ALBERTA PRECISION LABORATORIES

Phlebotomy - Collecting Blood by Venipuncture (LTR78504)

Last Updated Time: 07/12/2023 **Revision: 4.70**

Introduction

Phlebotomy is the drawing of venous blood from patients for laboratory analysis and diagnosis. Proper phlebotomy technique is essential for accurate patient results.

Policy: Pediatrics and Neonates

- Refer to **Appendix I** (maximum draw for patients under 14 years of age) for the amount and frequency of blood collection.
- Venipuncture sites in patients < 2 years are limited to the median cubital, cephalic, or basilic veins, listed in the order of preferred choice & safety.
- Choose appropriate needle after assessing the veins.
- Take care in securing the child's arm to prevent injury caused by unexpected movement. Try to gain the child's confidence.
- A parent or guardian usually accompanies pediatric patients. Be reassuring and tell them how they can help you. If a parent appears very agitated or appears to be a hindrance to the procedure, ask if they would rather wait in the waiting room.

Patient Safety

Hand hygiene

Because phlebotomy is an invasive procedure, good hand hygiene is essential. Phlebotomist's hands **must be cleaned at least twice** during each phlebotomy cycle:

1. Immediately prior to assembling phlebotomy supplies and equipment.
2. After completion of venipuncture and handling of the patient's specimens.

Notes:

- If the phlebotomist touches anything not related to the patient, or if the phlebotomist leaves the room, then hand hygiene must be repeated.
- Generally, the contents of blood collection trays and blood collection areas are deemed to be considered "clean" and hands must be washed or sanitized before touching items in the "clean" area. If a collection device, tube or any phlebotomy equipment is potentially contaminated in any way, it must be discarded and replaced with new.
- For patients in the same room, the first and last incidents for hand hygiene may be combined provided the phlebotomist does not touch anything other than the phlebotomy cart/tray.
- "Phlebotomy" includes material and patient preparation, collection, labelling, post-collection care and patient instructions.

Patient Safety (continued)

Hazards of pediatric venipuncture

Obtaining large quantities of blood from an infant, especially from premature infants, may result in:

- anemia
- cardiac arrest

Immediate or delayed hazards of deep venipuncture include:

- hemorrhage
- venous thrombosis
- reflex arteriospasm
- gangrene of an extremity
- damage to surrounding tissues or organs
- infection
- injury caused by restraining the child during the collection

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Policy: Patient consent

The phlebotomist is required to explain the process to the patient prior to collection and must stop **immediately** if consent is withdrawn at any point prior to or during the procedure.

Specimen

Human blood

Materials and reagents

- Disposable examination Gloves
- Needle
- Needle holder
- Tourniquet
- Blood collection tubes
- Alcohol swab
- Optim 33TB® cleaner
- "Post Phlebotomy Care" information sheet (Stock #1S1328).
- Hand hygiene facilities
  - soap and water
  - alcohol hand sanitizer (Min 60% alcohol)
- Gauze/cotton ball
- Sharps disposal container
- Surgical tape/bandage

Safety

Note the following Safety Precautions: Contact the Needlestick Hotline immediately following any incident with human samples

Hazard	Precaution
Needlestick	• Use only safety engineered needles and lancets (i.e. shielded, self-blunting, or retracting). • Activate safety device immediately after specimen collection. • Assess patient's ability to hold arm still during phlebotomy; obtain assistance if required. • Maintain control of the needle at all times. If using a butterfly needle, do not release your hold on the device during the procedure. • Do not recap needles. • Do not break or cut needles. • Discard used needles and lancets into puncture resistant needle disposal containers.
Human Pathogen	• Human blood specimens are assumed to be potentially infectious for blood borne pathogens. • WHMIS Class D3. • Avoid skin contact by wearing gloves. • Avoid spilling or splashing of material. • Use face shield if possible risk of reagents or specimens being splashed into the eyes or face. • Wash hands thoroughly after handling specimens • Decontaminate spills using Optim 33TB®.

Policy: Patient identification

Confirm patient identity - correct patient identification is crucial and is the most important step in phlebotomy. Proceeding without confirmation of the patient's identity can result in serious consequences for the patient involved, including unnecessary subsequent investigations and/or treatment that may lead to further complications.

The Patient	Another Person	Hospital or Facility

Ask the patient to:
• Spell their first name
• Spell their last name
• State their date of birth
• The patient may produce an ID card such as:
  ○ Health Care
  ○ Social Insurance
  ○ Hospital ID
  ○ Drivers License
	Responsible adult accompanying the patient.	• Check the hospital or facility ID band
		• Nursing/medical staff may ID the patient
		Do not rely on information on the bed, outside the room, or the room number on the requisition.

Policy: Patient identification (continued)

Notes:

- If Patient Registration occurs in the collection station at the time of specimen collection then verbal patient identification is not required unless the collection is performed by a different staff member. Refer to the Patient Registration procedure for complete information
- Compare the information to the requisition or the collection list. If there is **any** discrepancy, investigate further to ensure you have the correct patient. In hospitals/facilities, report discrepancies to the nursing desk. **Do not** collect the blood or modify any patient demographic information until you are certain you have the correct person and data entry has been done on the correct patient file.

Phlebotomy procedure

Step	Action
1.	Before starting the collection procedure, ensure the patient is seated or laying down in a secure, stabilized position.
2.	Inform the patient of your intent to collect a blood sample. **DO NOT** proceed further if: • a well oriented, responsible, competent, adult patient refuses. • a parent or guardian refuses. • the patient cannot be immobilized sufficiently to collect without risk of injury to patient and/or phlebotomist. • at any point during the procedure the consent is withdrawn. • the testing is medical/legal, i.e. RCMP requesting toxicology/alcohol testing. It then becomes a physician or RCMP collection.
3.	Ensure the patient has followed all applicable special instructions for this collection and all appropriate information related to fasting, drug information, etc. has been captured on the requisition and at Data Entry. Certain blood tests must be obtained at specific times. For example, drawing antibiotic levels, trough specimens need to be obtained immediately prior to the next dose. This is most often applicable in hospital settings. If in doubt, verify with the nursing station.

Step	Action
4.	Ask the patient if they have had any previous reaction (such as fainting) during past collections. *"Have you ever had blood taken before?"* *"Were there any problems?"* • If they have had an adverse reaction in the past or are unsure and appear agitated or unwell, escort patient to an ECG room and lay them down for the collection. • If patient had no problems in past collections **or** are unsure and appear well and calm, proceed with collection. **Continue to observe the patient for any signs of distress** (pale, dizzy, weak, sweating, fast breathing). If a patient appears unwell at any point during the collection – **stop immediately**.
5.	Perform hand hygiene with soap and water or alcohol hand sanitizer in view of the patient. If your hands are visibly soiled, they must be washed with soap and water.
6.	Assemble the equipment and supplies.
7.	Put on disposable examination gloves.
8.	Position the patient's arm ensuring it is adequately supported
9.	Ask the patient to close their hand and make a fist to make the veins become more prominent and easier to enter. Note: Certain specified specimen collections may require a tourniquet not be used. Refer to specific collection requirements.
10.	Apply the tourniquet 3-4 inches above the venipuncture site (adults) • Do not tie too tightly. • Never leave the tourniquet on longer than two minutes. • Remove the tourniquet as soon as blood appears in the vacutainer. • It is permissible to leave the tourniquet on until midway through the collection of the last tube, as long as it does not exceed the 2-minute limit.
11.	Select a puncture site in the arm. The order of preference is as follows: 1st median cubital vein 2nd cephalic cubital vein 3rd basilic cubital vein 4th back of hand 5th top of foot
12.	Palpate the median cubital vein first. If it is apparent, use it without looking further. This vein is usually bigger, anchors best, bruises least and is less painful. The cephalic vein is used as a second choice over the basilic vein, since it does not roll and bruise as easily. It does however, flow slower than the basilic

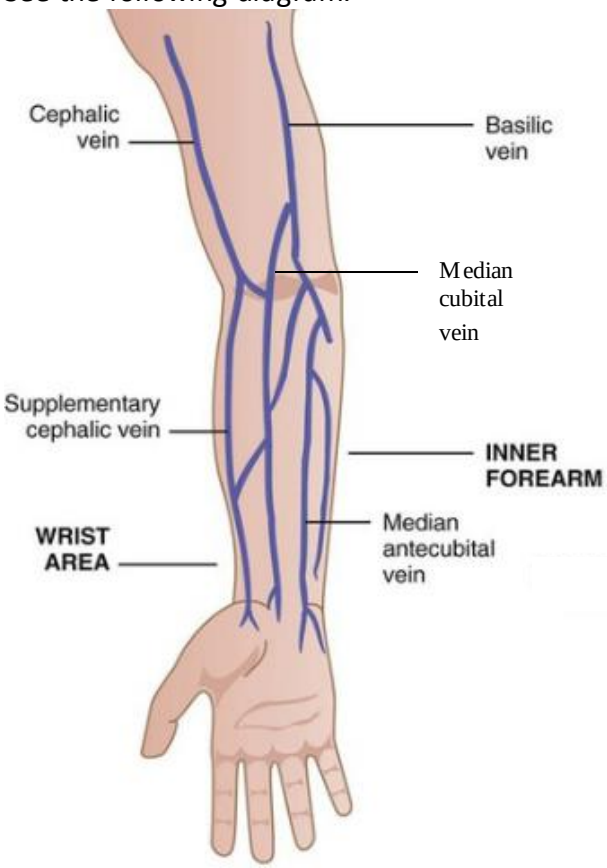
Phlebotomy procedure (continued)

Step	Action
13.	If superficial veins are not readily apparent, techniques to find a vein include: • checking both arms • lowering the arm to help dilate the veins • having patient make a fist until blood flow is established • turning the wrist in either direction • applying a glove filled with warm tap water to the site
14.	Feel along the vein and consider the following 4 points: • bounce • direction • size of needle • depth
15.	Refer to the Factor/Consideration table below, to select an appropriate venipuncture site. Then go to Step 16, page 7

Factor	Consideration
Selection of sites other than the arm	• Are extremely difficult and potentially dangerous. • Only experienced phlebotomists should attempt these. • Risks to the patient include nerve damage, infection, pain and slower healing of the site. • **Do not** attempt feet or ankle venipuncture if the patient is diabetic or has circulatory problems.
Extensive scarring	Avoid areas with extensive scars (i.e. patients that have undergone chemotherapy) or healed burns.
Radical Mastectomy	• May cause possible lymphostasis • Collect from the arm opposite to the operated or irradiated side of the mastectomy or axillary node dissection. • If it is not possible to collect from the opposite arm, collect from an alternate site. • If an alternate site cannot be found and there is a good vein in the operated/ irradiated side, collect from this arm
Areas of hematoma (bruising)	• May yield erroneous test results. • If no other site is available, collect below the hematoma.
Edema/ Swelling	• May interfere with vein selection. • Increased interstitial fluid may affect results

Phlebotomy procedure (continued)

Factor	Consideration
Areas affected by skin conditions	• Whenever possible, avoid using a site that is affected by certain skin conditions like eczema, or infection. If the skin condition is extensive and you are unable to avoid collection from an affected area, proceed as follows: 1) Inform the patient of the risk involved: *"Collecting blood through this area may increase the risk of it becoming infected"* 2) Obtain a verbal consent from patient prior to collection: *"Do I have your consent to proceed with blood collection through this area"?* 3) If answer is "Yes", write down on the requisition: "*Blood collection performed through (location). Risk informed. Consent obtained. (Date & Time)*" If answer is "No", proceed with next available site.
Obesity	• May cause double creases at the elbow. • A vein may be found on the inner (basilic) side of the lower crease. • Often the veins in obese persons are not as deep as they feel.
An IV is running	Whenever possible, select an alternate site. If not possible: • Contact nursing staff to request the IV be turned off at least 5 mins prior to collection. • Apply the tourniquet below the IV site and select a vein other than the one with the IV. Collect the sample 2-3 inches below the IV site. If unable to collect below the IV the collection becomes a "physician to draw" specimen. • Draw 5 mL into a plain red top discard tube prior to collecting the required tubes. • Write on the requisition of collection list that the sample was collected from the IV arm.
Area without sensation	Avoid drawing blood from an arm affected by a stroke or neurological injury that has resulted in a loss of sensation. The patient may not be able to alert you hit a nerve or there are other problems.
Deceased patients	• Do not collect blood from a deceased patient. • Contact the pathologist on call if you are requested to do so.

Step	Action
16.	Assemble the equipment and supplies.
17.	Put on disposable examination gloves.
18.	See the following diagram:  **Veins of the Arm**
19.	Disinfect the venipuncture site with an alcohol pad: • Use a circular motion, from the centre of the site to the periphery. • Site must remain wet for a total of 60 seconds. Allow to air dry. • If you have to reevaluate or palpate the vein after cleansing, cleanse your gloved finger with alcohol prior to touching the venipuncture site to ensure cleanliness of the site is maintained. **Note**: Use 10% Providone - Iodine (Betadine) solution if the patient is allergic to alcohol, or if a blood alcohol level is ordered.

Phlebotomy procedure (continued)

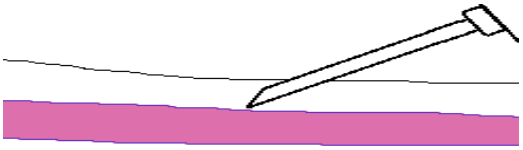
Step	Action
20.	Perform the venipuncture. • Use your thumb and index finger to draw the patient's skin taut and anchor the vein. • With the bevel up and the needle held at a 15-30º angle, insert the needle. • If using a butterfly, maintain control of the needle by holding the device for the duration of the procedure.
21.	Remove the tourniquet after blood flow is established. Ask the patient to open their fist
22.	Using the Order of Draw, fill the required tubes. Use a discard tube if required (ex. butterfly collection and Na Citrate or ESR tube is first/only tube collected). **Note**: For specific collection criteria, adhere to the guidelines in the LIS or on the DL Test Directory.
23.	If the patient suddenly experiences an intense shooting pain on insertion of needle, terminate the collection immediately. A nerve may have been injured. Advise the patient to follow-up with their physicians if tingling or pain persists. If patient consents, choose another site and re-attempt the collection.
24.	Remove the needle, activate the safety device and press a clean cotton ball or gauze to the venipuncture site. Have the patient apply pressure to the site for 5 minutes or until confident the bleeding has stopped.
25.	Dispose the used needle directly into a sharps container.
26.	**Immediately** mix all additive and gel tubes by gentle and complete inversion as per the Order of Draw Chart. Initial tubes are to be mixed as subsequent tubes are being drawn to avoid delays in mixing.
27.	Discard cotton balls and other non-sharp items into the routine garbage. Dispose any grossly contaminated items into bio-medical waste buckets.
28.	In full view of the patient, apply computer labels, or hand label each sample with the patient's full name plus the PHN.
29.	Record your tech code and the time of collection in the appropriate areas on the source document.
30.	Ensure bleeding has stopped before applying surgical tape or a Band-Aid on the venipuncture site. Patients on anticoagulant therapy may take longer to clot. **Do not release the patient until bleeding has fully stopped.**

Post phlebotomy

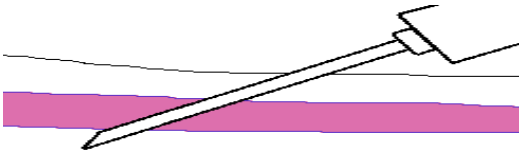
Step	Action
1.	Post-phlebotomy: • Provide the patient with a "Post Phlebotomy Care" information sheet (stock #1S1328). • Ask patient if he/she is feeling dizzy, weak or unwell. • Observe patient for signs of paleness, sweating, nausea (i.e. imminent fainting) • If patient reports feeling well and looks well, he/she is free to leave. • If patient reports feeling unwell or appears unwell, ask him/her to remain seated or lying down until he/she feels better. ○ If patient was seating and prefers lying down, escort patient to an ECG room. ○ Do not leave the patient unattended. Ask for help if needed. ○ If patient is requesting water or juice, ask a helper to provide it. ○ If patient recovers shortly, assist patient in standing up and walking for at least 10 steps, ensuring patient will not fall. ○ If patient remains unwell for > 30 minutes or condition deteriorates after 15 minutes, inform the patient that an ambulance will be called and ask helper to make the 911 call.
2.	Before leaving a patient's room, leave things the way you found them and take any garbage (gloves, used cotton balls, tubes) with you. Move bedside tables back; put side rails up if they were up. Turn lights off if you turned them on or unless the patient says otherwise.
3.	Clean the phlebotomy station arm immediately following each collection. • If no visual contamination, use an Optim 33TB® wipe on the entire surface of the arm. This will clean and disinfect the arm. • If any visual contamination is noted, use an Optim 33TB® wipe on the entire surface of the arm to clean the arm and immediately repeat with a second wipe to disinfect the arm. • If any visual contamination is noted on other surfaces, clean and disinfect immediately using this same process.
4.	Place labeled specimens and requisition in the processing area.
5.	Remove gloves and discard into regular garbage.
6.	Perform hand hygiene (hand washing with soap and water or use of alcohol hand sanitizer).

If an incomplete collection or no blood is obtained

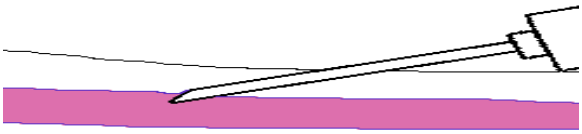
Change the position of the needle. Move it forward (it may not be in the lumen).



or move it backward (it may have penetrated too far)



or adjust the angle (the bevel may be against the vein wall)

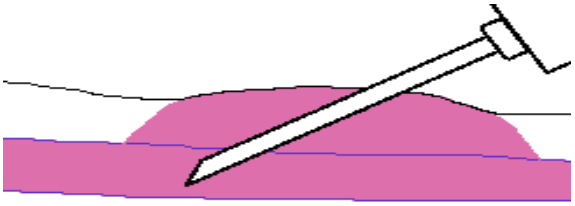


If the blood stops flowing into the tube

- Loosen the tourniquet. It may be obstructing blood flow.
- Try another tube. There may be no vacuum in the one being used. If no blood flows into the second tube, pull back slowly as it may have penetrated too far when the tube was inserted.
- The vein may have collapsed; ask the patient to reform their fist or ask another staff member to re-secure the tourniquet to increase venous filling. If this is not successful, remove the needle, take care of the puncture site, and redraw.
- The needle may have pulled out of the vein when switching tubes. Hold equipment firmly. Place fingers against patient's arm and use the flange of the vacutainer holder for leverage when withdrawing and inserting tubes.

Problems other than an incomplete collection:

If a hematoma forms under the skin adjacent to the puncture site - release the tourniquet immediately and withdraw the needle. Apply firm pressure. Hematoma formation is particularly a problem in older patients.



Number of allowable venipuncture attempts

If, the collection is. . .	Then, . . .
a PSC or Hospital Collection	• If unsuccessful, you may attempt a second poke if you are confident you can get the blood. If not confident, you must ask the patient if they are comfortable having another phlebotomist collect or if they would prefer to reschedule. • The patient's verbal consent must be obtained before the second phlebotomist proceeds • Prior to poking a patient a third time, refer to the appropriate section below. • As the second phlebotomist, you may also attempt two pokes if you are confident on the second poke. If not confident, you must ask the patient if they are comfortable having a third phlebotomist to collect. • Each phlebotomist can attempt up to two pokes as long as **the total number of pokes does not exceed 4** • **PSC only -** No phlebotomist may poke the patient more than two times. • **All patient collection environments** - The patient may not be poked more than a total of 4 times.

If unable to obtain a sample

If the collection is…	Then…
a PSC Collection and **patient is returning** for collection	• ensure all entered tests are canceled in the LIS with Collection Unsuccessful – Max Attempts (51006) • circle uncollected tests on the requisition and indicate TF. Return the requisition to the patient and ask them to return for collection at another time. Instruct them to be warm and hydrated to increase the chance of a successful venipuncture
a PSC Collection and rescheduled collection is unsuccessful and/or **patient not returning** for recollection	• ensure all entered tests are credited in the LIS with Collection Unsuccessful – Max Attempts (51006)
a hospital or facility collection	• ensure the medical or support staff is notified we were unable to obtain the specimen • document on lab collection log as required

Adverse patient reactions

Phlebotomy may induce a variety of adverse reactions in patients. Refer to "PCS Emergencies" for information regarding specific adverse reactions.

Reactions in patients require judgment on your part. Play it safe. If in doubt, always contact a physician or call EMS (911).

User Groups

PSC LAII

References

1. Frederick L. Kiechle. So You're Going to Collect a Blood Specimen, An introduction to Phlebotomy. 13th Edition, 2010.
2. Clinical and Laboratory Standards Institute H3-A6, Volume 27, Number 26. October 2007.
3. Becton Dickinson package insert. Vacutainer® Brand Evacuated Blood System, March 2000.
4. Ogden-Grable, H. and Gill, G.W. (2005). Phlebotomy Puncture Juncture: Preventing Phlebotomy Errors-Potential For Harming Your Patients. Lab Medicine, 36:7; 430-433. July 2005.
5. WHO guidelines on drawing blood: best practices in phlebotomy. WHO publication 2010. Accessed online on February 1, 2012: http://whqlibdoc.who.int/publications/2010/9789241599221_eng.pdf
6. Clinical and Laboratory Standards Institute, GP41, 7ed. April 2017

APPENDIX 1

Maximum Draw in Patients Weighing Less than 45 kg/100 lb, Within a 24-Hour Time Period

Phlebotomists

Use maximum volume limits in the table below, for a single blood collection. A patient's clinical condition may require a volume exceeding maximum volume

- Requests that exceed the collection guidelines **must be reviewed and authorized** by a physician, nurse or authorized health care provider before proceeding with blood collection
- Always document the receipt of authorization to exceed maximum volumes – include authorizing name, date, and time

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Maximum Volume Collection Guidelines

Exception – <u>Blood cultures:</u> The volume collected for the blood cultures can be in addition to the maximum volume allowed for a single blood collection

Patient's Weight in:		Maximum Volume (mL)	
Pounds	Kilograms	at one time	in 1 month
6 - 8	2.7 - 3.6	2.5	23
9 - 10	3.7 - 4.5	3.5	30
11 - 15	4.6 - 6.8	5	40
16 - 20	6.9 - 9.1	10	60
21 - 25	9.2 - 11.4	10	70
26 - 30	11.5 - 13.6	10	80
61 - 35	13.7 - 15.9	10	100
36 - 40	16.0 - 18.5	10	130
41 - 45	18.6 - 20.4	20	140
46 - 50	20.5 - 23.0	20	160

Patient's Weight in:		Maximum Volume (mL)	
Pounds	Kilograms	at one time	in 1 month
51 - 55	23.1 - 25.0	20	180
56 - 60	25.1 - 27.5	20	200
61 - 65	27.6 - 29.5	25	220
66 - 70	30 - 32.0	30	240
71 - 75	32.1 - 34.0	30	250
76 - 80	34.1 - 36.0	30	270
81 - 85	36.1 - 38.5	30	290
86 - 90	38.6 - 40.5	30	310
951 - 95	40.6 - 73.1	30	330
96 - 100	43.2 - 45.4	30	350

Note: Excessive blood collection can lead to complications such as phlebotomy-induced (iatrogenic) anemia. Monitoring the volume of blood collected from patients susceptible to phlebotomy-induced anemia is critical to ensure that frequent diagnostic sampling does not complicate patient care and/or threaten their well-being

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Health care providers

Apply the Minimum Volume Collection Guidelines to coordinate test orders and to authorize blood collection to minimize patient safety risks:

- Total volume of blood collected must be limited, based on the patient's weight and the volume of blood requested over a specified time period:
  - 5% of total blood volume within a 24 hour period
  - 10% of total blood volume over an 8 week period
- Maximum collection volumes indicated above are lower than the recommended 5% within a 24-hour period to allow for potential multiple collections

The blood volume for children is approximately 75-80 mL/kg, and is higher in newborns. Blood volume for adults is approximately 65-70 mL/kg