

Venipuncture and Phlebotomy

Learning Package



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Introduction

Phlebotomy is the most common invasive medical procedure in health care. Strict adherence to Clinical Laboratory Standards Institute standards and best practice guidelines decreases errors in both the pre-analytical and post-analytical phases of specimen collection/interpretation. Total error ranges from 46% to 68.2% in the pre-analytical phase of specimen collection (Healthcare policy, 2014). For this reason, it is critical that patients be positively identified by staff prior to collection, ensuring that blood specimens are drawn for the correct patient.

Performing venipuncture and phlebotomy for the purpose of obtaining blood samples involves acquiring challenging skills that require knowledge, perseverance, patience and practice. Confidence and proficiency come with performing this procedure on real patients with different and varied types and qualities of veins.

The *Venipuncture and Phlebotomy Learning package* has been developed to provide staff with the training required by Collingwood General and Marine Hospital (CGMH), to attain competency in venous blood collection. Allowing only trained, competent phlebotomists to procure venous blood specimens from patients provides assurance that patient safety and satisfaction are priorities.

Learning Objectives

Upon completion of this learning package, the health care provider performing venipuncture (phlebotomist) will be able to:

- Describe the significant differences between veins and arteries
- Explain the process and criteria for vein assessment and selection and possible contraindications to venipuncture site selection
- Identify who can perform venipuncture and phlebotomy procedures
- Identify the purposes for which blood specimens are collected by venipuncture
- Describe the procedure for blood specimen collection including blood culture and blood transfusion specimen selection
- Describe the requirements for positive patient identification and labelling of blood specimens
- Describe techniques used for vein stabilization, distention and site preparation
- Describe patient positioning
- Discuss the equipment required for collecting blood specimens
- Identify possible complications of venipuncture and factors that may contribute to pre-analytical error
- Discuss the significance of the *Blood Collection Order of Draw* and the sequence for blood collection
- List safety and infection control precautions
- Troubleshoot causes for venipuncture failure
- Recognize possible complications associated with venipuncture procedures and describe the proper follow-up

- Describe additional steps to avoid hematoma, hemolysis or hemo-concentration
- Describe post-venipuncture care

Venipuncture is a procedure in which a vein is punctured by inserting a hollow-bore needle through the skin. It is done to obtain a blood specimen for the purposes of diagnostic evaluation, analysis of patient responses to treatment, for type and antibody screen or cross-matching, and blood culture to assist in the confirmation and identification of causative organisms in bacteremia and septicemia.

Blood tests are one of the most commonly used diagnostic aids in the care and management of patients and yield valuable information about nutritional, hematologic, metabolic, immune and biochemical status.

Initial Factors for Consideration

When a blood test is ordered by an authorized prescriber it is important to identify if there are any special conditions or patient preparation that is required to ensure the quality of the test results.

Examples of this include whether the patient needs to fast for a period of time prior to the blood specimen being obtained, coordinating the collection of a blood specimen with the administration of a medication, or identifying that a specimen will require specific temperature controls once collected.

Since veins are the major sources of blood for laboratory testing, as well as routes for intravenous fluids and blood replacement, maintaining their integrity is essential. In cases where patients have limited available venipuncture sites, the phlebotomist must be skilled in venipuncture to avoid unnecessary injury to veins and surrounding structures.

Another important factor for consideration by the prescriber is to assess/ascertain whether the blood test may be processed from a specimen drawn previously on the same day. The laboratory may be contacted to determine if an additional order may be placed on an existing specimen. This steps help to eliminate the need to perform unnecessary venipuncture reducing the volume of blood taken from a patient, and preventing waste of the resources associated with obtaining and processing additional specimens.

Hand Hygiene

Hand Hygiene is one of the most effective measures to reduce the occurrence of hospital associated infections. The '4 Moments of Hand Hygiene' must be observed during the collection process.

Patient Identification

Confirming the patient's identity is the most crucial step in collection of laboratory specimens. Many patients have similar names and the same date of birth. Unique identification is required to ensure results are reported on the correct patient. Collection should only occur *after* the patient is correctly identified. All steps of the collection and labelling process will occur in the presence of the patient.

To ensure the safety and security of our patients, it is necessary to clearly identify all patients. Our practice is to confirm with at least two (2) person-specific identifiers related to information unique to the patient prior to the initiation of any intervention, procedure or treatment.

Two (2) person-specific identifiers will be used to identify every inpatient, emergency and outpatient prior to any intervention, procedure or treatment to validate and confirm patient identification. Person-specific identifiers include:

- First name and last name
- Date of birth
- Master Patient Index Number (M00#)
- Registration number (e.g. current visit #: ER, OP, DC, MD, DT or AC)
- Health Card Number

The patient identification band should be securely attached to the patient either on the patient's wrist or ankle. Securing the identification band to the bedrail identifies the bedrail; but, does not identify the patient *and* is not acceptable.

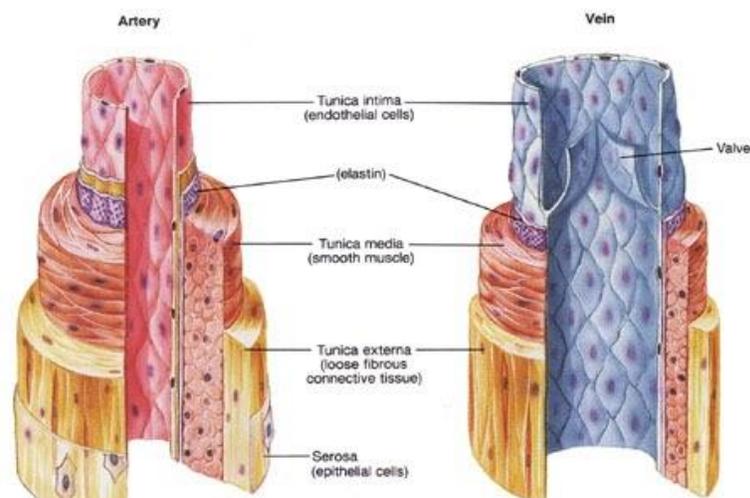
On every occasion that a patient receives medication, undergoes any treatment, test or procedure, or care is transferred to another provider, the patient's identity must be validated using two (2) of the person-specific identifiers.

It is important to ask the patient to state his/her name rather than staff stating the name, as some patients may answer to the wrong name

Anatomy & Physiology

Superficial veins of the upper extremities are routinely utilized for intravenous cannulation. Although arteries rarely appear superficially, aberrant arteries can pop up in unusual places. Therefore, it is necessary to differentiate between veins and arteries. The risk of arterial cannulation also increases in the antecubital fossa where arteries and veins lie closer together.

Veins return deoxygenated blue tinged blood from the body to the heart under minimal pressure. Veins do not pulsate. Veins contain valves to aid in the prevention of backflow due to their low pressure. Veins will distend and collapse.



Fox, Stuart I.
Human Physiology 4th
Brown Publishers

Tunica adventitia/externa is the outermost coat. It consists of white fibrous connective tissue. It functions to support the vessel while blood is being pumped through it. It prevents arteries from collapsing when cut.

Tunica media is the smooth muscle layer and is found just inside the tunica adventia. It consists of elastic and fibrous tissues. It is this coat that is innervated by autonomic fibers and permits constriction and dilation of vessels.

Tunica intima is the endothelial lining of the vessel. These endothelial cells are thin and flat to allow rapid flow of blood through the vessels. This layer is what makes up valves in veins. Arteries do not have valves.

Arteries transport oxygenated red blood from the heart to the body under pressure. Arteries pulsate. Arteries will not collapse.

Nerves – bundles of nerve fibres that carry impulses to and from the brain and spinal cord. Reduce the risk of nerve damage by avoiding areas of greater risk.

*****Always palpate a chosen vessel for arterial pulsation prior to cannulation*****

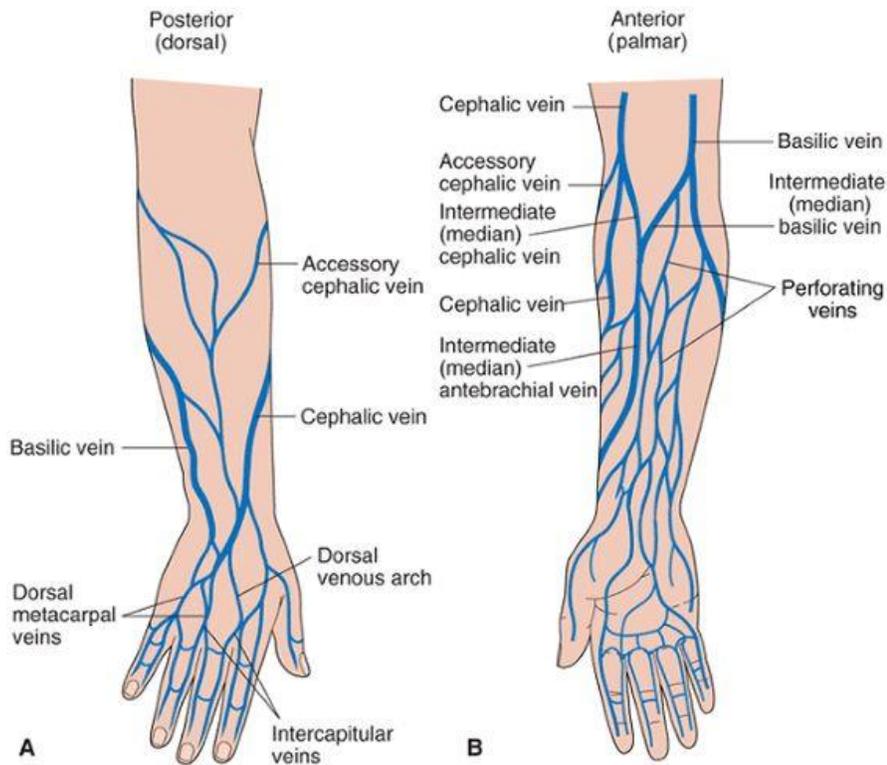
Veins of the Upper Extremity

The **Cephalic vein** travels along the radial surface of the forearm. Its size and position make it readily accessible.

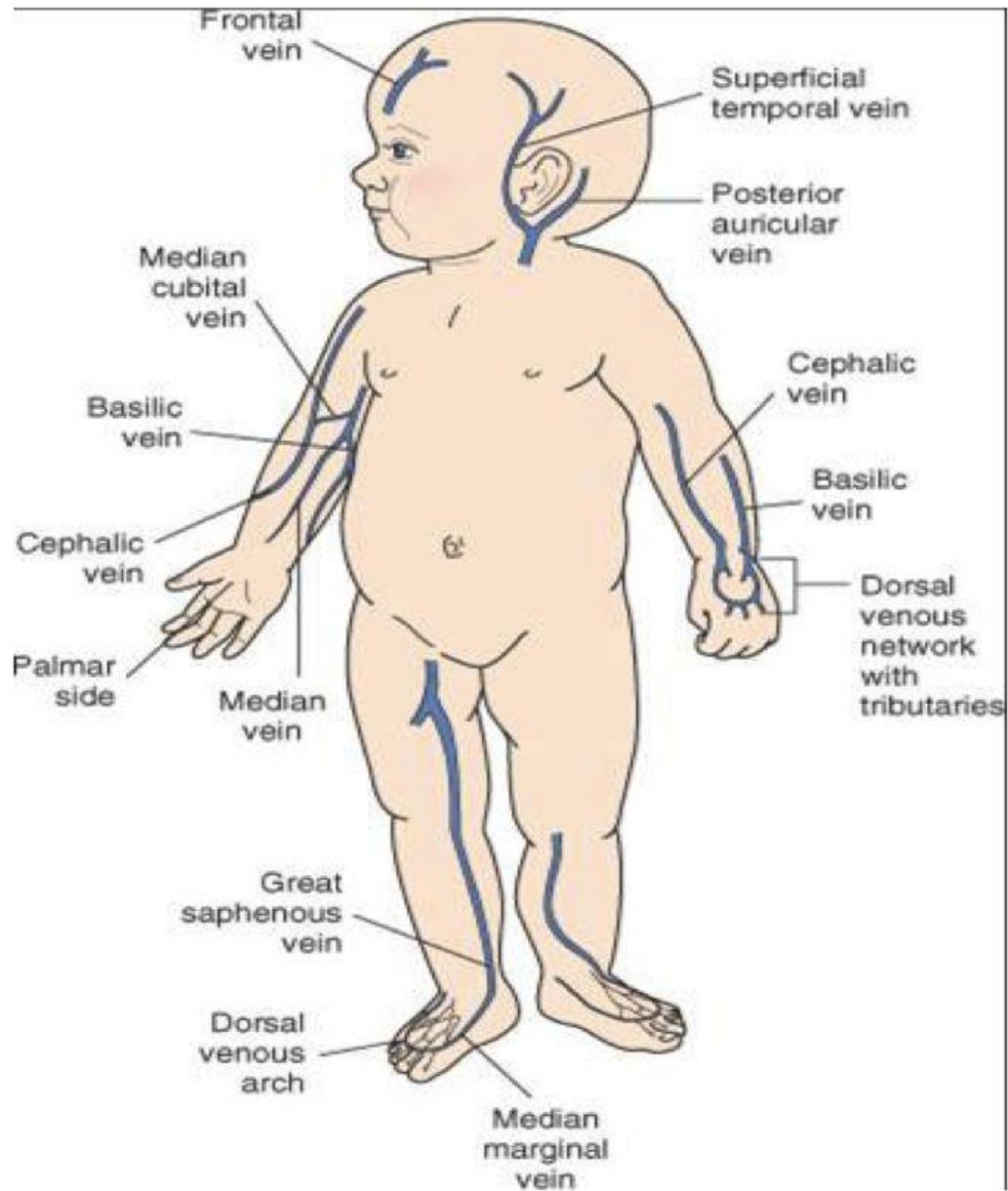
The **Accessory Cephalic vein** is located on the posterior aspect of the forearm joining the cephalic below the elbow. It is fairly easy to palpate if not visible and is another good choice.

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

Antecubital fossa pertains to the surface of the arm in front of the elbow.



PAEDIATRIC ANATOMY



Venipuncture Primary Sites

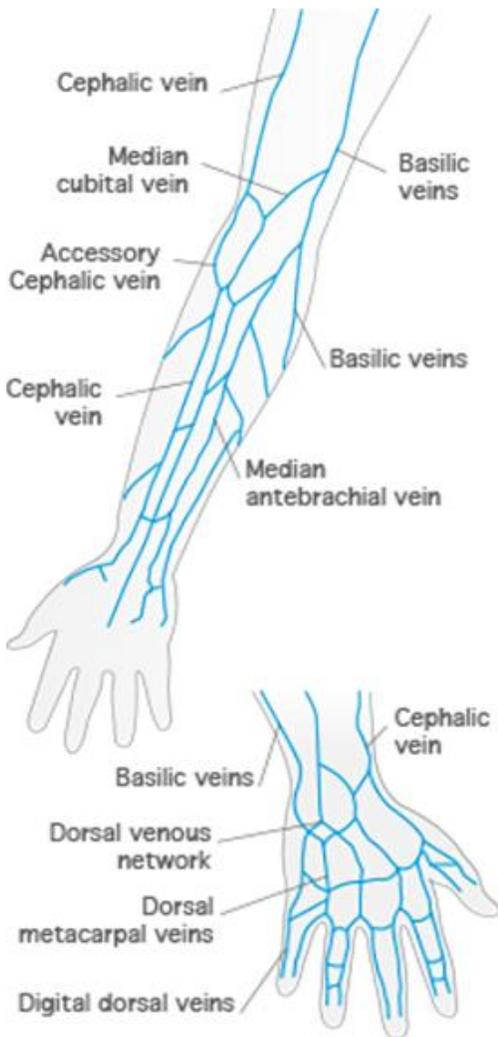
The preferred venipuncture site is the antecubital fossa, which is the area of either arm that is anterior to (in front of) the bend of the elbow where a number of large veins lie relatively near the skin's surface.

When antecubital veins are not acceptable or are unavailable, veins on the back of the hand are also acceptable for venipuncture.

Collections outside of the recommended venipuncture sites must not be attempted without a thorough knowledge of the area's anatomy and the risks involved, and any such attempt must also be made according to facility policy.

Arterial punctures shall not be considered an alternative to venipunctures, because results obtained from arterial specimens are not equivalent for many analytes. Arterial blood sampling can also be more painful to the patient and pose greater risk of injury and complications.

The three most common adult sites for the collection of blood specimen(s) for lab analysis to assist with diagnosis and treatment of the patient are the median, cephalic, and basilic.



Order of preference:

- 1) Median(al) vein – the **1st** vein of choice as it is usually the largest, most stationary, closest to the surface, and the most isolated from underlying structures. It is also the least painful to puncture.
- 2) Cephalic vein (outer arm) – the **2nd** choice. Choose when the medial vein is inaccessible.
- 3) Basilic vein (inner arm) – the **3rd** choice. Choose when the medial and cephalic are inaccessible.

Note: even though the basilic vein is often the most visible, it is the **third choice** as it is more painful for the patient and bruises more readily than the other veins

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

- It is acceptable to puncture any of the three veins in the antecubital area. But the basilic vein is the least forgiving because the median nerve and brachial artery are in close proximity. An increased risk of injury exists when using the basilic vein
- Although the large and fuller median and cephalic veins are used most frequently, the posterior (back) wrist and hand veins are also acceptable

BE AWARE of the proximity of arteries to veins. Although arteries rarely appear superficially, **aberrant** arteries can pop up in unusual places. **Always palpate for arterial pulsation prior to venipuncture.**

Venipuncture must not be performed on the scalps of newborns without physician permission and specialized training. Draws must not be attempted on the ankles or any part of the lower extremities without documented permission of the physician because of the potential for significant medical complications (e.g. phlebitis, thrombosis, tissue, necrosis). Draws outside of acceptable areas should be not undertaken without thorough knowledge of the anatomy and associated risks and should be in accordance with facility policy.

Vein Assessment

Careful vein assessment is essential

- For successful attempt
- To ensure viability of venipuncture site
- To help reduce mechanical phlebitis

Factors to consider when choosing a vein

- Patient's medical history
- Patient's age, size and general condition
- Condition of the patient's veins
- Veins commonly used for venipuncture
- Your skill in venipuncture
- *Patient input* as to quality and accessibility of veins from the perspective of past experience with venipuncture

Always palpate a potential vein

You may want to learn to palpate veins with gloves on your hands. PPE is applicable whenever there is a change of coming in contact with blood.

Gloves **must** be worn when doing blood draws

- Choose gloves that fit your hand properly
- You should not have any wrinkles or they will feel like veins when doing initial palpation

Palpating 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
- Palpate the portion where the cannula tip will rest, not just the point of insertion
- The more you palpate, the more you develop your sense of touch!
- *Note:* veins which appear suitable on inspection, can prove otherwise upon palpation

A suitable vein should:

- Feel round, firm, full – not hard, bumpy or flat
- Have bounce or elasticity
- Be wide enough to accommodate the diameter of the cannula/needle

Be cautious of the following

- The obese patient's veins may be more difficult to feel and palpation may require more time
- The elderly patient's vessel walls may be fragile and susceptible to bruising and infiltration
- The patient who is peripherally shut down may benefit from a warm, dry towel placed on the area for 15-20 minutes prior to venipuncture attempt

- The patient with an IV in situ will require that you draw blood in the opposite arm or *below* the IV site, preferably from another vein

Remember to collaborate with the patient. Seek their input into potential site selection. The patient may have had prior experience which would be helpful in achieving a positive outcome.

Site Selection Limitations when Collecting Venous Blood Specimens

Sites that Must Not be Used	
Site	Rationale
Fistula, arm with fistula or vascular graft	<ul style="list-style-type: none"> Threatens the integrity of fistulas and vascular grafts, which can lead to serious patient complications Application of a tourniquet could cause the graft to clot
Arteries	<ul style="list-style-type: none"> Risk of misinterpretation of results and patient mismanagement if arterial blood is used rather than venous blood. Note: arterial and venous blood specimens are not equivalent for many analytes Poses a significantly higher risk of injury and complications than venous access
Veins on lateral and palmar surface (underside) of the wrist	<ul style="list-style-type: none"> Increased risk of nerve, tendon, and arterial involvement The wrist is highly sensitive to pain 3 major nerves are located within a 2 inch radius of the anterior (underside) of the wrist
Infected sites	<ul style="list-style-type: none"> Potential for altered test results, exacerbation of infection, and patient discomfort
Lower Forearm	<ul style="list-style-type: none"> Punctures to the underside of the lower forearm should never be attempted due to the close proximity to the surface of nerves and tendons
Thrombosed Veins	<ul style="list-style-type: none"> Sometimes because of repeated injections, veins may become thrombosed – meaning that clots have formed and the blood no longer flows. Thrombosed veins are usually firm, discoloured and tender. If a selected vein is thrombosed, another sit is to be used
Sites that require a Physician's Order/Permission	
Site	Rationale
Limbs on the side of a mastectomy	<ul style="list-style-type: none"> Risk of lymphedema and the potential for altered test results
Any part of the lower extremities	<ul style="list-style-type: none"> Risks tissue necrosis in diabetic patients and thrombophlebitis in patients with coagulopathies <i>Ankles and Feet:</i> foot and ankle veins may be acceptable sites for venipuncture. However puncturing these veins can result in the formation of clots in patients prone to thrombosis Approval must be obtained from the physician before puncturing foot and ankle veins
Sites that should be Avoided	
Site	Rationale
Extensive scarring, healed burns	<ul style="list-style-type: none"> Difficult to puncture scar tissue and obtain a useful specimen Palpation and needle insertion complications Inability to detect adverse reactions
Hematoma	<ul style="list-style-type: none"> May cause discomfort to the patient and potential altered test results If another vein site is not available, collect the specimen below the hematoma
Above and below infusing fluids or from a VAD	<ul style="list-style-type: none"> Possible contamination of specimen with IV fluids
Inflamed sites (including inflamed tattoos)	<ul style="list-style-type: none"> Patient discomfort and possible complications
Edematous sites	<ul style="list-style-type: none"> Potential for altered test results
Extremity affected by stroke and injury	<ul style="list-style-type: none"> Inability to detect adverse reaction, e.g. nerve injury, pain, infection as circulation is impaired Complications may be more prevalent

Adapted from Clinical and Laboratory Standards Institute. (April 2017). GP41 Collection of Diagnostic Venous Blood Specimens (7th ed.).

Other Considerations

Previous Mastectomy

A physician must provide written permission before a venipuncture is performed on the side on which a mastectomy has been performed because of the potential for complications due to lymphedema, a potentially devastating complication that leads to progressive edema, pain and recurrent infections.

Women who have had a mastectomy will also have had (typically) adjacent lymph nodes removed. This greatly reduces lymph flow to the arm on the side of the mastectomy. This may increase the infection rate or result in lymphedema that will affect the accuracy of test results. It could cause complications for the patient to have blood drawn from the same side as a prior mastectomy by venipuncture or capillary puncture.

- *Single* mastectomy
 - Use the opposite arm , if veins accessible
 - If not, is a capillary puncture an option on the other arm
- *Double* mastectomy
 - Consult with the ordering physician, for options (feet, legs)

Obtaining Accurate Test Results in Special Circumstances

Intravenous Therapy (IV)

Fluid can dilute the specimen, causing grossly inaccurate test results.

It is ***against*** the standards of phlebotomy to perform a venipuncture ***above*** an active IV site, even if it has been temporarily shut off.

It is ***always*** preferable to select a vein from the opposite arm.

If this is not possible, samples may be drawn ***below*** the IV by:

1. Turning off the IV for at least 2 minutes before venipuncture. IV's should only be turned off with permission of the primary nurse/health care provider caring for the patient
2. Applying the tourniquet ***below*** the IV site
3. Selecting a vein other than the one with the IV if possible
4. Re-starting the IV after drawing the specimen

*Drawing a blood specimen from an intravenous line is not a normal practice at CGMH. Laboratory staff **do not** collect blood samples from intravenous lines. If blood samples are drawn from an intravenous line, discard two times the dead-space volume and for coagulation testing, 5 mL of blood or six times the dead space volume.*

Initiation of Intravenous Access

Drawing blood during the initiation of an IV can be done by nurses; but, it is not the practice of laboratory technicians at CGMH. Drawing bloods at the time of IV initiation is commonly done and the risks associated with same include the following; but, are not limited to collapsing the vein and hemolysis in the sample(s).

The Emergency Nurses Association, in their *Clinical Practice Guideline: Prevention of Hemolysis in Peripherally Collected Venous Specimens*, did a literature review and found Berger-Achituv, Budde-Schwartzman, Ellis, Shenkman, and Erez (2010) and Saleem et al. (2009) found no significant difference in hemolysis rates with venipuncture or peripheral intravenous (PIV) catheter. Berger-Achituv et al. (2010) performed a paired, within-subject study on children 1–16 years of age and compared nine hematological and chemical indices to determine if there were differences between samples from venipuncture or IV. Only one venipuncture sample had significant hemolysis. No other samples exceeded their standard for significant hemolysis (HI of 25 or serum hemoglobin [Hgb] 51 mg/dL). There were no significant differences in hemolysis between venipuncture and PIV catheter samples in terms of the serum fHb levels (20.7 + 10 mg/dL vs. 19.6 + 10.7 mg/dL, $p = 0.64$) or HI. Saleem et al. (2009) evaluated blood sampling and found no significant difference.

The Infusion Nurses Society, *Infusion Therapy Standards of Practice 2016*, state:

43. Phlebotomy

Standard

III. *Blood Sampling via a Vascular Access Device*

D. Short peripheral catheters

1. Consider obtaining a blood sample from an indwelling short peripheral catheter for paediatric patients, adults with difficult venous access, presence of bleeding disorders, and the need for serial tests. Infusing solutions should be stopped for at least 2 minutes prior to obtaining the blood sample; waste 1 to 2 mL of blood before obtaining the sample.
2. Sampling of blood from indwelling short peripheral catheters is reliable for many routine blood tests, including coagulation studies. Obtaining blood cultures from short peripheral catheters at insertion or during the dwell is not recommended.
3. Obtaining a blood sample during the insertion of a short peripheral catheter is associated with higher rates of hemolysis and spurious lab values, regardless of whether the sample was drawn directly from the catheter hub or from an attached extension set. The effect of this process on the outcome of the catheter is unknown.

Methods of Vein Distention

Application of Tourniquet

- Apply tourniquet above antecubital fossa to enable visualization of the whole arm. This area best tolerates tourniquet application. Otherwise apply tourniquet 2-4 inches (5-10 cm) above insertion site
- Placing tourniquet over a sleeve or wash cloth reduces pinching and discomfort
- Place tourniquet under patient's arm making sure it lies flat against the patient's skin. Bring ends of the tourniquet up and towards one another so one overlaps the other
- To tie the tourniquet, lift and stretch it; then using two fingers, tuck the top tail under the bottom. Make sure the tails point away from the venipuncture site



Palpate the radial pulse to ensure arterial flow has not been compromised. Although the most common reason for inadequate vein distention is a loose tourniquet, it cannot be so tight as to disrupt arterial flow

- Tourniquet application must not exceed **one minute** before access the vein in order to prevent hemoconcentration
- If a tourniquet has been in place for longer than one minute before accessing the vein, it must be released and reapplied after two minutes before the venipuncture is performed
- Non-latex tourniquets must be used to prevent latex sensitivity and allergic reactions
- Because of the prevalence of methicillin-resistant *Staphylococcus aureus* and other pathogens on previously used tourniquets, single-use tourniquets are recommended to prevent the spread of health care acquired infections. Alternatively, inpatients may be assigned a tourniquet upon admission to be exclusively used for their venous access procedures
- Constriction must not be excessive or uncomfortable to the patient
- You may need to ask the patient to clench their fist. While this is not mandatory, veins become more prominent and easier to enter when the patient forms a fist. If forming a fist is required to facilitate vein location and during needle entry, the phlebotomist may ask the patient to clench and hold the fist until blood flows into the collection device. Patients must not be instructed or permitted to vigorously open and close the hand ('pumping'). Hand pumping can cause significant elevations in the potassium concentration in specimens collected, risking complications and patient mismanagement
- This encourages veins normally elliptical in shape to become more rounded. **Do not** encourage the pumping action of clenching and unclenching the fist when venipuncture is being performed. This will distend the vein; *however*, it may alter some lab measures and should be not be utilized. Normally you would ask the patient to unclench their fist once blood has returned

- If veins will not distend sufficiently, remove the tourniquet and allow the vessels to refill. Sometimes veins fill better on the second try due to rebound effect

Note: for patient comfort the tourniquet may be applied over clothing to prevent pinching of the skin; alternatively, gauze or other pad can be used as a barrier between the tourniquet and skin

Note: a blood pressure cuff inflated below the patient's diastolic pressure may be used to apply constriction in place of a tourniquet. The application of a blood pressure cuff must be performed only by those with knowledge and training in using such devices

Other Methods of Vein Distention

Arm Dangling

- Dangle arm over the side of the bed to assist in vein dilation

Gentle Tapping

- Gentle tapping or flicking of the vein with a finger will assist in vasodilation. **Do not** slap. Although this has the same effect, it can be very irritating to the patient

Relaxation

- A frightened or anxious patient may readily vasoconstrict. Help your patient to relax through various techniques such as deep breathing, distraction and visualization. A thorough explanation may be enough to comfort or calm the patient
- In paediatrics a tourniquet may be inappropriate. The gentle grasp of the holder hand will promote venous distention and then allow blood return
- Due to infection control, tourniquets are one patient use only. They are to remain with the patient and be discarded when they become too loose or patient is discharged
- Due to severe allergies, tourniquets are to be latex free

Heat

- Rub or stroke the arm to warm the skin
- If it is still difficult to visualize the veins, remove the tourniquet and apply warm compresses for 5-10 minutes to promote vasodilation

Paediatric Suggestions

- Crying in small infants helps with venous distention, especially in the scalp
- A tourniquet may be inappropriate – instead a gentle grasp by the holders hand will cause enough venous distention and allow for blood flow
- Always attempt to apply a tourniquet over fabric, as not to damage immature skin
- Swaddle baby/young child in a light blanket so the appendage of use is free: keeping limb in straight alignment – proper extension

Site Preparation

The puncture site must be cleansed to minimize microbiological contamination of the specimen and patient infection.

Cleansing Method for Venipuncture

- Cleanse the site with friction using Chlorhexidine gluconate 2%/Isopropyl Alcohol 70% swab or commercially prepared pad using a back and forth motion over a 4 inch area where the puncture is to be done for a minimum of 30-60 seconds
- If intended insertion site becomes contaminated prior to commencement of the venipuncture procedure, the site must be cleansed again and allowed to dry
- Allow the area to dry. This practice prevents the patient from experiencing a burning sensation when the venipuncture is performed and allows for optimal decontamination

Why Allow Intended Site to Dry?

Chlorhexidine is a long acting antiseptic if it is allowed to dry on the skin. Therefore, it should not be wiped off, blown on or fanned.

Gloves

- The phlebotomist must put new gloves on before the venipuncture is performed, with consideration for latex hypersensitivity
- Gloves must remain intact during the procedure. Fingertips of the gloves must not be removed. Organization policy must be followed for isolation patients or other situations that may require donning gloves earlier in the procedure
- Best practice mandates that gloves **must** be worn for ALL venipuncture attempts, since there is a risk of blood exposure – accurate sizing is important
- Apply properly fitting gloves – gloves may be applied following assessment, cleansing or as you become more expert. Assessment should be learnt with gloves on. Ensure proper size for your hand so that there are no wrinkles

Remember gloves *will not* protect against needle stick injuries. They **will protect** against contact and splash. *PPE* is to be applied whenever there is a potential for contact with blood. Consistent practice will improve dexterity.



Immobilization of the Vein

- Proper stabilization of the vein can be key to success
- The inserter's non-dominant hand should stabilize
- Attempt to stabilize creating a flat surface and not working over digits
- A firm grip should be maintained throughout the procedure
- Never place a digit above the insertion site
- Support the limb of choice to be able to apply traction
- The tendency of the vein to roll is often due to not anchoring properly

Superficial veins have a tendency to roll if not anchored properly

- To immobilize a vein in the antecubital space for venipuncture, encircle and stabilize the patient's arm with your non-dominant hand. Place the thumb 4 to 6 cm to the edge of where the needle is to enter and press down on the arm. Grasp the arm with your encircling fingers as the thumb stretches and holds the vein taut



Order of Blood Draw



Helping all people live healthy lives

BD Vacutainer® Order of Draw for Multiple Tube Collections

Designed for Your Safety

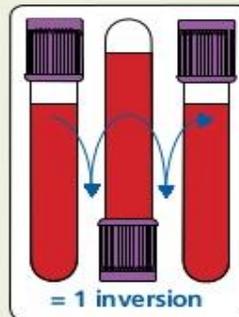
Reflects change in CLSI recommended Order of Draw (H3-A5, Vol 23, No 32, 8.10.2)

Closure Color	Collection Tube	Mix by Inverting
BD Vacutainer® Blood Collection Tubes (glass or plastic)		
	• Blood Cultures - SPS	8 to 10 times
	• Citrate Tube*	3 to 4 times
or	• BD Vacutainer® SST™ Gel Separator Tube	5 times
	• Serum Tube (glass or plastic)	5 times (plastic) none (glass)
	• BD Vacutainer® Rapid Serum Tube (RST)	5 to 6 times
or	• BD Vacutainer® PST™ Gel Separator Tube With Heparin	8 to 10 times
	• Heparin Tube	8 to 10 times
or	• EDTA Tube	8 to 10 times
	• BD Vacutainer® PPT™ Separator Tube K ₂ EDTA with Gel	8 to 10 times
	• Fluoride (glucose) Tube	8 to 10 times

* When using a winged blood collection set for venipuncture and a coagulation (citrate) tube is the first specimen tube to be drawn, a discard tube should be drawn first. The discard tube must be used to fill the blood collection set tubing's "dead space" with blood but the discard tube does not need to be completely filled. This important step will ensure proper blood-to-additive ratio. The discard tube should be a nonadditive or coagulation tube.

Note: Always follow your facility's protocol for order of draw

Handle all biologic samples and blood collection "sharps" (lancets, needles, luer adapters and blood collection sets) according to the policies and procedures of your facility. Obtain appropriate medical attention in the event of any exposure to biologic samples (for example, through a puncture injury) since they may transmit viral hepatitis, HIV (AIDS), or other infectious diseases. Utilize any built-in used needle protector if the blood collection device provides one. BD does not recommend resheathing used needles, but the policies and procedures of your facility may differ and must always be followed. Discard any blood collection "sharps" in biohazard containers approved for their disposal.



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 Date Issued: 08/12/05. Approved by: Lab Manager Page 1 of 1. **Notice: this document hardcopy must be used for reference purpose only. The on-line copy must be considered the current documentation**

Retrieved from http://www.bd.com/vacutainer/pdfs/plus_plastic_tubes_instructions_orderofdraw_vs5734.pdf

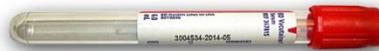
Order of Blood Draw

At CGMH we use BD® Vacutainer Blood Collection Tubes and as per the manufacturer's recommendations, the order of draw for multiple tube collections is:

- 1) Blood cultures
- 2) Blue top (coagulation)
- 3) Gold top (PSA)
- 4) Red Top (drug levels)
- 5) Light Green Top (BUN, Creatinine, electrolytes, cardiac, liver enzymes, Ca⁺⁺, phosphorus and other chemistry tests)
- 6) Dark Green Top (Venous ABGs)
- 7) Lavender (CBC)
- 8) Pink (EDTA for Blood Bank samples)

Discard Tubes

If you are drawing samples using a winged blood collection set with vacutainer, *for coagulation sample*, a clear (no additives) red top discard tube must be used before attaching the sample tube. This tube will allow any air in the infusion set to be removed, therefore preventing inaccurate lab results.



Venipuncture/Winged set Blood Collection

Equipment

- Requisitions
- Tourniquet
- Antiseptic skin cleanser *****Note: alcohol free wipes MUST be used when drawing toxicology levels**
- Non-sterile gloves
- Safety needle and/or winged blood collection set
- Vacutainer
- Vacutubes
- Gauze
- Biohazard bag
- Tape

Procedure

1. Gather all supplies and necessary equipment to perform venipuncture
2. Perform hand hygiene
3. Identify and prepare the patient
 - i. Introduce yourself to the patient
 - ii. Verify the correct patient using two identifiers
 - iii. Ask whether the patient has any allergies (tape, chlorhexidine)
 - iv. Review patient's history of venipunctures and ask about signs of adverse responses to previous venipunctures, including vagal response
 - v. Explain the procedure to the patient and obtain verbal consent. The patient has a right to refuse a test at any time before the blood sampling, so it is important to ensure that the patient has understood the procedure
4. At patient's bedside compare laboratory requisitions and/or labels with the patient's two identifiers to *confirm you have the correct labels for the blood specimens*
5. Ensure equipment is positioned within reach
6. Place a clean cloth or paper drape under patient's arm
7. Position both self and patient for comfort and visibility making sure arm and/or hand are in good alignment
 - i. Position the patient so the vein is readily accessible
 - ii. Position the patient so that you are able to work from a comfortable position
 - iii. Keep the arm in straight alignment. You may need to support the elbow to ensure proper extension of the arm
 - iv. If the patient **is in bed**, move them to the edge of the bed closest to you. Elevate the bed to a proper working height. Place equipment where readily available except on the patient's bed where it can be easily upset
 - v. If the patient **is sitting**, ensure that the arm can be positioned in an extended position across a table or supported by a pillow to a proper working height
 - vi. **NEVER** attempt venipuncture on a patient that is standing. Even the hardest may faint when least expected. For the same reason patients should not have anything in their mouths

- vii. Paediatric suggestions – please see Appendix A
8. Wash hands and apply gloves
 9. Prepare equipment and place the needle in the vacutainer
 10. Assess and select vein of choice as per previous criteria
 11. Apply a single-use tourniquet as necessary
 12. Palpate vein even when visible to ensure against puncturing an artery
 13. Cleanse chosen site (in a back and forth direction over a 4 inch area) with Chlorhexidine prep pads (0.5% chlorhexidine gluconate, 70% V/V isopropanol alcohol) and allow to air dry (30-60 seconds)
 14. Immobilize vein and hold taut during the procedure. If the venipuncture proves difficult and the vein must be touched again, the site should be cleansed again
 15. Align needle with the vein holding the bevel up at correct angle
 16. Depending on the depth of the vein, pierce the skin at an angle of 30° or less, directly above the vein. The deeper the vein, the steeper the angle must be. Puncture the skin and vessel quickly and smoothly
 17. Position the needle in the same direction as the vein selected. Insert the needle, bevel up, at a 15 degree angle. The needle should be inserted in one smooth motion. Only the index finger and thumb should move forward to guide the needle into the vein
 18. Release the vein and push the evacuated tube onto the back of the needle. Be sure to keep the holder stationary. Once the tube has been pushed onto the needle, take your hand off of the tube. If the stopper of the tube has been punctured by the back of the needle, and blood is not entering the tube, pushing on the tube will **not** cause blood to enter it
 19. Allow the tube to fill, when the vacuum has been exhausted, blood will no longer enter the tube
 20. Keeping the holder absolutely still, pull the evacuated tube off the back of the needle and replace it with the second tube (if the first tube contained an additive, gently **invert** it while waiting for the second, third, subsequent tubes to fill). **NOTE:** when using a winged blood collection set, maintain needle placement by holding or otherwise securing the device throughout the collection
 21. Draw evacuated tubes in the 'order of draw' mixing blood with additive as necessary
 22. Release tourniquet within one minute of application
 23. Place a piece of gauze or a cotton ball over the puncture site. **Do not push down on the gauze**
 24. Remove the needle from the patient's arm and immediately apply pressure with the gauze
 25. Activate the needle safety device and dispose of unit appropriately immediately into a biohazard container
 26. If the last evacuated tube collected contains an additive, invert gently several times to mix the blood with the additive. (See Order of Draw sheet re: number of times for inversion)
 27. Inspect puncture site and apply bandage if needed
 28. Label tubes **immediately** and correctly after drawing blood
 29. Discard materials in appropriate waste receptacle and disinfect work area
 30. Remove gloves and wash hands

Blood Culture Collection

Blood culture bottles contain a solution that provides a rich, nutrient growth medium in which all microorganisms known to cause sepsis can multiply to detectable levels. The majority of infections result from aerobic bacteria and anaerobic specimens therefore are not routinely ordered.

Blood specimens are transferred into the blood culture bottles with the assistance of a vacuum similar to the blood collection tubes; however, blood culture bottles **will not stop filling** at a preset volume. This becomes significant when choosing a blood collection system that allows the drawing of the specimen directly from the patient into the culture bottle. In this case the outside of the bottle must be marked before starting to ensure the appropriate fill volume. This must be monitored during the draw, to ensure that the culture medium in the bottle remains upright.

Number of Blood Cultures

Present guidelines are to collect two sets per episode – one set consists of an aerobic and anaerobic vial (blue and yellow).

Exceptions include the following:

- Collections from neonates and infants, where one blood culture is often all that can be obtained safely
- Infective endocarditis where three blood culture sets per 24 hour period is recommended
- Rarely are there indications for collecting more than three blood culture sets per 24 hour period

Single blood cultures should never be drawn from adult patients as this practice results in an inadequate volume of blood cultured, and the results of single blood cultures are more difficult to interpret

Volume of Blood for Culture

BacTec recommended volumes:

- Aerobic vials (blue) – 8-10 mLs blood
- Anaerobic vials (yellow) – 5-7 mLs blood
- Paediatric vials (pink) – 1-3 mLs blood

CGMH routine recommendations shall be:

- Adults (age 10 and older) – one set will consist of an aerobic and anaerobic vial (blue and yellow)
- Children (less than 10 years old) – PedsPlus vial (pink)
- When less than the recommended volume of blood is drawn for culture, the blood should be inoculated into the aerobic vial first; any remaining blood should then be inoculated into the anaerobic vial. If only 1-3 mL can be obtained, use a PedsPlus blood culture bottle

Disinfection of Skin and Prevention of Blood Culture Contamination

- Chlorhexidine gluconate is the recommended skin disinfectant for older infants, children and adults. **NOT to be used on infants less than two months of age**
- Use 70% isopropyl alcohol on infants less than two months of age

Catheter-Related Bloodstream Infections

- Central venous access device (CVAD, central line) contamination investigation – draw two sets, one peripheral and the second from the access device. Each set should consist of one aerobic (Standard /10 Aerobic/F) and one anaerobic (Lytic/10 Anaerobic/F) bottle

Equipment

- Chlorhexidine prep-pads (0.5% chlorhexidine gluconate, 70% V/V isopropanol alcohol)
- 70% alcohol
- Safety-Lok blood collection sets
- BacTec Standard/10 Aerobic/F culture vials
- BacTec Lytic/10 Anaerobic/F culture vials
- BacTec Peds Plus/F culture vials

Procedure

1. Gather all supplies and necessary equipment to perform venipuncture
2. Perform hand hygiene
3. Identify and prepare the patient
 - i. Introduce yourself to the patient
 - ii. Verify the correct patient using two identifiers
 - iii. Ask whether the patient has any allergies (tape, chlorhexidine)
 - iv. Review patient's history of venipunctures and ask about signs of adverse responses to previous venipunctures, including vagal response
 - v. Explain the procedure to the patient and obtain verbal consent. The patient has a right to refuse a test at any time before the blood sampling, so it is important to ensure that the patient has understood the procedure
4. At patient's bedside compare laboratory requisitions and/or labels with the patient's two identifiers to *confirm you have the correct labels for the blood specimens*
5. Ensure equipment is positioned within reach
6. Place a clean cloth or paper drape under patient's arm
7. Position both self and patient for comfort and visibility making sure arm and/or hand are in good alignment
 - i. Position the patient so the vein is readily accessible
 - ii. Position the patient so that you are able to work from a comfortable position
 - iii. Keep the arm in straight alignment. You may need to support the elbow to ensure proper extension of the arm
 - iv. If the patient **is in bed**, move them to the edge of the bed closest to you. Elevate the bed to a proper working height. Place equipment where readily available except on the patient's bed where it can be easily upset
 - v. If the patient **is sitting**, ensure that the arm can be positioned in an extended position across a table or supported by a pillow to a proper working height
 - vi. **NEVER** attempt venipuncture on a patient that is standing. Even the hardest may faint when least expected. For the same reason patients should not have anything in their mouths
 - vii. Paediatric suggestions – please see Appendix A

8. Wash hands and apply gloves
9. Mark the BacTec blood culture bottles at the volume line with a marker before the venipuncture begins
10. Cleanse chosen site (in a back and forth direction over a 4 inch area) with Chlorhexidine prep pads and allow to air dry (30-60 seconds)
11. Remove the plastic cap from each BacTec bottle and disinfect the rubber septum with a chlorhexidine prep pad – allow to air dry
12. Using a Safety-Lok blood collection system, perform venipuncture and fill the BacTec bottle(s) to the appropriate volume mark made on the blood culture bottle. *The bottle needs to be kept upright during collection*
 - i. Aerobic vials (blue top) are to be drawn first and filled with 8-10 mLs of blood
 - ii. Anaerobic vials (yellow top) are to be drawn second and filled with 5-7 mLs of blood
 - iii. Paediatric vials (pink top) is a single vial draw and filled with 1-3 mLs of blood
13. Blood culture bottles should ***always be inoculated first*** when other specimens are to be obtained from the same venipuncture
14. Specimens should be transported to the laboratory and loaded into the BacTec as soon as possible. If a delay in loading inoculated bottles is anticipated, keep bottles at *room temperature* for up to 48 hours. ***Do not*** store at any other temperatures (do not incubate or refrigerate)

Appendix A

Paediatric Suggestions/Considerations

- Assisting and holding the child appropriately during the procedure is an essential job
- The child and the inserter's needs must be anticipated
- The holder must be able to sooth the patient and parents
- Educate the child when age appropriate to do so
- For best success, position child lying with head slightly elevated
- Parents should be made aware of process and given the option to remain with child
- Parents, however, **should not** be expected to be the holder
- If possible, prepare separate room than assigned
- Limit the amount of onlookers and those who can hear the process
- Elevate the patient position to a workable height
- Warming a child is often useful
- Swaddle baby/young child in a light blanket so the appendage of use is free – full physical restraining can be traumatizing
- Keeping limb in straight alignment – proper extension
- Additional assistance may be required
- Monitor the amount of choices to child to benefit quicker success but cooperation should be rewarded
- Never attempt venipuncture on child while standing or in holder's arms
- Placement of equipment should be readily available
- *'Bear Hug position'* - caregiver supports child in a hug position
- *'Joey position'* – caregiver supports child on their lap and additional health care worker assists to immobilize limb

Appendix B

Troubleshooting

Problem	Possible Cause	Action
Blood fails to enter the Evacuated (Vacutainer™)	Change the position of the needle	<ul style="list-style-type: none"> • Move the needle <i>forwards</i> – it may not be in the lumen of the vein • Move the needle <i>backwards</i> – the needle may have gone completely through the vein • As the needle moves back into the lumen of the vein, blood will flow • <i>Adjust the angle</i> of the needle – the bevel may be against the vein wall • <i>Loosen</i> the tourniquet – it may be too tight and obstructing blood flow • Try <i>another</i> tube – there may be no vacuum in the one being used <p>Side-to-side manipulation of the needle is not recommended and is against the standards for the procedure. Injuries to the patient may result from this technique</p>
Blood Stops Flowing into the Tube	Needle may have pulled out of the vein when switching tubes	<ul style="list-style-type: none"> • To avoid this from happening, hold equipment firmly and place fingers against patient's arm, using the flange for leverage when withdrawing and inserting tubes • The vein may have collapsed – re-secure the tourniquet to increase venous filling. If this is not successful, remove the needle, take care of the puncture site and redraw
If Unable to obtain blood after <i>First</i> attempt		<ul style="list-style-type: none"> • Release the tourniquet and give the patient a rest • Re-apply the tourniquet to the other arm and look for another vein • If an adequate vein is found, select a new needle and repeat the procedure
If Unable to obtain blood after <i>Second</i> attempt	<i>Don't try again</i>	<ul style="list-style-type: none"> • At this point it is best to get help • Everyone has had the experience of failing to get blood and the next person attempting might obtain it with ease. The patient may also appreciate a new start with someone else

Appendix C

Risks and Complications

Complication	Possible Cause/Symptoms	Action
Accidental Arterial Puncture	Arterial puncture	<ul style="list-style-type: none"> • If accidental arterial puncture is suspected during the procedure (e.g. rapidly forming hematoma, rapid filling of tube), the phlebotomist must remove the needle immediately and apply direct forceful pressure to the puncture site for a minimum of 5 minutes or until active bleeding has ceased • The nursing staff and/or physician must be notified and the incident documented according to facility policy
Hematoma	During venipuncture blood may leak out of the vein and clot under the skin	<ul style="list-style-type: none"> • Remove the tourniquet before removing the needle • Maintain needle placement throughout the collection • Remove the tube from the holder before needle removal • Before bandaging, take steps to determine whether the puncture site is sealed • If a hematoma begins to form during the venipuncture, the phlebotomist must remove the needle immediately and apply pressure
Hemolysis		<ul style="list-style-type: none"> • Avoid collecting through a VAD or during an IV start • If using a syringe and needle, make sure the needle is fitted securely on a syringe to avoid frothing • When using a syringe, avoid pulling the plunger back too forcibly • Avoid forcefully transferring the syringe's contents into the tube • Discontinue sluggish draws that can be caused by collapsed veins and improper needle placement • Because the interior diameters of needles vary avoid the use of 25 gauge needles if frequent hemolysis is observed • Avoid tourniquet constriction longer than one minute • Avoid mixing the specimens vigorously • Gently transport the specimen to avoid shaking
<p>Nerve Injury</p> <p><i>Every time</i> you perform an upper-extremity venipuncture you run the risk of inadvertently puncturing or nicking a nerve. If a nerve has been damaged, the patient will feel "an immediate and distinct pain"</p>	<ul style="list-style-type: none"> • Shooting electrical pain • Severe or unusual pain • Tingling or numbness in the limb • Onset of tremor of the limb 	<ul style="list-style-type: none"> • Release the tourniquet <i>immediately</i> • <i>Withdraw</i> the needle – removing the needle immediately will minimize the risk • Apply direct pressure to the site until the bleeding has stopped. Do not apply ice to the venipuncture site as it is probably of little or no benefit • Inform patient they may have suffered a small nerve injury. Symptoms usually resolve within a couple of weeks. If symptoms persist or intensify advise the

<p>going down the arm into the fingertips. This pain is more intense than the normal discomfort experience during venipuncture</p>		<p>patient to see their physician</p> <ul style="list-style-type: none"> • Complete an incident report • Notify your supervisor of the incident as soon as possible
<p>Nerve Compression Injury A second type of nerve injury results from compression by a hematoma in a subcutaneous tissue They usually are a result of contact with an artery during vein access</p>	<ul style="list-style-type: none"> • The patient will feel tingling and numbness in the affected area 	<ul style="list-style-type: none"> • Notify the physician immediately • Inform patient that they may have a nerve compression from a hematoma • Educate patient to notify physician immediately if tingling or numbness symptoms develop • Complete an incident report • Notify your supervisor of the incident as soon as possible
<p>Dizziness (Vertigo), Syncope (Fainting) or Unexpected Non-responsiveness Fainting for many patients is often the result of a psychological aversion to needles or the thought or sight of blood. The phlebotomist may first notice its onset while drawing blood</p>	<ul style="list-style-type: none"> • The patient will feel cool and clammy • Perspiration may be evident • They may complain of dizziness • They may become nauseated 	<ul style="list-style-type: none"> • Release the tourniquet and withdraw the needle immediately • If the patient is sitting, instruct them to bend over, putting their head between their knees – loosen any tight clothing. Once the patient has recovered sufficiently, escort them to a stretcher or bed and have them lie down for 10-15 minutes • Stay with the patient – do not leave the patient unattended • Syncope (fainting) is very rare lying down. If a patient appears to faint while lying down contact a nurse and/or physician immediately <p><i>If patient is unconscious</i></p> <ul style="list-style-type: none"> • Call for assistance immediately • Lie the patient down, either on a bed or stretcher or on the floor • Maintain airway and roll patient on side, in recovery position • If the patient starts to have a seizure, obtain immediate medical attention • When patient becomes responsive, check vital signs, pulse and blood pressure (if unqualified to assess vital signs, get assistance from a qualified health care professional) • When patient feels able, have them put their legs over the side of the bed and remain sitting • When patient feels able, have them attempt to stand while providing support • If physician unavailable, recommend patient go to ED for assessment before leaving the hospital. Document their response • Patients leaving the hospital after fainting should be cautioned against driving and should be accompanied by a responsible party
<p>Nausea</p>		<ul style="list-style-type: none"> • Make the patient as comfortable as possible and provide an emesis basin/bag • Instruct the patient to breathe deeply and slowly • Apply cold compresses to the patient’s forehead

Vomiting		<ul style="list-style-type: none"> • Give the patient an emesis basin/bag and have tissues ready • Give the patient water to rinse out his/her mouth
Convulsive Seizures		<ul style="list-style-type: none"> • Remove the tourniquet and collection tube, withdraw the needle, activate the device's safety feature and apply pressure • If possible, move patient to the floor or support him/her on the chair • Move sharp objects and furniture away from the patient • Cushion the patient's head if he/she has collapsed onto the floor • Note the time that the seizure started • Stay with the patient until he/she has fully recovered • Talk calmly and reassuringly to the patient during and after the seizure • Allow the convulsions to happen. Do not restrain the patient. Report the frequency and duration of seizures to emergency personnel
Monitoring Blood Volume Collected Maximum blood volume information is intended to guide health care workers in effectively coordinating test orders and blood collection to minimize the risk of iatrogenic anemia, especially for the paediatric patient		

Appendix D

Definitions

Angle of insertion – the angle formed by the surface of the skin and the needle entering the skin

Antecubital – situated anterior to the cubitis, or elbow

Antiseptic – a substance that inhibits growth and development of micro-organisms

Bevel – a slanting edge

Cannula – a tube for insertion into a duct, cavity, or blood vessel

Distal – remote; farther from the point of reference. *Example* – the wrist is distal to the elbow

Hematoma – a localized collection of blood, usually clotted, in an organ, space, or tissue, usually due to a break in the wall of a blood vessel

Hemoconcentration – decrease of the fluid content of the blood, with resulting increase in its concentration

Hemolysis – disruption of the integrity of the red cell membrane, causing release of hemoglobin and other intra-cellular components

Iatrogenic anemia – anemia caused by diagnostic blood sampling

Lateral – denoting a position further from the median plane or midline of the body

Medial – situated in the midline of a body or structure

Palpate – to examine by the hand, to feel

Phlebotomy – the act of drawing or removing blood from the circulatory system through a puncture to obtain a specimen for analysis and diagnosis

Pre-evacuation – the creation of a vacuum, induced during the manufacture of the tube or by the user immediately before use

Proximal – nearest, closer to the point of reference. *Example* – the wrist is proximal to the metacarpal bones

Recumbent – lying down or reclining backward

Reflux – a backward or return flow

Rolling veins – superficial venous vasculature that is not firmly anchored superficially and that moves laterally during venous access attempts

Specimen – discrete portion of a body fluid, breath, hair, or tissue taken for examination, study, or analysis of one or more quantities or properties assumed to apply for the whole

Supine – lying on the back

Syncope (fainting) – a loss of consciousness over a short period of time, caused by a temporary lack of oxygen in the brain

Thrombosed – presence of thrombus. An aggregation of blood factors, primarily platelets and fibrin with entrapment of cellular elements, frequently causing vascular obstruction at the point of its formation

Tourniquet – an instrument for the compression of a blood vessel by application around an extremity to control the circulation and the flow of blood to or from the distal area

Vascular Access Device (VAD) – a device inserted temporarily or permanently into a vein and/or artery to allow access to the circulatory system for the administration of fluids or medications, or for various procedures

Vasovagal attack – a transient vascular and neurogenic reaction marked by pallor, nausea, sweating, bradycardia and rapid fall in arterial blood pressure, which when below a critical level, results in loss of consciousness, and characteristic EEG changes

Venipuncture – the puncture of a vein for surgical or therapeutic purposes, or for collecting blood specimens for analysis

Ventral – denoting a position more toward the belly surface. *Example* underside of arm

References

- Capital Health. (2013). Venipuncture for blood specimen collection – learning module.
- Clinical and Laboratory Standards Institute (CLSI). (2017). *Collection of diagnostic and venous blood specimens* (7th ed). Wayne, PA: Clinical and Standards Institute.
- Dietrich, H. (2014). One poke or two: can intravenous catheters provide an acceptable blood sample? A data set presentation, review of previous data sets, and discussion. *Journal of Emergency Nursing*, (4), Issue 6, 575-578.
- Emergency Nurses Association. (2016). Clinical practice guideline: prevention of blood specimen hemolysis in peripherally collected venous specimens.
- London Health Sciences Centre. (2017). Venipuncture self-directed learning package.
- Markham Stouffville Hospital. (2015). Venipuncture and phlebotomy learning package.
- Mosby's Skills Online. (2016). Therapeutic phlebotomy.
- Southlake Regional Health Centre. (2009). Venous blood collection self-directed education package.

Pictures

Front page -

https://www.google.ca/search?tbm=isch&q=venipuncture&chips=q:venipuncture,g_2:site&sa=X&ved=0ahUKEwi9kovl1uTbAhUF54MKHaPYClcQ4IYIKCgA&biw=1920&bih=988&dpr=1#imgrc=ls337XSeojC2jM:&spf=1529581470717

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Page 9 - https://www.google.ca/search?q=scalp+veins+for+iv&tbm=isch&tbs=rimg:CXzyFTE7cMVPlijcSTzFp-K5ArHnn1f_1es66dhIQRHnLzz450tY-

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Page 10 - https://www.google.ca/search?tbm=isch&q=cephalic+vein&chips=q:cephalic+vein,g_2:arm&sa=X&ved=0ahUKEwi-gvCi0-TbAhVrwYMKHaV8DNIQ4IYIKCgA&biw=1920&bih=988&dpr=1#imgrc=KnX_F_YmnJe-0M:&spf=1529580534329

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VENIPUNCTURE/PHLEBOTOMY COMPETENCE CHECKLIST

****Proper hand hygiene moments and PPE to be utilized****

To be observed three times

Skill Performed/Procedure	Date/Initials	Date/Initials	Date/Initials
Selects necessary and proper equipment/supplies to perform venipuncture (tubes, tourniquet, needle, etc.)			
Perform hand hygiene			
Identify and verify patient with two identifiers			
Verify patient has no allergies to tape, chlorhexidine			
Explain procedure to patient			
Compare/verify that laboratory requisitions and labels are correct (patient, test ordered)			
Prepare equipment and ensure that it is within reach			
Position self and patient for comfort and visibility			
Wash hands and apply gloves			
Applies tourniquet correctly			
Palpates the antecubital area and/or appropriate venipuncture site			
Properly cleanses venipuncture site with chlorhexidine			
Stabilize vein			
Inserts needle, bevel up			
Smoothly pushes evacuated tube into holder without changing needle position or smoothly draw blood into syringe			
Adjusts needle if necessary to obtain flow then stabilizes vacutainer			
Changes vacutubes without changing needle position			
Fills vacutubes in correct order of draw			
Mixes anticoagulated vacutubes correctly			
Releases tourniquet while filling last tube			
Removes last tube from needle before withdrawing needle			
Withdraws needle from arm smoothly. Activates safety mechanism			
Applies pressure to site after withdrawing needle, until bleeding has stopped (apply coverage prn)			
PRN – transfers blood in vacutubes – order of draw			
Disposes of needle properly and carefully			
At patient beside – labels the vacutubes matching labels to requisition(s). Signs requisition and/or labels			
Checks site to ascertain bleeding has stopped			
Document accordingly			
Bag vacutubes & requisition - send to lab			

Certifier

Date

Staff name

Date

VENIPUNCTURE/PHLEBOTOMY QUIZ

Name: _____

Staff require 80% to pass **and** 3 venipuncture/phlebotomy observation/collections to be competent.

1. If at all possible, one should avoid venipuncture in:
 - a) The lower extremities
 - b) An extremity with impaired circulation
 - c) An extremity where infection is present
 - d) All of the above

2. At what angle should the venipuncture needle be inserted?
 - a) 15° - 30°
 - b) 80° - 90°
 - c) 35° - 45°
 - d) None of the above

3. When performing venipuncture for the purpose of blood sampling for more than one specimen, in which order should the specimens be collected?
 - a) Most important test first
 - b) Order on the requisition
 - c) Following the prescribed order of draw
 - d) Smallest tube first

4. When performing venipuncture do not keep tourniquet on longer than:
 - a) 30 seconds
 - b) 1 minute
 - c) 2 minutes
 - d) 30 seconds – 2 minutes

5. Selecting a vein for blood specimen collection below an active IV should only be performed:
 - a) As a last resort
 - b) By following a very specific procedure
 - c) In the absence of other acceptable sites
 - d) All of the above

6. The following is not considered a unique identifier when identifying a patient:
 - a) Date of birth
 - b) Patient name
 - c) Medical record number
 - d) Health care number

7. Phlebotomists can cause re-analytical error in blood specimens by which of the following actions:
- a) Mixing specimens thoroughly by shaking vigorously
 - b) Forcing blood into a test tube from a syringe
 - c) Failing to label specimens at the bedside
 - d) All of the above
8. How many attempts at venipuncture on an individual patient is appropriate when you experience difficulty?
- a) One
 - b) Three
 - c) As many as required
 - d) Two
9. Select the correct statement regarding how arteries differ from veins:
- a) Arteries have valves and veins do not
 - b) Arteries can collapse, veins will not
 - c) Arteries are usually found superficially
 - d) Arteries pulse and veins do not
10. The 3 main layers of a vein include:
- a) Tunica media, nerves, tunica intima
 - b) Capillaries, tunica intima, tunica adventitia
 - c) Tunica intima, tunica adventitia, valves
 - d) Tunica adventitia, tunica media, tunica intima
11. Select the appropriate colour vacutube for a CBC:
- a) Light blue
 - b) Lavender
 - c) Gold
 - d) Pink
12. Select the appropriate colour vacutube for a PT/aPTT:
- a) Light green
 - b) Red
 - c) Lavender
 - d) Light blue
13. When taking multiple tubes from a patient, which answer is correct?
- a) Take gold, light blue, then lavender
 - b) Take light blue, light green, then lavender
 - c) Take light blue, lavender, then light green
 - d) Take light green, lavender, then light blue

14. Why is it important *not* to obtain blood sampling from existing peripheral IV site?
- a) High risk of hemolysis
 - b) High risk of IV fluid contamination
 - c) Manipulation can increase risk of loss of PIV
 - d) All of the above
15. Never attempt venipuncture on a patient that is standing
- a) True
 - b) False
16. Labeling of specimens ...
- a) Should always be done at the bedside
 - b) Date, time and user
 - c) Requisitions should be checked prior with patient identification bands
 - d) All of the above
17. Appropriate PPE and non-sterile gloves should always be worn due to the risk of blood exposure
- a) True
 - b) False
18. Which measure will prevent hematoma formulation following venipuncture?
- a) Have patient flex arm for 1-2 minutes
 - b) Immediately apply bandaid
 - c) Hold gauze firmly in place for 1-2 minutes
 - d) Have patient open and close first several times
19. A well distended vein should be:
- a) Spongy and elastic
 - b) Hard and swollen
 - c) Warm to touch
 - d) Moveable when touched
20. How should blood culture bottles be prepared?
- a) Never pour blood from one tube to another
 - b) Leave chlorhexidine/alcohol wipe on septum until ready to inject blood into bottles
 - c) Disinfect the exposed rubber septum with a chlorhexidine/alcohol wipe
 - d) Draw blood to anaerobic vial first