Specimen Collection - Routine Blood Specimen Collection

	Document Classification:	☐ Policy ☐Procedure ☒ Policy and Procedure
	Document Type:	☐ Administrative ☒ Clinical
	Applicability:	☒ Organization ☐ Hospital ☐ NMG ☐ Department Only
Effective Date:	8/31/2010	

Purpose:

To provide a standard procedure for collecting blood specimens used for laboratory testing.

Policy Statement:

The Laboratory has primary responsibility for the 6 am specimen collection and will provide backup phlebotomy support to hospital units for all other draws. Samples from the ED, FBC, Surgical Services, PCU, and NMC Practices are collected by staff who have demonstrated competency with specimen collection techniques. Samples are also collected by clinical staff from outpatient non-NMC sites (referrals).

To ensure accurate results, the patient and specimens must be appropriately identified, the sample must be collected properly, and the specimen must be processed correctly. Errors in any of these variables can adversely affect patient results, therefore it is vital that proper collection techniques be observed. Unsuitable samples may be rejected without being tested.

Background: N/A

Definitions: N/A

Procedure:

A. Assemble needed supplies:

a. Evacuated Collection Tubes - The tubes are designed to fill with a predetermined volume of blood by vacuum. The rubber stoppers are color coded according to the additive that the tube contains. Various sizes are available. Blood should **NEVER** be poured from one tube to another since the tubes can have different additives or coatings (see illustrations at end).
b. BD or Greiner safety push button blood collection set and BD or Greiner safety needle - The gauge number indicates the bore size: the larger the gauge number, the smaller the needle bore. Needles are available for evacuated systems and for

use with a syringe, single draw or butterfly system. Safety needles are designed to blunt the sharp end after blood collection to prevent accidental needle sticks.

c. Holder/Adapter - use with the evacuated collection system.
d. Disposable Tourniquet
e. Alcohol Wipes - 70% isopropyl alcohol.
f. Chlorhexadine wipes/swabs - Used if blood culture is to be drawn.
g. Sterile Gauze sponges - for application on the site from which the needle is withdrawn.
h. Adhesive bandages / tape - protects the venipuncture site after collection.
i. Sharps container - needles should NEVER be broken, bent, or recapped. Needles should be placed in the sharps container IMMEDIATELY after their use.
j. Gloves - worn to protect the patient and the phlebotomist. Choose an appropriate size. Gloves that are too large should not be used, as the additional space at the fingertips can get caught in tourniquets and can interfere with fine motor skills required for phlebotomy. Latex gloves should not be used due to the risk of allergies to the patient and the phlebotomist.
k. Syringes - may be used in place of the evacuated collection tube for special circumstances.

B. Review the requisition or orders to determine which tests need to be performed and select the appropriate tube type.

Prior to collecting specimens, review all orders. For inpatient sites and NMC Practices, orders will be filed electronically in Meditech. Orders from other area providers may be accessed in the Lab Faxed Order Folder located on the user's desktop. Orders from UVMMC affiliated providers are filed in EPIC (Laboratory Assistants have been granted permission to access these orders).

For all "walk-in" patients presenting to the NMC Outpatient Laboratory or one of the NMC Urgent Care Sites with orders from a non-NMC provider, staff will verify orders electronically AND will check for the presence of additional paper-based orders, which are scanned into the Lab Faxed Order Folder. In some cases, patients have additional orders from a variety of providers and/or orders are sometimes updated. For this reason, it is critical that NMC Urgent Care staff call the Laboratory to double-check for the existence of additional orders before collecting a specimen.

C. Patient Identification

1. In a professional and courteous manner, greet the patient and identify yourself

2. For outpatients, ask the patient to sit in one of the phlebotomy chairs. For inpatients ensure that the patient is in a comfortable position in the bed and that the bed is adjusted ergonomically for the phlebotomist.

3. Review the laboratory requisition or provider orders

4. Ask the patient to state their name and date of birth (DOB).

5. Order tests in the LIS and obtain labels

6. Verify the name and DOB against the requisition, labels, and all other paperwork

7. Verify patient identification against the patient's wristband.

8. Verify and document any items about the patient's condition that may be relevant to the testing being performed (fasting vs. non-fasting for chemistry samples, current medications such as anticoagulants or "blood thinners" for coagulation samples, history of transfusions or pregnancies for blood bank samples, etc.)

D. Equipment and Tube Selection

1. Choose the appropriate tube types and place them in an accessible location near the patient.

    a. Unusual or special tests should be researched prior to phlebotomy
    b. Special handling instructions for many tests are outlined in the LIS and/or on the labels
    c. Special handling instructions should be printed, reviewed, and then sent with the specimen.
    d. Online references should be followed as these are generally more up-to-date than printed test directories

2. Select and assemble the appropriate blood collection device. The preferred method for routine blood draws is a single use safety needle. For difficult sticks on patients with fragile or collapsible veins, a butterfly setup may be used. On rare occasions, a syringe and needle may be necessary for special collections.

E. Venipuncture Site Selection

Although the larger and fuller median cubital and cephalic veins of the arm are used most frequently, the basilic vein on the dorsum of the arm or dorsal hand veins are also acceptable for venipuncture. Foot veins are a last resort and require a written order because of the higher probability of complications.

Certain areas are to be avoided when choosing a site:

- Extensive scars from burns and surgery - it is difficult to puncture the scar tissue and obtain a specimen.
- The upper extremity on the side of a previous mastectomy - test results may be affected because of lymphedema.
- Hematoma - may cause erroneous test results. If another site is not available, collect the specimen distal to the hematoma.
- Intravenous therapy (IV) / blood transfusions - fluid may dilute the specimen, so collect from the opposite arm if possible. Otherwise, satisfactory samples may be drawn below the IV by following these procedures:

    1. Contact the Charge Nurse and request that the IV be turned off for at least 2 minutes before venipuncture.
    2. Apply the tourniquet below the IV site. Select a vein other than the one with the IV.
    3. Perform the venipuncture. Draw 5 ml of blood and discard before drawing the specimen tubes for testing.

- Cannula/fistula/heparin lock -. In general, blood should not be drawn from an arm with a fistula or cannula without consulting the attending physician. Laboratory personnel do not collect samples from these sites. Consult with the Charge Nurse to coordinate collection by qualified personnel.
- Edematous extremities - tissue fluid accumulation alters test results.

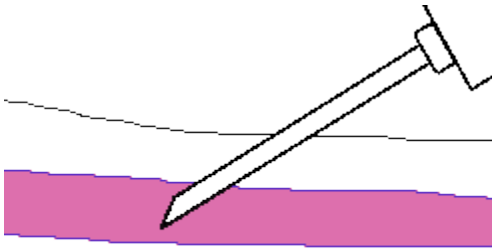
F. Vein Selection

Palpate and trace the path of veins with the index finger. Arteries pulsate, are most elastic, and have a thick wall. Thrombosed veins lack resilience, feel cord-like, and roll easily.

- If superficial veins are not readily apparent, you can apply a warm, damp washcloth to the site for 5 minutes, or lower the extremity to allow the veins to fill.

G. Phlebotomy

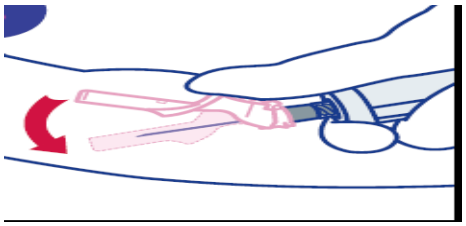
- Apply the tourniquet 3-4 inches above the selected puncture site. Do not place too tightly or leave on more than 1 minute.
- The patient should make a fist without pumping the hand.
- Select the venipuncture site.
- Prepare the patient's arm using an alcohol prep. Cleanse in a circular fashion, beginning at the site and working outward. Allow to air dry.
- Inform the patient that they may feel slight pain or “a pinch”.
- Grasp the patient's arm firmly using your thumb to draw the skin taut and anchor the vein. The needle should form a 15 to 30-degree angle with the surface of the arm. Swiftly insert the needle through the skin and into the lumen of the vein. Avoid trauma and excessive probing.



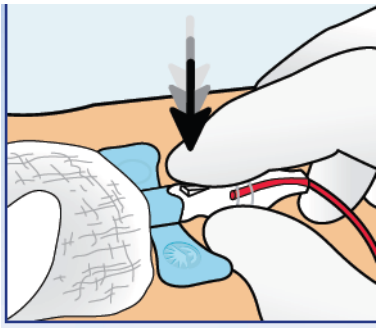
- Collect the tubes in the proper order (see Laboratory Policy titled “Blood Draw Tube Order”). Gently mix each tube 5-8 times after drawing.
- When the last tube to be drawn is filling, remove the tourniquet.
- Remove the needle from the patient's arm using a swift backward motion.
- Press down on the gauze once the needle is out of the arm, applying adequate pressure to avoid formation of a hematoma. Instruct the patient to continue to apply pressure to the gauze for at least 5 minutes to prevent bruising. This is

especially important with patients on anticoagulant therapy, as they may be more prone to bleeding and subsequent bruising.

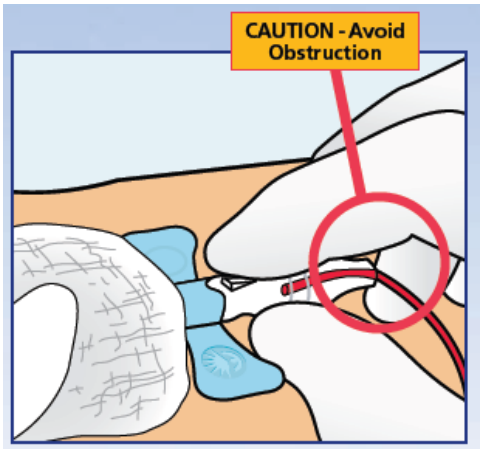
- Immediately after removing needle from vein, position thumb squarely on pink safety shield thumb pad and push pink safety shield forward to cover needle. An audible click may be heard. Lock shield into place and inspect. DO NOT attempt to engage safety shield by pressing against a hard surface.



- For butterfly needles, activate the push button safety mechanism prior to withdrawing from the vein. Detailed instructions are outlined below.



The device is designed to be activated while the needle is still in the patient's vein. Place your gauze pad or cotton ball on the venipuncture site. Allow gauze pad or cotton ball to cover nose of front barrel. Following the collection procedure, **and while the needle is still in the vein,** grasp the body with the thumb and middle finger. Activate the button with the tip of the index finger.



To ensure complete and immediate retraction of device, make sure to keep fingers and hands away from the end of the blood collection set during retraction. Do not impede retraction.

- Dispose of contaminated materials/supplies in designated containers.

- Label all tubes at the patient bedside. Under no circumstances should samples be labeled at a later time or when the phlebotomist or patient has left the room.
- The collector's initials, signature, or employee number, date, and time should be written on the tube, the order sheet/requisition, and recorded in the LIS.
- Inform the patient that Lab results will be made available to their provider. Based on the tests ordered, provide the patient with an estimate for when the results will be available to the provider. Patients are encouraged to contact their provider directly. Alternatively, patients may obtain copies of their medical record through Health Information Management.
- Deliver specimens promptly to the laboratory.

Note Well:

Order	Tube Type	Cap Color (Greiner has colored rings, BD does not)	Mix by Gentle Inversion
1	Blood Culture – Aerobic*	Blood Culture Bottle – grey cap / blue rim	8 – 10 times
2	Blood Culture – Anaerobic*	Blood Culture Bottle – orange cap / gold rim	8 – 10 times
OR	*Blood Culture – Pediatric**	Blood Culture Bottle – pink cap / silver rim	8 – 10 times
3	Trace Metals	Royal Blue Top	8 – 10 times
4	Sodium Citrate **	Blue Top / black ring	4 – 5 times
5	Clot Activator	Red Top / black ring	5 – 10 times
6	Clot Activator w/Gel	Red Top / yellow ring	5 – 10 times
7	Lithium Heparin w/Gel	Green Top / yellow ring	5 – 10 times
8	K2 EDTA, 3 mL	Purple Top / black ring	8 – 10 times
10	K2 EDTA, 6 mL	Pink Top	8 – 10 times
11	ACDA or ACDB	Pale Yellow Top	8 – 10 times

* Blood Cultures must be collected following the special instructions outlined in the NMC "Specimen Collection – Blood Culture Collection" procedure.

** For coagulation studies, ensure that the correct blood to additive ratio is met by checking that the draw volume is within the black triangle marking on the tube label. If the volume is not within +/- 10% of the line, the sample will be rejected.

It is unacceptable to combine the contents from separate tubes. Never pour over or combine contents from one tube to another.

Blood tubes have a vacuum which draws the blood into the tube through the stopper. When the vacuum is broken, the only way the tube can be used is to take off the stopper and fill it. Laboratory personnel will be glad to demonstrate how to use the system.

Special Safety Precautions

Standard Precautions will be used during sample collections and when handling open specimens. This includes the use of gloves when performing phlebotomy.

Laboratory personnel will adhere to all NMC Isolation/Precautions protocols.

Clean up any blood spills with current approved disinfectant.

Hand hygiene is performed in view of the patient prior to phlebotomy, after removing gloves, and at the completion of the phlebotomy process.

Quality Control

- Blood tubes are QC'd by the manufacturer during production.
- Visually inspect that the tube tops are secure to ensure that the vacuum is intact.
- Review the expiration date. Do not use if the tube has expired.
- Any concerns about the integrity of tubes should be documented (including lot number and expiration date) and brought to the attention of supervisory staff.

To prevent a hematoma:

- Puncture only the uppermost wall of the vein
- Remove the tourniquet before removing the needle
- Use the major superficial veins
- Make sure the needle fully penetrates the upper most wall of the vein. (Partial penetration may allow blood to leak into the soft tissue surrounding the vein by way of the needle bevel)
- Apply pressure to the venipuncture site

To prevent hemolysis (which can interfere with many tests):

- Mix tubes with anticoagulant additives gently 5-10 times
- Avoid drawing blood from a hematoma
- Avoid drawing the plunger back too forcefully, if using a needle and syringe, and avoid frothing of the sample
- Make sure the venipuncture site is dry
- Avoid a probing, traumatic venipuncture
- Avoid drawing blood through IV lines, ports or catheters

Indwelling Lines or Catheters:

- Potential source of test error
- Most lines are flushed with a solution of heparin to reduce the risk of thrombosis
- Discard a sample at least three times the volume of the line before a specimen is obtained for analysis

Hemoconcentration: An increased concentration of larger molecules and formed elements in the blood may be due to several factors:

- Prolonged tourniquet application (no more than 2 minutes)
- Massaging, squeezing, or probing a site
- Long-term IV therapy
- Sclerosed or occluded veins

Prolonged Tourniquet Application:

- Primary effect is hemoconcentration of non-filterable elements (i.e. proteins). The hydrostatic pressure causes some water and filterable elements to leave the extracellular space.
- Significant increases can be found in total protein, aspartate aminotransferase (AST), total lipids, cholesterol, iron
- Affects packed cell volume and other cellular elements

Patient Preparation Factors:

- Therapeutic Drug Monitoring: different pharmacologic agents have patterns of administration, body distribution, metabolism, and elimination that affect the drug concentration as measured in the blood. Many drugs will have "peak" and "trough" levels that vary according to dosage levels and intervals. Check for timing instructions for drawing the appropriate samples.
- Effects of Exercise: Muscular activity has both transient and longer lasting effects. The creatine kinase (CK), aspartate aminotransferase (AST), lactate dehydrogenase (LDH), and platelet count may increase.
- Stress: May cause transient elevation in white blood cells (WBC's) and elevated adrenal hormone values (cortisol and catecholamines). Anxiety that results in hyperventilation may cause acid-base imbalances, and increased lactate.
- Diurnal Rhythms: Diurnal rhythms are body fluid and analyte fluctuations during the day. For example, serum cortisol levels are highest in early

morning but are decreased in the afternoon. Serum iron levels tend to drop during the day. You must check the timing of these variations for the desired collection point.

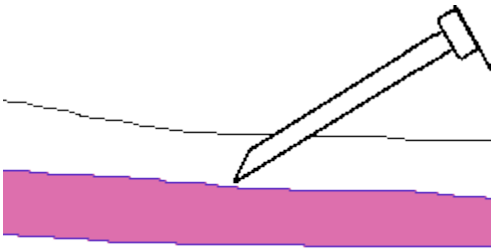
- Posture: Postural changes (supine to sitting etc.) are known to vary lab results of some analytes. Certain larger molecules are not filterable into the tissue; therefore they are more concentrated in the blood. Enzymes, proteins, lipids, iron, and calcium are significantly increased with changes in position.
- Other Factors: Age, gender, and pregnancy have an influence on laboratory testing. Normal reference ranges are often noted according to age.

TROUBLESHOOTING GUIDELINES:

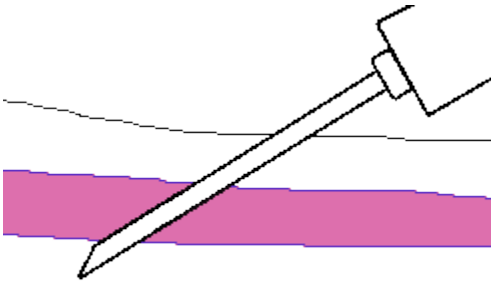
"Fishing" for a vein is strongly discouraged, however these simple techniques may be used to improve success during a difficult phlebotomy.

IF AN INCOMPLETE COLLECTION OR NO BLOOD IS OBTAINED:

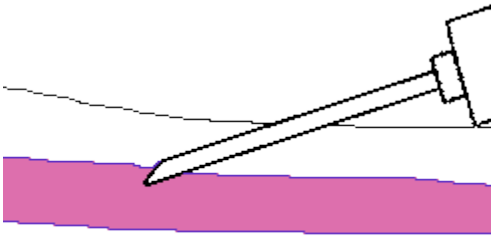
- Change the position of the needle. Move it forward (it may not be in the lumen)



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



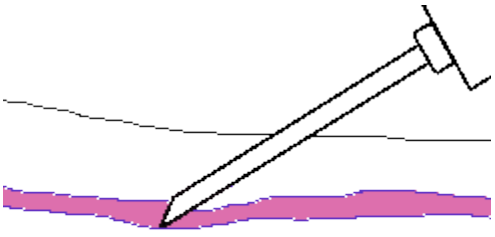
- Adjust the angle (the bevel may be against the vein wall).



- Loosen the tourniquet. It may be obstructing blood flow.
- Try another tube. There may be no vacuum in the one being used.
- Re-anchor the vein. Veins sometimes roll away from the point of the needle and puncture site.

IF BLOOD STOPS FLOWING INTO THE TUBE:

- The vein may have collapsed; resecure the tourniquet to increase venous filling. If this is not successful, remove the needle, take care of the puncture site, and redraw.

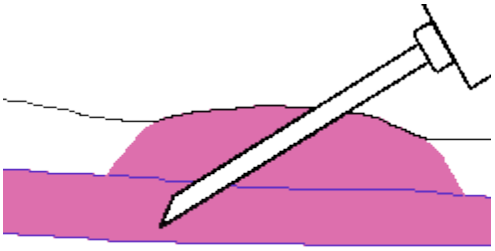


- The needle may have pulled out of the vein when switching tubes. Hold equipment firmly and place fingers against patient's arm, using the flange for leverage when withdrawing and inserting tubes.

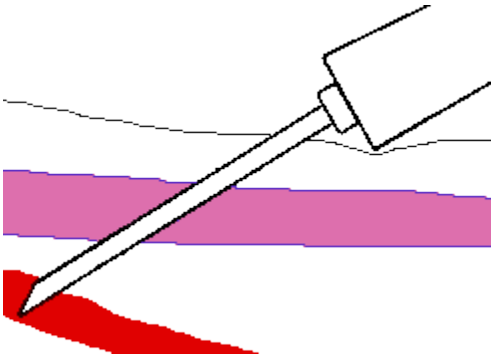
PROBLEMS OTHER THAN AN INCOMPLETE COLLECTION:

- 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 a problem in older patients.



- The blood is bright red (arterial) rather than venous. Apply firm pressure for more than 5 minutes.



EMLA Cream use on Pediatric Patients

EMLA cream (2.5% lidocaine, 2.5% priolocain) is a topical anesthetic that is used to reduce distress, anxiety, and pain associated with phlebotomy in pediatric outpatients. EMLA cream is applied to the venipuncture site 30 to 60 minutes

prior to the phlebotomy procedure.

Providers wishing to utilize EMLA cream may apply the anesthetic in their office prior to sending the patient to the Laboratory. Providers are encouraged to assess the phlebotomy site in advance of applying the EMLA cream to avoid the need perform phlebotomy on an alternate site that has not been treated with the anesthetic.

Alternatively, providers may submit written and signed orders for the use of EMLA cream at NMC. The anesthetic will be applied by nursing staff from the Family Birthing Center.

Prior to performing phlebotomy, the phlebotomist will use sterile gauze to remove the EMLA cream from the phlebotomy site. Gloves must be worn to avoid anesthetizing the phlebotomist's fingers or hand.

Related Policies:

Ammonia and Lactic Acid Collection Procedure
Blood Draw Tube Order
Orders for Laboratory Tests *(Policy located on Laboratory site)*
Specimen Collection (Fingerstick)
Specimen Collection for Neonates & Children
Specimen Collection – Blood Culture Collection

References:

Procedures for the Collection of Diagnostic Blood Specimens by Venipuncture; Approved Standard – Sixth Edition, H3-A6, Vol. 27 No. 26,

"Blood Collection: Routine Venipuncture and Specimen Handling" Mercer University School of Medicine, Online Phlebotomy Tutorial, 8/30/10.

BD Vacutainer Push Button Blood Collection Set Quick Reference Guide, Becton Dickinson Company, P/N VS7104-4, 11/07, downloaded 8/30/10. http://www.bd.com/vacutainer/pdfs/VS7104_Push_Button_Inservice_Poster.pdf

BD Vacutainer Eclipse Blood Collection Needle Quick Reference Guide, Becton Dickinson Company, P/N VS7424-2 03/07, http://www.bd.com/vacutainer/pdfs/VS7424-2EclipseQRC.pdf, downloaded 08/30/10.

"EMLA cream as a topical anesthetic before office phlebotomy in children." Young SS, Schwartz R., Sheridan MJ., South Med J. 1996 Dec;89(12):1184-7.

"Safety net: juggling the gains, losses of phlebotomy routines" Karen Lusky, CAP Today, June 2004, downloaded 7/12/2011.

Keywords - Not part of policy: Blood Collection Techniques, Venipuncture, Phlebotomy, Blood Draw, Lab Draw