the Appropriate Collection Tube and Specimen Container Types.
5. Tourniquets. Latex-free tourniquets are available
6. Antiseptic. Individually packaged 70% isopropyl alcohol wipes.
7. 2x2 Gauze or cotton balls.
8. Sharps Disposal Container. An OSHA acceptable, puncture proof container marked "Biohazardous".
9. Bandages or tape

SAFETY

1. Observe universal (standard) safety precautions. Observe all applicable isolation procedures.
2. PPE's will be worn at all time.
3. Wash hands in warm, running water with the chlorhexidine gluconate hand washing product (approved by the Infection Control Committee), or if not visibly contaminated with a commercial foaming hand wash product before and after each patient collection.
4. Gloves are to be worn during all phlebotomies, and changed between patient collections. Palpation of phlebotomy site may be performed without gloves providing the skin is not broken.
5. A lab coat or gown must be worn during blood collection procedures.
6. Needles and hubs are single use and are disposed of in an appropriate 'sharps' container as one unit. Needles are never recapped, removed, broken, or bent after phlebotomy procedure.
7. Gloves are to be discarded in the appropriate container immediately after the phlebotomy procedure. All other items used for the procedure must be disposed of according to proper biohazardous waste disposal policy.
8. Contaminated surfaces must be cleaned with freshly prepared 10% bleach solution. All surfaces are cleaned daily with bleach.
9. In the case of an accidental needlestick, immediately wash the area with an antibacterial soap, express blood from the wound, and contact your supervisor.

PROCEDURE

1. Identify the patient. Outpatients are called into the phlebotomy area and asked their name and date of birth. This information must match the requisition. Inpatients are identified by their arm band. If it has been removed, a nurse must install a new one before the patient can be drawn.
2. Reassure the patient that the minimum amount of blood required for testing will be drawn.
3. Assemble the necessary equipment appropriate to the patient's physical characteristics.
4. Wash hands and put on gloves.
5. Position the patient with the arm extended to form a straight-line form shoulder to wrist.
6. Do not attempt a venepuncture more than twice. Notify your supervisor or patient's physician if unsuccessful.
7. Select the appropriate vein for venepuncture. The larger median cubital, basilic and cephalic veins are most frequently used, but other may be necessary and will become more prominent if the patient closes his fist tightly. At no time may phlebotomists perform venepuncture on an artery. At no time will blood be drawn from the feet unless there is a specific order in the computer.
8. Apply the tourniquet 3-4 inches above the collection site. Never leave the tourniquet on for over 1 minute If a tourniquet is used for preliminary vein selection, release it and reapply after two minutes.
9. Clean the puncture site by making a smooth pass over the site with the 70% alcohol pad. Allow the skin to dry before proceeding. Do not touch the puncture site after cleaning.
10. Perform the venepuncture



Troubleshooting Hints for Blood Collection

If a blood sample is not attainable:

- Reposition the needle.
- Ensure that the collection tube is completely pushed onto the back of the needle in the hub.
- Use another tube as vacuum may have been lost.
- Loosen the tourniquet.
- Probing is not recommended. In most cases, another puncture in a site below the first site is advised.
- A patient should never be pierced more than twice unsuccessfully by a phlebotomist. The Supervisor should be called to assess the patient.

Labelling the Tubes

How to Label...

1. Use ICE label if available otherwise a black pen
2. Include **full name**, **D.O.B, Ward, date and time**
3. Write the **time of collection** on the request form and initial the form
4. Place the tubes in the bag and attach the blood form and seal

Tubes and the Order of Draw

Blood bottles have specific solutions in each tube to enable the blood to be analysed in the laboratories. It is therefore important to take the blood in a specific order to reduce any cross contamination of solutions.

In your preparation for venepuncture, check the requisition for specific test(s) required. **Be certain** that you understand what type of blood specimen is required, what tube is needed, and the amount of specimen required. **If in doubt,** call the appropriate lab.

All tubes must be mixed to allow accurate testing in the laboratory. Blue and mauve tops should be gently rotated 3-4 times. All other tubes should be rotated 6-8 times.

Order of Draw

- Blood Cultures should be taken first - Then most commonly:
- Blue Top (clotting screen)
- Yellow Top (biochemistry profile)
- Purple Top (full blood count)

Phlebotomy – RF Hoke

Order of Draw

Stopper	Additive	Indications	Inversions	Function of additives
	Tryptic-Soy Protein broth	Blood Cultures Ideally, 10 mls per bottle **Aerobic** then **Anaerobic**	3 - 4	The additive is a bacterial growth activator.
	Sodium Citrate 3.2%	INR, APTR, APTT, All Coagulation screening	3 - 4	Inhibition of clotting by holding Ca away
	Sodium Citrate 3.2%	ESR (Erythrocyte Sedimentation Rate)	3 - 4	Same
	Silica	Viral serology, antibiotic levels	5	Activate clotting
	SST gel	All biochemistry, C-RP	5	Clotting activation+ blood separation
	Lithium Heparin	Plasma biochemistry Chromosomes	8 – 10	Inhibition of clotting by working on prothrombin
	Potassium EDTA	FBC, HbA1C, Blood Bank, ESR	8 - 10	Clotting inhibition by holding Ca
	EDTA	Blood Bank, Antibody screen Whole blood tests	8 - 10	
	Sodium Fluoride / Potassium Oxalate	Fasting Glucose, Glucose tolerance test	8 - 10	Preventing Glycolysis (the breakdown of sugars into more Glucose

Table 2. The Order of Draw

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The blood culture bottles always come at the top of the order of draw (see page 42). The blue topped bottle should be filled first as it is for Aerobic bacteria then the marron topped bottle should be filled as it is for Anaerobic bacteria. The blood culture bottles are used for the diagnosis of blood infection (e.g. Septicaemia)

Tube	Cap Colour	Additive	Determination	Inversion
Sodium Citrate	Light Blue	Buffered sodium citrate 0.109M (3.2%)	PT, APTT, D-Dimer, Lupus Anticoagulant, Anti-Thrombin III, Protein S & C, Fibrinogen, Factor Assay, HLA B27	3-4
Red Top Plain	Red	Clot Activator silicone-coated	Cold Agglutinins, Abnormal Blood Group Antibody Screen, Antibody Identification & Vitamin D2 & D3 (HPLC)	5
Plain	Gold	Clot Activator and gel for serum separation	Biochemistry, Virology, Immunology, Vit B12, Folate, Anticonvulsant Drug Monitoring, Therapeutic Drug Monitoring (TDM) & other investigations that require serum (i.e. plain blood)	5
Royal Blue Plain	Royal Blue (Serum)	Trace Element (with clot activator)	Zinc, Copper, Aluminum, Selenium	8-10
Lithium Heparin	Green	Lithium Heparin	STAT Biochemistry, Plasma Ammonia (in ice pack), CD34, Blood Alcohol, Toxicological Tests, Chromosomes Studies, Electrolytes, Renal Function Tests, TB Spot	8-10
Lithium Heparin	Light Green	Lithium Heparin and gel for plasma separation	STAT Biochemistry, Plasma Ammonia (in ice pack), CD34, Blood Alcohol, Toxicological Tests, Chromosomes Studies, Electrolytes, Renal Function Tests	8-10
Royal Blue EDTA	Royal Blue (K_2 EDTA)	K_2 EDTA	Arsenic, Cadmium, Chromium, Mercury, Lead, Manganese	8-10
K_2 EDTA	Lavender	Spray-coated K_2 EDTA	FBC, PBF, MP, ESR, HBA1c, Cyclosporine A, G6PD, RBC Cholinesterase, ACTH, Renin, HB Electrophoresis, Thalassemia Screening, CD4/CD8, Factor V Leiden	8-10
Sodium Fluoride	Grey	Sodium Fluoride	Glucose, Lactic Acid (in ice pack)	8-10

Surrey Pathology Services NHS

A joint venture between Frimley Health NHS Foundation Trust, Royal Surrey County Hospital NHS Foundation Trust and Ashford & St. Peter's Hospitals NHS Foundation Trust

USE THIS SIDE ONLY IN THE EVENT OF ELECTRONIC SYSTEM FAILURE

Lab No.:

For laboratory use only

Samples Received Date and Time:

Status: URGENT / ROUTINE

Please circle as appropriate

PATIENT DETAILS

NHS NUMBER:
HOSPITAL NUMBER:
SURNAME:
FORENAME:
DATE OF BIRTH:
SEX:
PATIENT CATEGORY:

ADDRESS:

TELEPHONE:

This is an example of a request form in which you can check the patient's details and what investigations should be performed.

REQUEST DETAILS

REQUESTING CLINICIAN:
LOCATION:
ADDRESS:

CONTACT NO.:
COPY TO:

REQUEST DATE:
COLLECTION DATE/TIME:
ANATOMICAL SITE OF ORIGIN:
SPECIMEN TYPE:
CLINICAL DETAILS:

Haematology

- ☐ Full Blood Count
- ☐ Coagulation Screen
- ☐ INR
- ☐ ESR
- ☐ B12 / Folate
- ☐ Infectious Mononucleosis
- ☐ Malarial Parasite Screening

Additional Investigation(s):

Immunology

- ☐ Anti-Nuclear Ab Screen
- ☐ Autoimmune Profile
- ☐ Bence Jones Protein
- ☐ Coeliac Screen - Tissue Transglutamine
- ☐ Protein Electrophoresis
- ☐ Rheumatoid Factor (Serum)

Additional Investigation(s):

Biochemistry

- ☐ Renal Profile (Na, K, Creat, Urea, eGFR)
- ☐ Liver Function Test
- ☐ Fasting Glucose/☐ Random Glucose
- ☐ Lipid Profile
- ☐ Bone Profile
- ☐ Thyroid Function Test
- ☐ C-reactive Protein (CRP)
- ☐ Haemoglobin A1C
- ☐ Microalbumin:Creatinine Ratio

Additional Investigation(s):

Blood Transfusion

- ☐ Routine Group and Antibody Screen
- ☐ Antenatal Group and Antibody Screen

Additional Investigation(s):

Microbiology

- ☐ Urine Specimens
- ☐ Genital Specimens
- ☐ Wound Specimens
- ☐ Eye Specimens
- ☐ Ear, Nose & Throat Specimens
- ☐ MRSA Screening
- ☐ Faeces Specimens
- ☐ Resp/AAFB Specimens
- ☐ Mycology Specimens

Additional Investigation(s):

Virology

- ☐ Hepatitis B Antibody (Post Vaccine)
- ☐ Chlamydia male first catch urine
- ☐ Chlamydia cervical samples
- ☐ Varicella Zoster Serology

Additional Investigation(s):

Table 1 Details of some general investigations

Investigation	Content	Tube
LFT Liver function test	- ALT - AST - GGT - Albumin - Globulin	Yellow
KFT RFT Renal function test Renal profile	- GFR - Urea - Creatinine - Electrolytes (Na, K , Mg, CL etc)	Yellow
Lipid profile fat	Cholesterol - HDL - LDL - VLDL Triglyceride	Yellow
Thyroid Function test	- TSH - T3 - T4	Yellow
Heart enzymes Cardiac panel	- Troponin	Yellow
Bone profile	- CPK - PO4 - Ca	Yellow
Anaemia profile	Confirmation - FBC - Hb The cause - (Ferritin) Fe- IDA - B12, Folic acid- MPA	Purple Yellow
Prostate profile	- PSA	Yellow
Pancreas	- Amylase	Yellow
Coagulation profile	- Coagulation factors - Fibrinogen - Fibrin - Factors, I, II, II, IV etc - Platelet aggregation - PT - aPTT - INR	Light Blue

BD Helping all people live healthy lives

BD Vacutainer® Venous Blood Collection

Tube Guide

For the full array of BD Vacutainer® Blood Collection Tubes, visit www.bd.com/vacutainer.
Many are available in a variety of sizes and draw volumes (for pediatric applications). Refer to our website for full descriptions.

BD Vacutainer® Tubes with BD Hemogard™ Closure	BD Vacutainer® Tubes with Conventional Stopper	Additive	Inversions at Blood Collection*	Laboratory Use	Your Lab's Draw Volume/Remarks
Gold	Red/Gray	• Clot activator and gel for serum separation	5	For serum determinations in chemistry. May be used for routine blood donor screening and diagnostic testing of serum for infectious disease.** Tube inversions ensure mixing of clot activator with blood. Blood clotting time: 30 minutes.	
Light Green	Green/Gray	• Lithium heparin and gel for plasma separation	8	For plasma determinations in chemistry. Tube inversions ensure mixing of anticoagulant (heparin) with blood to prevent clotting.	
Red	Red	• Silicone coated (glass) • Clot activator, Silicone coated (plastic)	0 5	For serum determinations in chemistry. May be used for routine blood donor screening and diagnostic testing of serum for infectious disease.** Tube inversions ensure mixing of clot activator with blood. Blood clotting time: 60 minutes.	
Orange		• Thrombin-based clot activator with gel for serum separation	5 to 6	For stat serum determinations in chemistry. Tube inversions ensure mixing of clot activator with blood. Blood clotting time: 5 minutes.	
Orange		• Thrombin-based clot activator	8	For stat serum determinations in chemistry. Tube inversions ensure mixing of clot activator with blood. Blood clotting time: 5 minutes.	
Royal Blue		• Clot activator (plastic serum) • K_2EDTA (plastic)	8 8	For trace-element, toxicology, and nutritional-chemistry determinations. Special stopper formulation provides low levels of trace elements (see package insert). Tube inversions ensure mixing of either clot activator or anticoagulant (EDTA) with blood.	
Green	Green	• Sodium heparin • Lithium heparin	8 8	For plasma determinations in chemistry. Tube inversions ensure mixing of anticoagulant (heparin) with blood to prevent clotting.	
Gray	Gray	• Potassium oxalate/ sodium fluoride • Sodium fluoride/Na_2 EDTA • Sodium fluoride (serum tube)	8 8 8	For glucose determinations. Oxalate and EDTA anticoagulants will give plasma samples. Sodium fluoride is the antiglycolytic agent. Tube inversions ensure proper mixing of additive with blood.	

 Tan		• K_2EDTA (plastic)	8	For lead determinations. This tube is certified to contain less than .01 µg/mL(ppm) lead. Tube inversions prevent clotting.	
	 Yellow	• Sodium polyanethol sulfonate (SPS) • Acid citrate dextrose additives (ACD): **Solution A -** 22.0 g/L trisodium citrate, 8.0 g/L citric acid, 24.5 g/L dextrose **Solution B -** 13.2 g/L trisodium citrate, 4.8 g/L citric acid, 14.7 g/L dextrose	8 8 8	SPS for blood culture specimen collections in microbiology. ACD for use in blood bank studies, HLA phenotyping, and DNA and paternity testing. Tube inversions ensure mixing of anticoagulant with blood to prevent clotting.	
 Lavender	 Lavender	• Liquid K_3EDTA (glass) • Spray-coated K_2EDTA (plastic)	8 8	K_2EDTA and K_3EDTA for whole blood hematology determinations. K_2EDTA may be used for routine immunohematology testing, and blood donor screening.*** Tube inversions ensure mixing of anticoagulant (EDTA) with blood to prevent clotting.	
 White		• K_2EDTA and gel for plasma separation	8	For use in molecular diagnostic test methods (such as, but not limited to, polymerase chain reaction [PCR] and/or branched DNA [bDNA] amplification techniques.) Tube inversions ensure mixing of anticoagulant (EDTA) with blood to prevent clotting.	
 Pink	 Pink	• Spray-coated K_2EDTA (plastic)	8	For whole blood hematology determinations. May be used for routine immunohematology testing and blood donor screening.*** Designed with special cross-match label for patient information required by the AABB. Tube inversions prevent clotting.	
 Light Blue  Clear	 Light Blue	• Buffered sodium citrate 0.105 M (≈3.2%) glass 0.109 M (3.2%) plastic • Citrate, theophylline, adenosine, dipyridamole (CTAD)	3-4 3-4	For coagulation determinations. CTAD for selected platelet function assays and routine coagulation determination. Tube inversions ensure mixing of anticoagulant (citrate) to prevent clotting.	
 Clear	 New Red/ Light Gray	• None (plastic)	0	For use as a discard tube or secondary specimen tube.	

Note: BD Vacutainer® Tubes for pediatric and partial draw applications can be found on our website.

BD Diagnostics
Preanalytical Systems
1 Becton Drive
Franklin Lakes, NJ 07417 USA

BD Global Technical Services: 1.800.631.0174
BD Customer Service: 1.888.237.2762
www.bd.com/vacutainer

* Invert gently, do not shake
** The performance characteristics of these tubes have not been established for infectious disease testing in general; therefore, users must validate the use of these tubes for their specific assay-instrument/reagent system combinations and specimen storage conditions.
*** The performance characteristics of these tubes have not been established for immunohematology testing in general; therefore, users must validate the use of these tubes for their specific assay-instrument/reagent system combinations and specimen storage conditions.

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Venepuncture Checklist

- Have you confirmed the identity of the patient?
- Have you obtained informed consent?
- Have you considered local anaesthesia?
- Does the patient have an IV infusion in progress in the limb you propose to use?
- Do you have all the equipment required?
- Do you have a sharps bin?
- Do you know how to document the procedure?
- What will you do if you are unsuccessful?

Venepuncture Key Points and Summary

- Always gain consent
- Always wear gloves when carrying out venepuncture
- Always use vacutainer equipment when taking blood, never a needle and syringe.
- Always label blood bottles immediately after taken, ideally by the bedside of the patient.
- Always follow the policies and guidelines
- Always perform the skill under direct supervision by a trained member of staff competent in the skill and who uses them regularly, until such time that you are signed off as competent

Complications of phlebotomy

(A) Direct Complications

Complications caused by the procedure to the patients. And you can think about such complications by summarising the procedure protocol into three main points in which most complications may take place as follows:

(1) ANTT (Aseptic non-touch technique).
(2) Finding the vessel with a tourniquet.
(3) Using the needle to withdraw the blood sample.

(1) ANTT (Aseptic non-touch technique).

If ANTT was not applied at any stage of the procedure the following complications may happened:

- Infection (phlebitis).
- Infection can then spread via the venous system and cause sepsis.
- Sepsis in turn can lead to multiorgan failure
- Death can result in extreme cases as a result of untreated sepsis.

(2) Finding the vessel with a tourniquet.

If the 4 conditions of using the tourniquet, (Being disposable, 4 inches higher from the site of the vein, not to be too tight, not to be kept for more than 2 minutes continuously), several complications may take place as follows:

- Blood supply to the limb will be compromised if the tourniquet was (too tight).
- Haematoma which is a bluish/greenish swelling due to the collection of blood under the skin and it happens if the tourniquet was (too close) to the vein site (less than 4 inches or finger-width).

  Here you need to think of other causes of haematoma:
  - If you remove the needle before releasing the tourniquet.
  - If you do not press the cotton enough on the area after removing the needle.
- Haemolysis, which means the breakdown of the red blood cells releasing contents that might change the plasma content and result in wrong results for investigations. This might happen if the tourniquet (was left for long time) that is more than 2 minutes. Hyperkalaemia (high

blood level of potassium) is a major example for such problem. The inside of red blood cells is rich of potassium that will be released to the plasma when the cells break down and gives false very high potassium readings on blood investigation.

Here you need to think of other causes for haemolysis:

- Too much inversion for the tubes after taking the blood sample.
- Too Small needle is used to withdrew blood from a very big vein.
- Too much alcohol on the vein site that was not left to dry for 30 seconds.

- Tourniquets should be disponible otherwise they can be a source of infection.

(3) Using the needle to withdraw the blood sample. Think about it from superficial (skin) to deeper layers (e.g. tendons, arteries and nerves).

- Bruising.
- Bleeding.
- Pain.
- Injury to a nerve or a tendon or an artery. Keep in mind that using too big needles and not following the protocols are more likely to cause such complications.

(B) Indirect Complications

Caused indirectly by the procedure. That can lead to failure of the procedure or negatively affect the results of the investigations.

- Wrong patient: If you do not identify the patient's information on their form, then wrong blood samples will be collected from the wrong patient that might lead to serious consequences if it passed unnoticed.
- Wrong tubes: Certain tubes must be used for certain investigations and wrong tubes choices can lead to wrong results.
- Wrong order of drew: After choosing the right tubes, they must be filled in a specific order to avoid cross contamination of additives that might lead to wrong results.
- No or too much inversion for the tubes: After collecting, too much inversion might lead to the breakdown of the red blood cells (Haemolysis). On the other hand, no inversion at all might lead to wrong results again because the sample is not mixed properly with the additive.
- If the tubes are not labelled, the risk of losing the sample is very high. The sample might be discarded as an unknown sample.
- If the tubes are not sent to the laboratory immediately after labelling them, there is high risk that the sample might become unfit for testing.

- Needle stick injury can happen if you do not take all the safety measures and protocols into account. Here what you need to do if this happened:
    - Encourage it to bleed as bleeding might push infectious material out.
    - Wash with water and soap.
    - Dressing.
    - Report it.
- Unsafe disposal of equipment, needles, aprons and gloves to the properly might put other people at risk of Infection to other.

(A) Long term complications

- Needle phobia.
- Bad experience

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Assessment and evaluation session (PART 2)

This section is vitally important for finishing the 2nd part of the phlebotomy training successfully with information on the Work Experience Program WEP sessions after that.

What is the assessment?

In order to gain the certificate of competence, the student is required to finish a 4 hours assessment session (part 2 phlebotomy session). In the session a professional assessor will assess the students theoretical and practical readiness to be considered competent based on the national standards that are applied in the United Kingdom.

When should I do the assessment?

It is advisable that students finish the second part of the training (Part 2 phlebotomy session) within 3 months since they attended their first part. The ideal time to do attend part 2 is within the first 3 weeks after the first session. It should be kept in mind that it is not advisable to attend the assessment in the first week or after 3 months from when the part one session completed. However, this can depend on the student's circumstances.

How can I pass the assessment (part 2) session?

In order to pass the assessment, you need to do the following:

- Make sure you read this book very well before you attend your assessment session.
- Make sure you go through your notes that you collected in your part 1 session.
- Make sure you read this section very well.

What is going to happen in the assessment day?

- You will learn how to choose the tubes for the right investigation.
- You will have a one-to-one **theoretical assessment (see appendix 1).**
- You will then be assessed for your **practical skills. (see appendix 2)**

What is the Work Experience Program WEP?

- Sessions can be booked optionally to practice with your colleague in the school building.
- You can book a session before your assessment to break the ice. However, you need to pass the assessment before you can book the session in order to get a reference letter from us.
- In the session you improve your skills and gain experience.

APPENDIX 1: QUESTIONS

Venepuncture Workbook Questions

Instructions: in your assessment day, you are expected that you answered these questions in advance. The assessor will discuss your answers with you as part of your theoretical assessment. You need to be able to justify your true or false answers so make sure to read the book and your notes before answering.

	Please tick True or false to each Question	True	False
1.	A pulse is always present on palpation of a vein	☐	☐
2.	Only Nurses can be held responsible	☐	☐
3.	Two attempts are acceptable in one patient episode per person	☐	☐
4.	The antecubital Fossa is easily accessible	☐	☐
5.	**Ignorance** is not a defence	☐	☐
6.	It is acceptable to perform a procedure that you have not been trained to do	☐	☐
7.	It is your responsibility to keep up to date with practice	☐	☐
8.	The antecubital fossa is located at the anterior aspect of the elbow	☐	☐
9.	Veins and arteries consist of 5 layers	☐	☐
10.	Veins take deoxygenated blood from the tissues to the heart	☐	☐
11.	The radial nerve gives feeling to the skin on the outside of the thumb	☐	☐
12.	The median nerve passes down the inside of the arm and crosses behind of the elbow	☐	☐
13.	Veins should be soft, palpable and bouncy	☐	☐
14.	When possible only perform venepuncture on healthy tissue	☐	☐
15.	Gloves must be worn for invasive procedures	☐	☐
16.	Always label blood bottles immediately after taken	☐	☐
17.	It does not matter which order you fill blood bottles	☐	☐
18.	ANTT is the second most important technique to prevent infections	☐	☐
19.	Careful technique will reduce the incidence of complications	☐	☐
20.	Topical local anaesthesia may be of benefit when patients are needle phobic	☐	☐

STEPS FROM A-Z OF PHLEBOTOMY PROCEDURE

FOLLOW THE PROTOCOL TO PASS THE ASSESSMENT:

1 Wear Apron (PPE) (personal protective equipment)

2 Wash your hands – 25 seconds – Dry hands – keep clean

3 Apply alcohol gel ---------- Follow same steps

4 Clean tray---inside out---wait or use disposable if available--------can apply alcohol gel

5 Place all equipment required on clean tray including tourniquet and right size gloves ---keep spares

6 Place pillow under patients arm and make patient comfortable – Check position of patient - DO not hyperextend arm

7 Inspection and palpitation of the vein with tourniquet on without wearing gloves and with tourniquet Ask leading question and make your own judgment to choose the vein

8 Release tourniquet ---NO LONGER THAN 2 MINUTES continually

9 Decontaminate hands

10 Wear the right size gloves

11 Assemble equipment

12 Swab the access sight – wait for 30 seconds (can apply tourniquet and then swab or swab first and apply tourniquet) Follow ANTT once swabbed

13 Apply tourniquet if haven't already

14 Stretch skin and Anchor vein and take sample following D A D ------To avoid missing rolling vein

15 Release tourniquet before withdrawing last sample tube (while last tube is filling release tourniquet) Never pull out needle first with tube still attached

16 Withdraw tube

17 Remove needle smoothly after placing cotton at the site without applying pressure (follow direction of vein)

18 Ask patient to apply [pressure with cotton at site

19 Invert tube if possible but never forget to invert within a minute or so

20 Always check the site for bruise or hematoma

21 Post procedure advice to patient

22 Label

23 Thank Patient

APPENDIX 2: ASSESSMENT CRITERIA FOR VENEPUNCTURE

Instructions: In your practical assessment, the assessor is going to fill this table for you. You need to be prepared and follow the protocol that will given to you in the part 1 day.

(Skill - Blood Venous Sampling Competency)

Name of Candidate

Job Title:
Ward/Dept:
(Print details clearly in BLOCK capitals)

Name of Assessor

Job Title:
Ward/Dept:

Skills for Health National Occupational Standard: CHS132.2012

At least 1 observational assessment must be performed to assess candidate competence. If there are any concerns or 'no' has been entered in any area of the assessment process another observational assessment must be completed, and repeated until fully competent.

Observational assessment
Did the candidate meet the following criteria?

Confirm that:	Assessment 1 Date: YES / NO	Assessment 2 Date: YES / NO	Comments
Check blood 'request' form for the following details: Confirm Test request: • Correct and printed Confirm Patient: • Full name • Date of birth • Hospital number			
Procedure discussed with patient, parent or carer			

Confirm that:	Assessment 1 Date: YES / NO	Assessment 2 Date: YES / NO	Comments
Gather correct blood bottles for the required blood tests			
Identify correct patient • wrist band, Photo ID, medical notes			
you apply **standard precautions** for infection control, using ANTT throughout the procedure			
you select and prepare an appropriate site for obtaining the venous blood ensuring it is cleaned effectively, immediately before the blood is obtained			
you apply, use and release a tourniquet at appropriate stages of the procedure			
you gain venous access using the selected blood collection system, in a manner which will cause minimum discomfort to the **individual**			
you take appropriate action to stimulate the flow of blood if there is a problem obtaining blood from the selected site, or choose an alternative site (only make a maximum of 2 attempts)			
you obtain the blood from the selected site: • in the correct container according to investigation required • in the correct volume • in the correct order of draw when taking multiple samples to avoid contamination			

Confirm that:	Assessment 1 Date: YES / NO	Assessment 2 Date: YES / NO	Comments
• you split the blood for culture if needed • you mix the blood and anti-coagulant thoroughly WHEN anti-coagulated blood is needed			
you promptly identify any indication that the individual may be suffering any adverse reaction/event to the procedure and act accordingly (seek help and advice if necessary)			
you remove blood collection equipment and stop blood flow with sufficient pressure at the correct point and for the sufficient length of time to ensure bleeding has stopped			
you apply a suitable dressing to the puncture site and advise the individual about how to care for the site			
Label all samples at the patient side: **If required**, use blood track handheld device to produce a demand printed label for the blood transfusion sample and attach so that the volume in the bottle can still be seen (handwrite if blood track is unavailable)			
All other blood samples you label clearly, accurately and legibly, using computer prepared labels where appropriate and hand write labels on blood samples obtained for cultures • Print and sign name on request forms			

Confirm that:	Assessment 1 Date: YES / NO	Assessment 2 Date: YES / NO	Comments
you place samples in the appropriate packaging and ensure the correct request forms are attached.			
you place samples in the nominated place for collection and transportation, ensuring the blood is delivered to the laboratory on time and kept at the required temperature to maintain its integrity as specified by special instructions			
you ensure immediate transport of the blood to the relevant department when blood sampling and investigations are urgent			
you document all relevant information clearly, accurately and correctly in the appropriate records			
You dispose of all blood collection equipment safely and appropriately			

All the above criteria must be achieved to gain competency

If competency not gained:

- Manager must give clear feedback
- Retraining requirements must be determined
- Re-assessment date to be arranged after further training

Your result

☐ Pass

☐ Reassessment is required

☐ In a part 2 session

☐ In a W.E.P. session

Candidate assessed as competent
Retraining and reassessment required

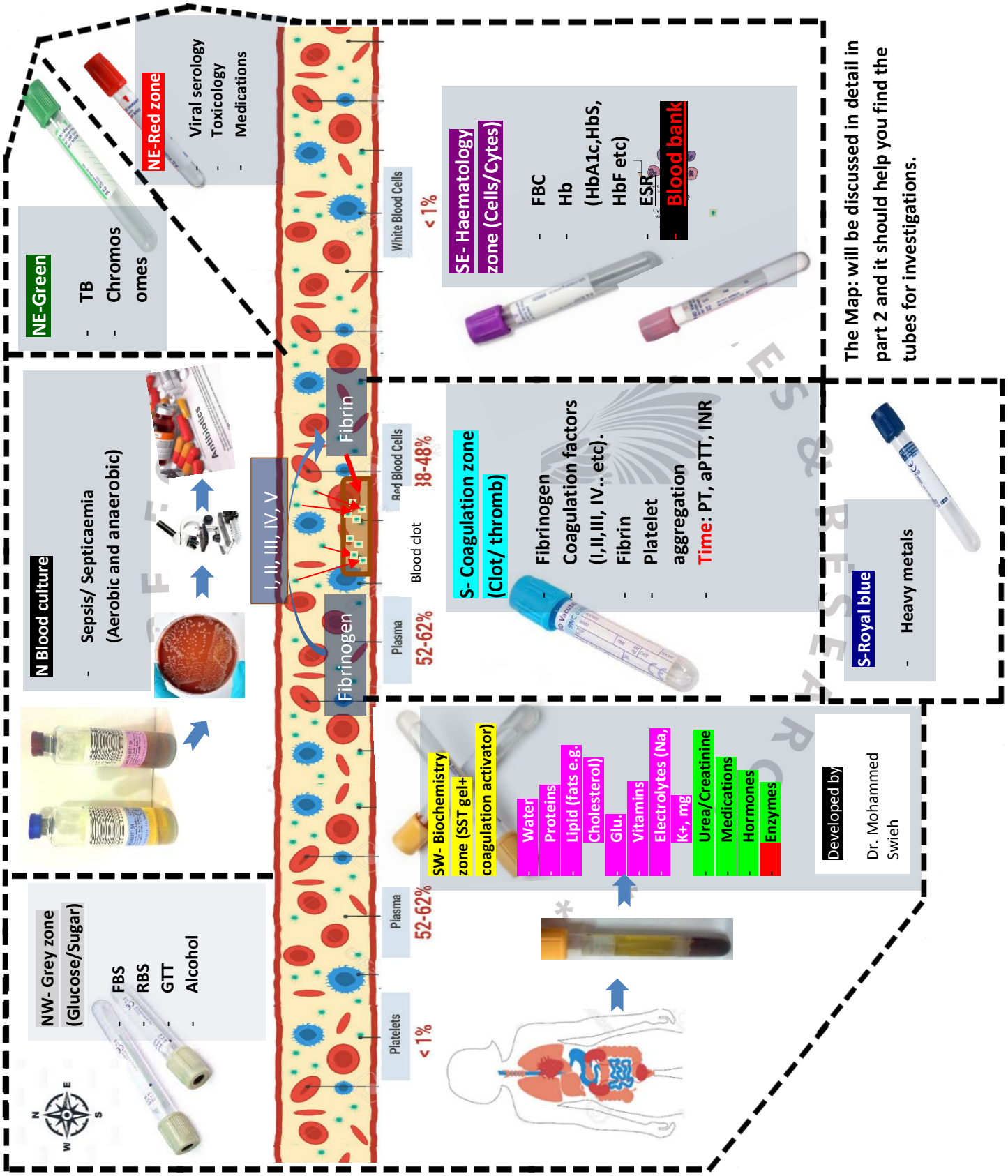
Signature of Assessor ……..Date……

I agree that I have sufficient current knowledge and understanding of the Venous Sampling process and feel that I am competent to practice.

Signature of Candidate ……..Date……..

For Office Use:
'Blood Venous Sampling Competency' Skill added to personal record on Trust Training Database Yes / No

APPENDIX 3: THE (MAP), A TOOL THAT WILL HELP YOU MAKE TUBE CHOICES



APPENDIX 4: CHS132 - NATIONAL OCCUPATIONAL STANDARD FOR OBTAINING VENOUS BLOOD SAMPLES

B

Skills for Health

CHS132 Obtain venous blood samples

OVERVIEW

This standard covers the use of venepuncture/phlebotomy techniques and procedures to obtain venous blood samples from individuals for investigations.

Users of this standard will need to ensure that practice reflects up to date information and policies.

Version No 1

KNOWLEDGE AND UNDERSTANDING

You will need to know and understand:

1. the current European and National legislation, national guidelines, organisational policies and protocols in accordance with Clinical/Corporate Governance which affect your work practice in relation to obtaining venous blood samples
2. your responsibilities and accountability in relation to the current European and National legislation, national guidelines and local policies and protocols and Clinical/Corporate Governance
3. the duty to report any acts or omissions in care that could be detrimental to yourself, other individuals or your employer
4. the importance of obtaining positive confirmation of individuals' identity and consent before starting the procedure, and effective ways of getting positive identification
5. the importance of working within your own sphere of competence and seeking advice when faced with situations outside your sphere of competence
6. the importance of applying standard precautions to obtaining venous blood samples and the potential consequences of poor practice
7. how infection is spread and how its spread may be limited - including how to use or apply the particular infection control measures needed when working with blood
8. the structure of blood vessels
9. the position of accessible veins for venous access in relation to arteries, nerves and other anatomical structures
10. blood clotting processes and factors influencing blood clotting
11. the contra-indications and changes in behaviour and condition, which indicate that the procedure should be stopped, and advice sought

12. the concerns which individuals may have in relation to you obtaining venous blood
13. how to prepare individuals for obtaining venous blood, including how their personal beliefs and preferences may affect their preparation
14. what is likely to cause discomfort to individuals during and after obtaining venous blood, and how such discomfort can be minimised
15. common adverse reactions/events to blood sampling, how to recognise them and the action(s) to take if they occur
16. the type and function of different blood collection systems
17. what dressings are needed for different types of puncture sites, how to apply and what advice to give individuals on caring for the site
18. the factors to consider in selecting the best site to use for venous access
19. the equipment and materials needed for venepuncture/phlebotomy and how to check and prepare blood collection systems
20. the importance of ensuring venous access sites are cleaned effectively, and how and when this should be done
21. the correct use of tourniquets
22. the importance of correctly and safely inserting and removing needles
23. how to recognise an arterial puncture, and the action to take if this occurs
24. the factors involved in the procedure which could affect the quality of the blood
25. the remedial action you can take if there are problems in obtaining blood
26. the complications and problems may occur during venepuncture, how to recognise them and what action(s) to take
27. when and how to dress venous puncture sites
28. the information that needs to be recorded on labels and other documentation
29. the importance of completing labels and documentation clearly, legibly and accurately
30. the importance of immediately reporting any issues which are outside your own sphere of competence without delay to the relevant member of staff

PERFORMANCE CRITERIA

You must be able to do the following:

1. apply standard precautions for infection prevention and control any other relevant health and safety measures
2. give the individual relevant information, support and reassurance in a manner which is sensitive to their needs and concerns
3. gain valid consent to carry out the planned activity
4. select and prepare:
    1. an appropriate site
    2. appropriate equipment for obtaining the venous blood
5. apply, use and release a tourniquet at appropriate stages of the procedure
6. gain venous access using the selected blood collection system, in a manner which will cause minimum discomfort to the individual
7. obtain the blood from the selected site:
    1. in the correct container according to investigation required

2. in the correct volume
3. in the correct order when taking multiple samples

8. take appropriate action to stimulate the flow of blood if there is a problem obtaining blood from the selected site, or choose an alternative site
9. mix the blood and anti-coagulant thoroughly when anti-coagulated blood is needed
10. promptly identify any indication that the individual may be suffering any adverse reaction/event to the procedure and act accordingly
11. remove blood collection equipment and stop blood flow with sufficient pressure at the correct point and for the sufficient length of time to ensure bleeding has stopped
12. apply a suitable dressing to the puncture site according to guidelines and/or protocols, and advise the individual about how to care for the site
13. label blood samples clearly, accurately and legibly, using computer prepared labels where appropriate
14. place samples in the appropriate packaging and ensure the correct request forms are attached
15. place samples in the nominated place for collection and transportation, ensuring the blood is kept at the required temperature to maintain its integrity
16. document all relevant information clearly, accurately and correctly in the appropriate records
17. ensure immediate transport of the blood to the relevant department when blood sampling and investigations are urgent

ADDITIONAL INFORMATION

This National Occupational Standard was developed by Skills for Health.

This standard links with the following dimension within the NHS Knowledge and Skills Framework (October 2004):

Dimension: HWB6 Assessment and treatment planning

This standard has replaced Diab_FA2, BDS11 and HCS_PHO2