UT HEALTH SAN ANTONIO CLINICAL LABORATORY

SPECIMEN COLLECTION GUIDELINES

PURPOSE:

To provide detailed procedures for specimen collection and handling.

SCOPE OF SERVICE:

The UT Health San Antonio Clinical Laboratory is an outpatient laboratory that services the UT Health Practice and is located within the UT Health Mays Cancer Center. The Clinical Laboratory supports the UT Health Physicians and the UT Health San Antonio MD Anderson Cancer Center Mission and Vision Statements. The hours of operation for the Clinical Laboratory are Monday through Friday 7:30am to 8:00pm. Phlebotomy draw site hours may vary by the locations they serve.

CLINICAL SIGNIFICANCE:

The quality and validity of tests performed in the clinical laboratory depends on the quality of the specimen collected from the patient and how the specimen is handled. Each test procedure has specific collection requirements for the type of specimen to be analyzed. This includes the preferred specimen for a certain test (i.e., blood, serum, plasma, urine, etc.), the required specimen volume, the type of collection tube needed for the specimen, the right kind of aliquot container and the optimal temperature necessary for its transport. It is also very important to supply patient's vital information when indicated (ex: height, weight, fasting status etc). The collection and proper handling of blood and urine, which are two of the most frequently requested body fluids for diagnostic testing and some specimens that require special collection instructions, handling and processing prior to testing are all detailed in this document.

FORMS OR RECORDS:

- Access to EPIC with ordering priviledges
- Uniform laboratory requisition form (in case EPIC is not functioning)
- Uniform laboratory add-on form
- University Health System laboratory requisition forms

TEST MENU:

UT Health San Antonio

UT Health San Antonio Clinical Laboratory In-House Test List

Abbrev	Order Choice Name	CPT Codes
CBC W/DIFF & PLT	CBC W/DIFF & PLT [H]	85025
CBC W/PLT	CBC W/PLT [H]	85027
HGBHCT	Hemoglobin & Hematocrit [H]	85014, 85018
PLT	Platelet Count [H]	85049
AFP	Alpha Feto Protein [SC]	82105
CEA	Carcinoembryonic Antigen (CEA) [SC]	82378
FERRITIN	Ferritin, Serum [SC]	82728
HCG	Human Chorionic Gonadotropin (hCG), Quantitative [SC]	84702
PSA	Prostate-specific Antigen (PSA), Serum [SC]	84153
TSH	Thyroid-stimulating Hormone (TSH) [SC]	84443
UA	Urinalysis, Complete [U]	81001
UA DIP	Urinalysis, Chemical (Dipstick) [U]	81003
ALB	Albumin [C]	82040
ALP	Alk. Phosphatase [C]	84075
ALT	SGPT (ALT) [C]	84460
AMY	Amylase [C]	82150
AST	SGOT (AST) [C]	84450
BMP	Basic Metabolic Panel (BMP) [C]	80048
BUN	BUN [C]	84520
CA	Calcium [C]	82310
CHOL	Cholesterol [C]	82465
CK	CK, Total [C]	82550
CL	Chloride [C]	82435
CMP	Comprehensive Metabolic Panel (CMP) [C]	80053
CREA	Creatinine [C]	82565
DBIL	Bilirubin, Direct [C]	82248
FE	Iron [C]	83540
FE & TIBC	Iron and Total Iron Binding Capacity (TIBC) [C]	83540, 83550
GGT	GGT [C]	82977
GLU	Glucose (Random) [C]	82947
GLU FAST	Glucose (Fasting) [C]	82947
GTT GESTATIONAL (50g)	Glucose, Gestational Screen (50g) [C]	82950
GTT GESTATIONAL 100g	Glucose Tolerance Test, Gestational, 4 Specimens (100g) [C]	82951, 82952
GTT GESTATIONAL 75g	Glucose Tolerance Test, Gestational, 3 Specimens(75g) [C]	82951
GTT, 2 HR	Glucose Tolerance Test, 2 Hour (75g) [C]	82947, 82950
HDL	High-density Lipoprotein (HDL) Cholesterol [C]	83718
HEPF	Liver Function Panel [C]	80076
K	Potassium [C]	84132
LDH	LDH [C]	83615
LIPID	Lipid Panel [C]	80061
LIPL	Lipase [C]	83690
LYTES	Electrolyte Panel [C]	80051
MG	Magnesium [C]	83735
NA	Sodium [C]	84295
PHOS	Phosphorus [C]	84100
RENAL FUNC.	Renal Function Panel [C]	80069
TBIL	Bilirubin, Total [C]	82247
TCO2	CO2 [C]	82374
TGL	Triglycerides [C]	84478
TIBC	Total Iron Binding Capacity (TIBC) [C]	83550
TP	Total Protein [C]	84155
URCA	Uric Acid [C]	84550
OCCBLD1	Occult Blood X 1 [M]	82270
SPREG	HCG, SERUM QUAL [C]	84703
MDIFF	MDIFF [H]	85007
APTT	Activated Partial Thromboplastin Time [Co]	85730
PT/INR	Prothrombin Time / INR [Co]	85610
FT4	Free T4 [SC]	84439
FOLATE	Folate (Folic Acid), Serum [C]	82746
VIT B12	Vitamin B12 (Cobalamin) [C]	82607
VIT B12 & Folate	Vitamin B12 & Folate(Folic acid) [C]	82607, 82746
HA1C	Hemoglobin A1C	83036
ESR	Erythrocyte Sedimentation Rate	85652
DRAW	Draw Fee	36415
HCV	Hepatitis C Virus Antibody [SC]	86803
HBsAG	Hepatitis B Surface Antigen [SC]	87340
HBsAG Conf.	Hepatitis B Surface Antigen confirmation [SC]	87341
HBs AB QL	Hepatitis B Surface Antibody, qualitative [SC]	86706
HBs AB QN	Hepatitis B Surface Antibody, quantitative [SC]	86317
HBc AB, IgM	Hepatitis B core, IgM Antibody [SC]	86705
HBc AB	Hepatitis B core, Total Antibody [SC]	86704
HAV AB, IgM	Hepatitis A Virus IgM Antibody [SC]	86709
HAV AB	Hepatitis A Virus Antibody [SC]	86708
Hep Panel, Acute	Acute Hepatitis Panel [SC]	80074

TEST ORDERING:

All test orders must be received on an EPIC, or manual requisition form. The laboratory will not accept verbal orders. For add on testing, a requisition need not be submitted to the laboratory, but the order must be present in EPIC to ensure accuracy. The following steps should be followed when ordering laboratory tests:

1. Orders for laboratory testing are only accepted from UT Health credentialed physicians, physician assistants and nurse practitioners. Orders will not be accepted from outside providers.
2. Verify the physician's orders. Clarify all testing issues prior to ordering the tests. The laboratory will call the nurse or physician in order to clarify any orders that are not clear or are expressed as an unknown medical acronym.
3. Determine what tests can be done at the UT Health Clinical Laboratory and what tests will need to be sent out to a reference laboratory. The reference laboratory used is dependent on the patient's insurance. This information may be found in EPIC, the institution's electronic medical record. Please do not use insurance information from any other source since it may not be accurate.
4. Complete the EPIC electronic laboratory requisition form. Please note the following requirements:

    a. Select tests from the "Preference List". Call the laboratory if you need to select a test from the global test directory.
    b. Certain tests require separate diagnosis codes for Medicare reimbursement. All ICD-10 codes that support the medical necessity for that test need to be included. Please note that the patient's primary diagnosis code is not always sufficient :e.g.-the use of 174.9 (breast CA) will not support medical necessity for a urine culture. It is the responsibility of the physician to provide the correct diagnoses. In the absence of a diagnosis code, please use signs and symptoms.
    c. Select the correct provider for that day's encounter.
    d. All orders for send-out testing from reference laboratories (LabCorp, Quest and University Health System) are also ordered via EPIC. Please note that orders for University Health System must have the "Status" changed to "Future". Do not release these orders. Orders for tests being submitted to LabCorp and Quest need to have the "Status" set to "UT Health Collect".

5. For research sponsor paid tests:

    a. All research paid tests are ordered on manual requisitions to University Health System. Add research account identification to all requisitions.
    b. University Health System has several requisitions. The correct requisition is dependent on the laboratory section analyzing the specimen. The laboratory provides blank copies of the UHS requisitions. Make sure the entire requisition is completed otherwise the specimen will be rejected.

6. When add-on tests are requested by the physician after the requisition and specimen have been processed by the laboratory, please notify the laboratory prior to ordering. Some analytes are not

stable in certain conditions and thereby not suitable to be processed after a certain period of time. The laboratory will also need to verify that there is sufficient sample for the requested test(s).The laboratory will not accept any verbal test add-on requests. Once the laboratory confirms that we have sufficient sample to run the test, please order the test via EPIC. The order must be present in EPIC before testing can begin.

7. Reference laboratories may have different specimen collection and handling requirements. All ordering areas have access to a table listing the most commonly ordered tests and their individual requirements or online access to the reference laboratories test menu providing specimen requirements. If a test is not listed, please verify the specimen requirements by calling the laboratory at 210-450-8270. A laboratory personnel should be able to give adequate and further instructions.

TURN AROUND TIME:

Turnaround times for Mays Cancer Center testing have been defined for the following assays and are monitored monthly as part of the QA process:

Comprehensive Metabolic Panel:	60 minutes
CBC with automated differential:	30 minutes
PT/aPTT assays:	30 minutes
Urinalysis with manual microscopic:	45 minutes

Times are monitored based on the time received in the laboratory to the time results are reported.

Clinic locations outside of the Mays Cancer Center have a same day turn around time for any in house assays designated as Urgent. All other in house assays will be performed within the next business day. Specimens submitted to reference laboratories will have a turn around time designated by the performing laboratory.

PATIENT PREPARATION:

Positive patient identification is critical for accurate test results and to prevent errors.

1. Identify the patient: Politely request the patient to state their name. Using the demographic sheet in the patient's chart for reference, ask the patient to provide additional information such as a birthdate. Verify that the EPIC generated labels have the correct information.
2. Check the requisition form for requested tests, patient information, and any special requirements.
3. Look for a suitable site for venipuncture.
4. Prepare the supplies for venipuncture.
5. Perform the venipuncture. (Please see accompanying procedure).
   Note: The maximum recommended blood volume to be drawn at one time is **50 mL** for adults.
6. Label tubes immediately in front of the patient while they are still seated. NEVER PRE-LABEL tubes, since our institution does not use bar coded arm bands that match the labels.

SPECIMEN REQUIREMENTS:

Color-coded plastic vacutainer tubes indicate the anticoagulant present in these collection tubes necessary to preserve the blood sample within the optimal time and temperature of transport to the testing laboratory. The evacuated tubes used at UT Health San Antonio are manufactured and evaluated for analytical interference by Becton, Dickinson and Company (BD Vacutainer® Tubes). The laboratory's Medical Director has found these containers to be acceptable for use. UT Health San Antonio uses plastic tubes in order to reduce tube breakage and possible injury. Please check the expiration dates on all tubes. Expired tubes may not be used since the vacuum and anticoagulant present may have already been compromised. Use the "Tube Requirement" information form to determine which tubes to use for the requested tests. Remember that laboratories may have different tube requirements for the same test.

When collecting blood samples it is important to allow the tube to fill completely. Becton, Dickinson and Company Vacutainer® Blood Collection Tubes are made to draw within ±10% of the stated draw volume at the time of manufacture. Incomplete tube filling may be due to sidewall piercing, when the back end of the needle embeds in the wall of the stopper rather than passing through the center of the stopper. Be sure to securely screw the holder onto the needle. This helps center the needle in the holder and prevents the back end of the needle from embedding in the wall of the stopper.

It is also important to follow the correct "order of draw"" for the color-stoppered tubes as indicated in the following chart. This order of the draw is based on the CLSI standard H3-A5, Vol 23, No 32, 8.10.2 and is designed to prevent additive carryover and erroneous results. Please see Table 1 on the next page

When using a winged blood collection set for venipuncture, and a blue-top (citrated) tube is the first specimen tube to be drawn, a "discard tube" (a non-additive, plain red-top tube) should be drawn first. This "discard tube" (which does need to be completely filled) is used to fill the blood collection tubing's set "dead space" and thus, will ensure continuous flow of blood through the blue-top tube, thereby maintaining the proper blood-to-additive ratio which is very crucial for coagulation (eg. PT/APTT, D-Dimer) testing.

Table 1

Collection Tube Additives and Order of the Draw

Order	Top Color	Additive	Laboratory Use
1	Yellow Top, OR Blood culture bottles	Sodium polyanethol sulfonate (SPS)	Used for blood cultures. Sterile technique required, invert tubes 8-10 times to prevent clotting
2	Light Blue Top	Buffered sodium citrate	For coagulation tests, 3-4 tube inversions will prevent clotting, full draw required
3	Black and Red "Tiger Top" Red Top	Tiger: Clot activator and gel for serum separation Red Top: Clot activator	Chemistries, immunology and serology. Invert plastic tubes 5 times to ensure mixing with clot activator
4	Dark Green Top	Lithium heparin	For plasma chemistry determinations, invert tube 8 – 10 times to prevent clotting. Please ensure that the green top tube states Lithium Heparin for chemistry determinations. If you are drawing a sample for Lithium levels or for Cytogenetics, please request a Sodium Heparin tube from the lab.
5	Purple/Lavender Top Pink Top Pearl White Top	K_2EDTA K_2EDTA (with special labeling) K_2EDTA with gel	Hematology (CBC), Blood Bank, Hemoglobin A1C; invert 8 – 10 times to prevent clotting and platelet clumping. Pink top tube also contains a label that meets the American Association of Blood Banks requirements For molecular diagnostic test methods.
6	Light Gray Top	Sodium Fluoride/ Potassium oxalate	Invert the tube 8 – 10 times. 1. Glucose: requires full draw 2. Lactic acid: Place on ice immediately after inversion

SPECIMEN COLLECTION AND STORAGE REQUIREMENTS

Serum separator and Red Top tubes:

1. Perform venipuncture as with any other blood collection vehicle.
2. Invert the tube gently 5 times.
3. Do not remove the stopper at any time. Allow the blood to clot for at least 30 minutes but not longer than 2 hours. Do **not** centrifuge immediately after drawing blood.
4. Centrifuge at 3000 RPM in a swing bucket centrifuge for 10 minutes.
5. Test immediately.
6. If the specimen is collected after hours at the Mays Cancer Center, the Pharmacokinetic Laboratory staff will centrifuge the specimen as indicated above. The serum will be transferred to a labeled plastic vial and the specimen stored at 4 °C or frozen at -20 °C until testing can be performed.
7. If tumor marker tests are ordered, and the specimen is processed after hours, the serum should be frozen at -20 °C overnight

Green Top Heparinized Tubes (Plasma):

Plasma contains fibrinogen and other clotting factors when separated from the red cells. Evacuated tubes used to collect plasma specimens contain heparin as the anticoagulant. Follow the instructions below for specimen preparation.

1. Perform venipuncture as with any other blood collection tube.
2. Invert the tube gently 8 – 10 times to mix blood and additive.
3. Note: Blood will **not** clot.
4. Centrifuge within 1 hour of collection at 3000 RPM or at 8500 RPM for 180 seconds (Stat Spin centrifuge) in a swing bucket centrifuge for 10 minutes.
5. Test immediately.
6. If the specimen cannot be tested immediately, pipet the plasma into a clean labeled vial. Do **not** transfer red blood cells to the vial. Indicate that the specimen is plasma on the specimen container and test request form.
7. Plasma for routine chemistry analysis may be frozen at -20 °C overnight.

Purple Top Tubes (EDTA):

1. Collect blood according to the instructions provided for the individual test.
2. For CBC's, thoroughly mix the blood with the EDTA by gently inverting the tube 8 – 10 times. Please place the tube on an automated rocker if there is going to be a delay in transport.
3. Test on hematology instrument within 6 hours of collection.
4. If specimen is received after hours, make a wedge blood smear, then refrigerate the specimen at at 4 °C overnight. Please note that refrigeration may alter the cell counts and indices. Results must be interpreted with caution.
5. **Never** freeze whole blood unless specifically instructed by the specimen requirements.
6. When frozen whole blood is required, transfer the specimen to a labeled plastic vial. **Never** freeze glass tubes.

Blue Top Citrated Plasma for Coagulation studies

Most coagulation tests and factor assays require platelet poor plasma. In order to produce valid results for coagulation tests and factor assays, specimen integrity is crucial and must be maintained. All specimens sent for testing must be collected and stored in the following manner:

1. Obtain venous blood by drawing a waste tube prior to obtaining the specimen. Draw the specimen in a light blue top sodium citrate tube. Avoid stasis and contamination of the specimen by tissue thromboplastin.
2. The use of Central Venous Catheters for collection of coagulation specimens is strongly discouraged and should be used only when there is no possibility of venous access. If samples must be drawn through a CVC, please follow the procedure listed on page 22 of this manual. If a multiple lumen port is in place, then each lumen must be flushed. A minimum of 6 times the volume of the catheter line must be "wasted" prior to collecting a blood sample for coagulation.
3. Tubes must be drawn to at least 90% capacity in order to maintain an exact ratio of 9 parts blood to 1 part coagulant. Over or underfilled tubes will be rejected.
4. Mix blood with anticoagulant (3.2% buffered sodium citrate) by gently inverting 3 – 4 times.
5. To obtain platelet-poor plasma, centrifuge the tube at 8500 RPM for 180 seconds in a Stat Spin centrifuge.
6. If specimen is received after hours: after centrifugation, immediately remove 2mL (min: 1mL) platelet-poor plasma from the red cells using a plastic pipet. Place the plasma into a properly labeled plastic vial. Indicate on the tube that the specimen is Citrated plasma. Glass vials will not be accepted. Freeze immediately at -20 °C overnight.

LABELING OF SPECIMENS

A properly labeled sample is essential so that the results of the test match the patient. Utilize the EPIC generated identification labels on the tubes immediately after the draw while the patient is still seated. If

labels are not available, you can write the patient information legibly on the specimen with a waterproof marker. The key elements in labeling are:

1. Patient's last name, first name and middle initial
2. Patient's MRN number.
3. Patient's Date of Birth.
4. NOTE: the elements of the above **MUST** match the name and MRN on the requisition form.
5. The phlebotomist's initials and time of draw must be written on the requisition.

TRANSPORT OF SPECIMENS

Fold the completed requisition form in half with the patient information facing out.

Place labeled specimen(s) in the biohazardous specimen transport bag and seal well. Place the folded test request form into the outer pocket of the specimen bag.

Transport the specimens in a third container such as an insulated "Igloo". This third container must be labeled with a biohazard warning sticker. Bring the specimens to the receiving box at the entrance of the laboratory and time stamp the requisition slip(s). All urine containers MUST be placed in an upright position in the box.

Send out specimens will be packaged in the same manner for pick up by the appropriate courier.

Once the specimens are received in the laboratory and are found to be acceptable, they will be released from the LIS stored orders log that is created when the test is first ordered into EPIC. The indicated tests are released and a bar-coded label is generated and placed on the tube. The sample is then placed on the appropriate analyzer for testing.

SPECIMEN REJECTION

Evaluation of sub-optimal specimens will be made on an individual basis, by the laboratory technologist, in consultation with the ordering physician. All rejected specimens will be entered into the Rejected Specimen Log in the LIS with a comment indicating the reason for rejection. The nurse or physician for clinic collections will be immediately notified. Phlebotomy drawsites will be notified by rejection logs distributed next business day. Reasons for rejection are listed on the following page:

Unlabeled Specimens

Improperly identified specimens are not discarded until the phlebotomy staff or the responsible nursing unit is notified.

Common specimen types (blood, urine, swabs, sputum, stool, thinpreps, etc.) which can be easily recollected and cannot, with certainty, be identified will require recollection.

Specimens which are less common and more difficult to recollect (CSF, fluids, tissues, etc.) will require the person who collected them to come to the laboratory to identify the specimen. The Mislabeled/Unlabeled waiver form must be completed. A comment will be made on the patient's report that testing was performed on a "mis-identified" tube.

Incorrectly Labeled Specimens

The same criteria as for Unlabeled Specimens apply to specimens that are labeled with the incorrect patient name or MRN when compared to the accompanying requisition.

Mislabeled/unlabeled specimens for Blood Bank will **always** be rejected and must be recollected.

Incorrect Container or Preservative

Specimens received in an improper container, or with inappropriate preservative that would invalidate the results, will require recollection. The collection site or nursing unit will be informed.

Insufficient Specimen for Procedure(s)

If insufficient specimen is received for all tests requested and the specimen is easily recollectable, a repeat collection will be requested. If the specimen is not easily recollectable, the ordering physician will be contacted to establish testing priority.

Clotted Specimens

Clotted hematology or coagulation samples will be rejected. See section on Pre-analytical Factors for tips on preventing clotting of whole blood.

Hemolyzed Specimens

According to the College of American Pathologists, hemolysis is the most common reason for specimen rejection. See section on Pre-analytical Factors for tips on preventing hemolysis.

STORAGE REQUIREMENTS:

All specimens should be transported to the laboratory as soon as possible for analysis. If a late specimen is expected, please call the laboratory before 5:00 pm. One of the staff will remain after hours to process the specimen.

If there is a scheduled draw for a research patient in the evening, please submit the specimens to the Pharmacokinetics Laboratory for preparation and storage.

Red top or Tiger top Tubes: Please spin at 3000 rpm for 10 minutes. The tiger top tube can be stored at 4 °C. If the blood is collected in a red top tube, please separate the serum into a separate container. Please note that this secondary container must be labeled exactly as the primary container. The serum can be stored at 4 °C.

Lavender (EDTA) tubes: After rocking, please make a smear of the blood and label with the patient's name, EPIC MRN, and date of collection. The primary EDTA tube can be stored at 4 °C.

Blue Top (Sodium Citrate tubes): Please spin down blood at 8500 rpm for 180 seconds using the laboratory's StatSpin Centrifuge. Please separate the plasma taking care to not disrupt the red cell layer. Transfer to a separate container, label this container exactly as the primary container and freeze the plasma at -20 °C.

The specimens will be analyzed by laboratory staff the next morning.

PREANALYTICAL FACTORS AFFECTING LABORATORY RESULTS

CLOTTING OF SPECIMENS:

Analysis of specimens requiring whole blood is not possible if the specimen is clotted. To prevent clotting:

- Mix tubes with anticoagulants as indicated in **Table 1**: **Collection Tube Additives and Order of the Draw**
- Avoid lengthy syringe draws
- Ensure brisk blood flow when using winged tubing

HEMOLYSIS:

Hemolysis can interfere with many laboratory tests. Some of the most affected tests are: potassium, sodium, calcium, magnesium, bilirubin, haptoglobin, total protein, aldolase, amylase, LDH, AST, ALT, phosphorus,

alkaline phosphatase, acid phosphatase, GGT, folate, and iron, and all hematology tests. The following tips will aid in preventing hemolysis:

- Mix tubes gently
- 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 probing, traumatic venipunctures
- Use the appropriate needle size for the vein
- Loose connections between the needle and needle adapter can cause air to be introduced into the system causing frothing of the specimen
- Indwelling lines or IV's
- Most lines are flushed with a solution of heparin to reduce the risk of thrombosis, therefore heparin contamination can occur
- Discard a sample at least 2 ½ to 3 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. The 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.

- Prolonged tourniquet application (no more than 2 minutes)
- Massaging, squeezing, or probing a site
- Long-term IV therapy
- Sclerosed or occluded veins
- Significant increases can be found in bilirubin, total protein, enzymes , total lipids, cholesterol, and iron and RBC's.

SAFETY

Always practice standard precautions:

- Wear gloves, a fluid repellent lab coat, and other personal protection equipment as needed when handling blood/body fluids.
- Change gloves after each patient.
- Wash hands frequently.
- Dispose of items in appropriate biohazardous waste or sharps containers.
- Dispose of needles immediately upon removal from the patient's vein. Do not bend, break, recap, or resheath needles to avoid accidental needle puncture or splashing of contents.
- Clean up any blood spills with a disinfectant such as freshly made 10% bleach.

DETAILS OF PROCEDURES:

VENOUS BLOOD COLLECTION

PURPOSE:

To obtain blood specimens for diagnostic studies per physicians orders.

SUPPLIES:

1. Evacuated collection tubes
2. Needles - 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.
3. Holder/Adapter to use with the evacuated collection system.
4. Tourniquet
5. Alcohol Wipes - 70% isopropyl alcohol.
6. Povidone-iodine wipes/swabs and/or chlorhexadine swabs - Used if blood culture is to be drawn.
7. Gauze sponges - for application on the site from which the needle is withdrawn.
8. Adhesive bandages / tape - protects the venipuncture site after collection.
9. Needle disposal unit - needles should NEVER be broken, bent, or recapped. Needles should be placed in a proper disposal unit IMMEDIATELY after their use.
10. Gloves and other Personal Protective Equipment (PPE) as needed. Be aware if you the phlebotomist and/or the patient has a latex allergy. Nitrile gloves should be worn to avoid latex sensitization. Latex allergies can be fatal.

A. Procedure for 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 force blood into the vein by massaging the arm from wrist to elbow, tap the site with index and second finger, apply a warm, damp washcloth to the site for 5 minutes, or lower the extremity to allow the veins to fill.

B. Venipuncture

1. Greet the patient and introduce yourself.
2. Identify the patient, ask the patient to state their name and date of birth.
3. Briefly explain the procedure; do not tell the patient the procedure will be painless and do not discuss the tests with the patient. Encourage them to seek out their healthcare provider for questions.
4. Determine the patient's fasting status. Do not ask the patient "Are you fasting?", rather ask the patient when was the last time they ate.
5. Position the patient so they are sitting in a chair, or lying down. The patient's arm should be positioned so that it is well supported and extended downward in a straight line. This position will allow the tubes to fill from the bottom up. Do not hyperextend the patient's arm since this makes vein palpation more difficult..
6. Don personal protective equipment.
7. Apply the tourniquet 3-4 inches above the selected puncture site. Do not place too tightly or leave on more than 1 minute.
8. The patient should make a fist without pumping the hand.
9. Select the venipuncture site. The median cubital is the vein of choice because it is larger and tends to be better anchored. The cephalic and basilica veins can also be used. When necessary , the veins from the back of the hand can be used. This will require a smaller needle. Certain areas such as burn scars, hematomas, upper extremity in a patient with a prior mastectomy, and an extremity with an IV are to be avoided when choosing a site.
10. Using an alcohol prep, cleanse in a circular fashion, beginning at the site and working outward. Allow to air dry.
11. Grasp the patient's arm firmly using the thumb of the non-dominant hand 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.
12. Swiftly insert the needle bevel side up through the skin and into the lumen of the vein. Avoid trauma and excessive probing.
13. When the last tube to be drawn is filling, remove the tourniquet.
14. Remove the needle from the patient's arm using a swift backward motion.
15. Press down on the gauze once the needle is out of the arm, applying adequate pressure to avoid formation of a hematoma. Do not allow patient to fold arm.
16. Dispose of contaminated materials/supplies in designated biohazardous waste and sharps containers.
17. Invert and label all appropriate tubes at the patient side.
18. If specimens cannot be delivered immediately, EDTA tubes should be placed on a rocker until they can be delivered
19. Deliver specimens to laboratory with completed requisition.
20. Clock requisition in upon specimen's arrival into laboratory.

TROUBLESHOOTING THE VENIPUNCTURE PROCEDURE

FOR INCOMPLETE OR NO BLOOD COLLECTION:

1. 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).
2. Adjust the angle so the bevel of the needle does not rest against the vein wall.
3. Loosen the tourniquet to prevent obstruction of blood flow.
4. Change tubes in case of no vacuum.
5. Re-anchor the vein in case it has rolled away from the point of the needle.

BLOOD STOPS FLOWING INTO THE TUBE:

1. Resecure the tourniquet to increase venous filling in case the vein has collapsed.
2. If this is not successful, remove the needle, apply pressure and bandage the puncture site, and redraw.
3. The needle may have pulled out of the vein when switching tubes. Try gently re-inserting the needle into the lumen of the vein.

OTHER PROBLEMS:

If a hematoma forms under the skin adjacent to the puncture site immediately release the tourniquet and withdraw the needle. Apply firm pressure.

CAPILLARY BLOOD COLLECTION BY FINGERSTICK FOR GLUCOSE TESTING

PURPOSE:

To obtain capillary whole blood specimens by fingerstick for ancillary glucose determination.

SUPPLIES:

1. Glucose Meter
2. Accu-Check Comfort Curve Test Strips
3. Becton, Dickinson and Company Genie® permanently retractable lancets
4. Alcohol pads
5. Gauze
6. Disposable gloves

PROCEDURE:

1. Verify physician order.
2. Identify patient by verifying the name and date of birth as shown on chart face sheet.
3. Explain the purpose of the test and steps of the testing procedure to the patient.
4. Wash hands and put on disposable gloves.
5. Prepare glucose meter for testing by turning it on and inserting test strip. Set it aside until sample is collected.
6. Choose the finger from which blood will be collected. The best locations for fingersticks are the 3rd and 4th fingers of the non-dominant hand. Do not use the tip of the finger or the center of the finger.
7. Wipe finger with alcohol.
8. Remove protective cap from lancet. Hold lancet between index finger and third finger. Make a skin puncture just off the center of the finger pad. The puncture should be made perpendicular to the ridges of the fingerprint.
9. Prick side of fingertip by pressing down on trigger with thumb.
10. Squeeze fingertip gently to obtain a small drop of blood. (Be careful not to squeeze the finger too hard or the drop of the blood may become diluted with interstitial fluid). Apply the drop of blood to the test strip, ensure there are no bubbles and that the yellow portion of the strip is filled.
11. Apply pressure to the fingerstick site with dry gauze.
12. When testing is complete, dispose of lancet in sharps container. Remove gloves and wash hands thoroughly with soap and water.
13. Record results, time of testing, and testing personnel's initials on completed laboratory requisition. Enter results into the LIS.

CENTRAL VENOUS CATHETER (CVC)/IMPLANTED PORT BLOOD DRAW

PURPOSE:

To provide guidelines for obtaining blood specimen through the patient's indwelling central venous catheter (CVC) for laboratory studies while maintaining sterility of catheter patency.

Note: Only authorized Licensed Vocational Nurses or Registed Nurses may draw blood by this method. Medical Technologists in the laboratory are not permitted to draw blood from a central access port. Use of a CVC for collection of blood specimens is strongly discouraged. If peripheral access is impossible, then the following flushing procedure must be followed.

PROCEDURE:

A. Determining System Integrity and Accessing the Portal

Supplies needed:

- Noncoring needle and extension set of appropriate gauge and length . Mask
- Sterile gloves
- Alcohol and povidone-iodine swabsticks or wipes
- 5 ml heparin solution (100 IU/ml)
- 10-ml or larger syringes
- 10 ml of normal saline (NS)
- Tape and gauze or transparent dressing

1. Assess for SOB, chest pain, or palpitations, which might indicate catheter fragmentation or embolization.
2. Examine and palpate the portal pocket and catheter tract for erythema, swelling or tenderness, which might indicate system leakage.
3. Set up the sterile field and supplies. Assure sharps container is easily accessible.
4. Prepare the site using three swabsticks of 70% isopropyl alcohol.
5. Start over the center of the portal septum and move outward in a circular motion. Cover an area approximately 4-5 inches in diameter Repeat the process two more times, using a new swabstick, each time. Allow the area to dry completely.
6. Repeat the cleaning procedure with a povidone-iodine swabstick. Repeat the process two more times, using a new povidone-iodine swabstick each time. Allow the area to dry completely. Anesthetize the site for needle puncture, if desired.
7. Prime the extension set and non-coring needle to remove all air form the fluid path.
8. Locate the portal by palpation. Immobilize the portal using thumb and fingers of the nondominant hand.

9. Insert the needle through the skin and portal septum at a 90-degree angle to the septum and slowly advance the needle until it touches the bottom of the portal chamber. Do not tilt or rock the needle as this may cause fluid leakage or damage the septum.
10. Using a 10-ml or larger syringe, aspirate for blood return. Difficulty in withdrawing blood may indicate catheter compression or obstruction.
11. Using a second 10-ml syringe, flush the system with 10 ml of NS, taking care not to apply excessive force to the syringe. Difficulty in injection or infusion fluid may indicate catheter compression or obstruction. Observe the portal pocket and catheter tract for swelling and inquire or observe whether the patient is experiencing burning, pain or discomfort. If any of these symptoms are noted and/or swelling of the portal pocket or catheter tract is observed, fluid extravasation into the portal pocket or catheter tract should be suspected. If accessing a multi -lumen system perform all of the steps for all lumens.
12. If portal is not going to be used immediately:
    - Clamp the extension set tubing and attach a syringe filled with 5 ml of heparin solution.
    - Release the clamp and instill the heparin solution, establishing a heparin lock.
    - Maintain positive pressure by clamping the extension set tubing while injecting the last 0.5 ml. of heparin
    - Withdraw the noncoring needle and dispose of in sharps container.
    - Document the procedure in the patient's medical record.
13. If portal is to be used immediately:
    - Secure the noncoring needle with an appropriate dressing. Replace the syringe with an injection cap or IV tubing.
    - Clean the injection cap or extension set hub with an alcohol or povidone-iodine swabstick or wipe.
    - Connect the fluid delivery system according to established protocol.
    - Tape or secure all connections.
    - Begin the infusion or give the injection.
    - Upon completion of the infusion or injection, close the clamps and disconnect
    - the fluid delivery system.
    - Clean the injection cap or extension set hub with alcohol or povidone-iodine swabstick or wipe. Allow the cap or hub to dry.
    - Release the clamps and flush the system with 5 ml of normal saline and give another injection; or begin the next infusion; or instill 5 ml of heparin solution, establishing a heparin lock. Maintain positive pressure by clamping the extension set tubing while injection the last 0.5 ml of heparin solution. . Discard the needles and syringes into a sharps container.
    - Label the dressing with date, time, needle gauge and length. Document the procedure in the patient's medical record.

B. Blood Sampling Procedure
    1. Do not attempt a blood sampling procedure, until catheter integrity check has been performed. Refer to instructions above.
    2. Verify physician order for lab tests to be drawn and ensure any special requirements are met (refer to specimen collection guideline chart).
    3. Identify the patient by verifying the name and date of birth with chart face sheet. Explain the procedure to the patient.
    4. Gather supplies:
        - Gloves
        - Alcohol or povidone-iodine swabsticks or wipes
        - Lab tubes and other blood sampling apparatus
        - 20 ml normal saline
        - 5 ml heparin solution (100 IU/ml)
    5. Wash hands.
    6. Put on gloves.
    7. Clean the injection cap or the extension set hub with an alcohol or povidone-iodine swabsticks or wipe. Allow the cap or hub to dry. Note: injection cap may be removed to connect a syringe or blood sampling apparatus directly to the extension set tubing.
    8. Using a syringe or blood sampling apparatus, "waste" a minimum of 6x the volume of the line prior to drawing the specimen. The requisition must state that the samples were obtained via a CVC.
    9. Flush the system with 20 ml of normal saline and instill 5 ml of heparin solution (100 IU/ml), establishing a heparin lock. Maintain positive pressure by clamping the extension set tubing while injecting the last 0.5 ml of heparin solution.
    10. Discard the needles and syringes in a sharps container.
    11. Document the procedure in the patient's medical record.
    12. Label each tube with patient last name, first name, MRN number, date, and initials of person obtaining the specimen.
    13. Deliver specimen to lab in timely manner with completed requisition.
    14. Clock requisition in upon specimen's arrival into laboratory.

COLLECTION OF BLOOD CULTURE SPECIMEN

PURPOSE:

To obtain an uncontaminated specimen for culture and sensitivity testing.

SUPPLIES:

- Blood Culture bottles, set of 2 for each culture order (lab specific) 2. Alcohol Pads

- Povidone-iodine pads
- Chlorhexadine swabs (ChloraPreps)
- Needle and 20cc syringe
- Gloves and other personal protective equipment (PPE) as needed

PROCEDURE:

1. Verify physician order for requested number of cultures to be obtained.
2. Obtain blood culture bottles from clinical laboratory.
3. Identify the patient by verifying the name and date of birth with chart face sheet. Put on gloves and personal protective equipment.
4. Prepare the blood culture bottles by swabbing the rubber stopper with alcohol. (Caution: Do not unscrew the tops of the bottles for any reason. The containers must remain tightly sealed and should be free of external spillage upon completion of procedure).
5. Select the venipuncture site. Verify that the patient is not allergic to iodine. (Note: Cleanse area twice with alcohol if the patient is allergic to iodine).
6. Starting at the intended venipuncture site, swab with the povidone-iodine pad in a circular fashion moving outward. Allow to dry 1-2 minutes prior to performing the phlebotomy. Perform the same technique with the chlorhexidine swabs.
7. If more than one set of blood cultures are ordered, each set must be drawn from a different site.
8. Perform the phlebotomy and transfer 10 cc of blood in each bottle.
9. After completing the draw, remove the povidone iodine from the patient's skin using another alcohol pad.
10. Label each bottle with patient's last name, first name, MRN, date, time, site of of collection, and phlebotomist's initials. Deliver to the laboratory with a completed requisition for each venipuncture site.

STOOL COLLECTION

FOR CULTURE:

The Meridian Bioscience, Inc. ParaPak C&S (Culture and Sensitivity) Kit is a used for the transport and preservation of bacterial enteric pathogens. The plastic disposable vials are filled with 15 ml of modified Cary-Blair transport medium, containing Phenol Red indicator. This isotonic non-nutritive medium will preserve the viability of delicate pathogens (as Shigella and Campylobacter) for up to 96 hours. A change in color of the indicator from red to yellow will indicate an overgrowth and improper storage of the specimen.

- Ask the patient to pass stool directly into a clean, dry container.
- Laboratory personnel will be responsible for transferring stool to the appropriate container
- Open the tube containing the liquid. Using the collection spoon built into the lid of the tube, place small scoopfuls of stool from areas that appear bloody, slimy y or watery into the tube until the contents rise to the red line. If the stool is formed (hard), please try ample small amounts from each end and the middle. Mix the contents of the tube with the spoon, then twist the cap tightly closed and shake the tube vigorously until the contents are well mixed.

FOR CLOSTRIDIUM DIFFICILE TOXIN A AND/OR B

Ask patient to pass stool into a sterile screw-cap container or stool transport tube without preservatives (ParaPak clean vial): "Cool whip" containers, denture cups, or other simiilar containers often leak or even explode during transport and may be rejected by the laboratory. Specimen should be kept should be kept at 4°C and transported to the laboratory within 24 hours of collection. If a longer period is required, specimen should be frozen at -70°C.

FOR OCCULT BLOOD:

PATIENT INSTRUCTIONS

1. For accurate test results, apply samples from bowel movents collected on three different days to slide
2. Do not collect sample if blood is visible in your stool or urine (e.g., menstruation, or active hemorrhoids)
3. Pass stool into a clean, dry container
4. Using the applicator stick provided, collect a small amount of fecal material
5. Apply a thin smear covering Box A
6. Reuse applicator to obtain a second sample from a different part of the stool. Apply a thin smear covering Box B.
7. Close cover flap
8. Return completed slides to your doctor or laboratory no later than 14 days after your first sample collection

DRUG AND DIET GUIDELINES

- For seven days before and during the stool collection period, avoid non-steroidal anti-inflammatory drugs such as ibuprofen, naproxen or aspirin (more than one adult aspirin a day).
- Acetaminophen (Tylenol) can be taken as needed.
- For three days before and during the stool collection period, avoid vitamin C in excess of 250 mg a day from supplements, and citrus fruits and juices.
- For three days before and during stool collection period. avoid red meats (beef, lamb and liver).

FOR PARASITOLOGY

The Meridian Bioscience, Inc. Para-Pak® Ultra Zn-PVA/10% Formalin Kits are used to preserve and prepare specimens for parasitology examination. This is a transport system with built in concentrator containing Zinc polyvinyl alcohol and 10% formalin vials for preservation and transport. Each kit consists of on vial containing 15 mL of Zn.PVA fixative and one vial containing 15mL of 10% Formalin preservative.

- The patient should be cautioned against the use of antacids, barium, bismuth, antidiarrheal medication, or oily laxatives prior to collection of the specimen
- Ask patient to pass stool directly into a specimen cup.
- Laboratory personnel will be responsible for transferring stool to the appropriate container.
- Select a bloody, slimy, or watery area of stool and sample with the collection spoon built into the specimen tube. Add sufficient stool to bring the liquid level to the "Fill to Here" line.
- Agitate the specimen with the spoon. Tighten the cap and shake firmly to ensure the specimen is homogenous
- Label each vial appropriately
- Return the vials to the ziplock bag, seal the bag

COLLECTION OF RANDOM VOIDED URINE SPECIMEN

PURPOSE:

To obtain an uncontaminated specimen for urinalysis and/or culture and sensitivity testing.

SUPPLIES:

1. Antiseptic towelettes
2. Sterile specimen container

PROCEDURE:

1. Instruct male patient to:
    a. Wash hands thoroughly with soap and water.
    b. Open specimen container and place cap on counter upside down.
    c. Do not touch inside of cup or lid. If touched, ask for another container.
    d. Open cleansing pads. .
    e. Pull back and hold foreskin and cleanse end of penis twice with a new cleansing pad each time. Discard pad in trashcan after use.
    f. Pass a small amount of urine into toilet.
    g. Collect the midstream urin_ into the specimen container. Avoid collection the last few drops of urine.
    h. Place top on container tightly and wash hands.
    i. Give specimen to nursing staff.

2. Instruct female patient to:
    a. Wash hands thoroughly with soap and water.
    b. Open specimen container and place cap on counter upside down.
    c. Do not touch inside of cup or lid. If touched, ask for another container.
    d. Open cleansing pads.
    e. Separate labia and cleanse area from which urine is passed three times with a new cleansing pad each time from front to back. Discard each pad after use in trashcan.
    f. Pass small amount of urine into toilet.
    g. Collect the midstream urine specimen into the specimen container. Avoid collecting the last few drops of urine.
    h. Place top on container tightly and wash hands.
    i. Give specimen container to nursing staff.
    j. At least 12cc of urine should be collected, if possible.

k. Deliver to the laboratory immediately. Urine specimens must be analyzed within 1 – 2 hours. If the specimen cannot be delivered within one to two hours, pour the urine into a Becton Dickinson Vacutainer Plus UA Preservative Tube (red and yellow cap), this is critical to prevent bacterial overgrowth. If the urine needs to be cultured and cannot be transported quickly to the lab the urine will have to be collected into a BD Vacutainer Plus C&S tube (gray top). This tube contains boric acid which will prevent bacterial overgrowth. Both of these tubes can be stored at room temperature overnight. Urine specimens that have not been refrigerated or preserved will not be accepted.

References:

Modern Urine Chemistry, Ames Division, Miles Laboratories, Inc. 1989.

COLLECTION OF 24-HOUR URINE SPECIMEN

A 24-hour urine collection may be required to measure the amount of certain analytes the kidneys clear from the body. Some analytes are cleared in different amounts during the day and night. With the 24-hour urine the analyte in question can be measured correctly. 24-hour urine collections are also used to assess adequate urine production. Some tests also require that the urine be collected along with a special preservative. If in doubt as to which container to use, please call the laboratory.

1. If the physician is ordering 5-HIAA, catecholamines, and/or VMA, there are certain dietary restrictions that apply. Instruct the patient to not have any of the following for at least 3 days prior to collection of specimen.
    - Bananas
    - Caffeine
    - Nuts
    - Chocolate
    - Vanilla
    - Aspirin
    - Citrus fruits
2. If the physician is ordering a creatinine clearance as an indirect measure of Gromerular Filtration Rate (GFR), a serum separator or red top tube will need to be drawn and analyzed for creatinine. The blood tube should be drawn when the patient returns the 24-hour urine collection container.

3. The following formula is used for the calculation of Creatinine Clearance:

    CrCl = (uCr x uV)/(sCr x 1440)

    Where CrCl is creatinine clearance in ml/min
    Where uCr is urine creatinine in mg/dl
    Where sCr is serum creatinine in mg/dl
    Where uV is 24 hour urine volume in ml
    Where 1440 represents number of minutes in 24 hours

4. Indications (where calculation above is inaccurate)
    - Altered protein intake
    - Vegetarian diet
    - Creatine Supplementation
    - Altered muscle mass
    - Malnutrition or muscle wasting
    - Amputation

PATIENT INSTRUCTIONS:

1. **Throw out** your first morning urine sample. Make sure your bladder has been completely emptied. Write this time and date on the collection bottle label.
2. This is the **START TIME**.
3. Begin collecting urine samples in the bottle with the **next** time you urinate.
4. For the next 24 hours urinate into a convenient container and pour all of the urine into the 24-hour amber colored container provided by your nurse. Save all the urine from each time you urinate for the complete 24 hour period. Place the bottle in a plastic bag and keep in the refrigerator during the collection period.
5. Collect the **last** urine sample 24 hours after your start time. Try to collect a urinesample at this time even if you not feel the urge to urinate. Write this time and date on the collection bottle label. This is the **FINISH TIME**.
6. If you try to urinate at the FINISH time but cannot produce any urine, this is still an acceptable 24 hour urine specimen. Write this as the finish time on the label.
7. Put the bottle in a plastic bag and keep in the refrigerator until you bring it to the laboratory.
8. Label the bottle with your **NAME** and **DATE OF BIRTH** as well as **START and FINISH dates and times** of the urine collection period.
9. Bring the bottle to the clinic the same day the test is finished. Hand the bottle to one of the nursing staff; do not just leave it on the counter. A blood sample may be collected that day.

COLLECTION OF THROAT CULTURE SPECIMEN

PURPOSE:

To assure proper collection of specimen to isolate and identify bacteria that cause infections of the tonsils, throat, and pharynx.

SUPPLIES:

- Culture collection swab in transport (available from laboratory)
- Tongue depressor

PROCEDURE:

1. Verify physician order.
2. Identify the patient by verifying the name and date of birth with chart face sheet. Position patient and explain procedure.
3. Put on gloves.
4. Instruct patient to tilt head back; encourage them to keep eyes open to help prevent gagging.
5. Depress tongue with tongue depressor and rub swab vigorously over each tonsillar area and posterior pharynx. Any exudates should be touched, and care should be taken to avoid the tongue, uvula, cheeks, and teeth.
6. Place swab in transport tube.
7. Label transport tube with patient last name, first name, EPIC MRN number, date, time of collection, and initials of person obtaining specimen.
8. Deliver to the laboratory with a completed requisition.

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6. Product Insert: Beckman Coulter Hemoccult® SENSA Fecal Occult Blood Testing Kit, Ref #395035
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