Phlebotomy & IV Therapy: SSOM
Medical Student Training

Center for Professional Practice and Development
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Objectives

- Discuss the Process for a Safe and Effective Phlebotomy Procedure
- Outline the Steps for Safe and Effective Intravenous Catheter Insertion
- Discuss Complications Related to Venipuncture and IV Insertion
- After Reviewing this PowerPoint
  - Demonstrate a Successful Phlebotomy Procedure
  - Demonstrate Successful Intravenous Catheter Insertion with Fluid Administration
Terminology: Blood Vessels

- **Artery**
  - Bright red, greater blood volume, bleeds quicker
  - Pulsates into the collection tube
    - Immediately stop procedure
    - Hold pressure for at least 10 minutes
    - Seek assistance

- **Vein**
  - Dark red, steady flow
  - Blood flow stopped by pressure
    - Contains valves

- **Capillary**
  - Color is between artery and vein, bleeding occurs slowly and evenly, easily controlled bleeding
Safe Practices to Prevent Blood Exposure

- Use needles with safety device
- **Never recap needles**
- Do not alter or dismantle products
- Use the product per manufacturer recommendations
- Always wear gloves
- Wear goggles or face mask with eye shield
- Dispose of sharps in approved sharps biohazard containers
- Clean blood exposure following hospital policy
- Report any safety incidents
Bloodborne Pathogens:

- Hepatitis B Virus (HBV)
- Hepatitis C Virus (HCV)
- Human Immunodeficiency Virus (HIV)

Specimen Source:

- Blood
- Saliva in dental procedures
- Cerebrospinal fluid
- Synovial fluid
- Peritoneal fluid
- Semen
- Vaginal secretions
- Stool
Needle Safety

- To engage the safety, hold the needle pointing away from you and using your thumb, press the safety cover over the needle until a click is heard.
  - Do not press safety cover against a hard surface to engage
  - Do not use a two handed technique

Butterfly Needle: Black triangle is the safety mechanism

Needle with needle holder
Venipuncture Equipment

- Gloves
- Goggles
- Tourniquet
- Disinfectant
- Needle
- Transfer Device
- Collection Tubes
- Gauze
- Tape/Band-Aid
- Sharps Container
- Patient Labels
Venipuncture Disinfectant

- **70% Isopropyl Alcohol**
  - Used for most blood draws
  - Clean using concentric circles

- **Chlorhexidine Gluconate**
  - 30 second scrub back and forth
  - Use for blood cultures

- **Povidone-Iodine**
  - Use if allergic to Chlorhexidine
  - Clean using concentric circles

For all cleansers, allow to dry completely for 30 sec.

**After cleaning the site DO NOT:**
- Dry the site with gauze
- Fan the site with your hand
- Blow on the site
- Touch the site
Venipuncture Needles

**Straight Needle**
- Used for routine blood draws
- Sharper needle point
- Cost effective
- Decreases risk of hemolysis

**Butterfly Needle**
- Used for difficult draws
- Provides “flash” for easy visibility of blood return

**21-23 gauge needle should be used for phlebotomy**
Transfer Device

- Reduces risk of accidental needle stick
- Hold transfer device vertically and allow tubes to fill until blood stops
- Never transfer blood without transfer device
Anatomy of a Needle
Order of Blood Draw

- Blood Cultures
  - Aerobic → Anaerobic
- Light Blue
- Red
- Gold
- Green
- Lavender
- Gray
- Heparinized Syringe

Do not shake the tubes after they are filled
Blood Collection Tubes

- **Light Blue Topped Tubes**
  - Sodium Citrate (anticoagulant) additive
  - Tests: PT/PTT/INR/D-DIMER

- **Red Topped Serum Tubes**
  - No polymer (gel) barrier or anticoagulant additive
  - Serum

- **Mottled-Tipped, Speckled Topped and Gold Topped Tubes (Serum Separation Tube, SST)**
  - Polymer barrier at the bottom of tube, no additive

- **Green Topped Tubes**
  - Sodium heparin or lithium heparin additive
  - Chemical tests (tests requiring plasma or whole blood): BMP, CMP, BUN

- **Purple and Pink Topped Tubes**
  - EDTA additive
  - Hepatology tests: CBC, RBC, WBC, BLOOD BANK

- **Gray Topped Tubes**
  - Potassium Oxalate & Sodium Fluoride, Sodium Fluoride & EDTA, or only Sodium Fluoride additive
  - Glucose Tests
3-2-1 Accountability

ACCOUNTABILITY PROCESS: SPECIMEN COLLECTION & LABELING

3-2-1 IMPACTS →
- Every clinical, INPATIENT staff member is responsible for collecting specimens

THREE STEPS →

STEP 1
Upon entering the room, ask the patient his/her name and DOB. Verify what the patient says matches the patient wristband. Next, check that the Name and DOB on a pre-printed label matches the Name and DOB on the patient wristband.

STEP 2
After completing STEP ONE, collect the lab specimen(s) according to Policy and Procedure. Once collected, legally write your INITIALS and ID NUMER on each label, and immediately label each specimen in the presence of the patient.

STEP 3
After labeling each specimen per Policy, focus your mind on the final task, which is to announce OUT LOUD the patient’s DOB, as read from each specimen label and the patient wristband.

TWO CHECKS TO ENSURE Accurate PATIENT IDENTIFICATION →
- Based on a review of the best evidence-based practices by the Specimen Labeling Committee, the second check OUT LOUD was added to help prevent errors
  1. One check after verifying the patient’s name and DOB
  2. Second check, OUT LOUD, after collecting specimen according to Policy

ONE PERSON ACCOUNTABLE FOR THE ENTIRE PROCESS
ONE BAG: ONE PATIENT’S SPECIMENS
- Your initials are your documentation of a specimen collected correctly according to Policy & Procedure.

*Collecting a specimen per policy and procedure means you are following the correct steps, cleaning processes, order of draw, etc., according to Loyola policy and procedures.
Performing the Venipuncture: Pre-Procedure

- Gather equipment
- Introduction
- Inform patient of procedure
- Wash hands
- Don personal protective gear (i.e. gloves, googles)
Performing the Venipuncture: Patient Identification

- This is the most important step in Venipuncture Process
- Two patient identifiers
  - Name
  - DOB
- In-Patient must be banded
- Ensure all Mysis labels match order in EPIC
- Correct any discrepancies before proceeding with blood draw
- Verify patient allergies (i.e: Chlorhexidine, alcohol swabs, Povidone-Iodine, Adhesives)
Performing the Venipuncture: Patient Positioning

- Inpatient: Supine in Bed
- Outpatient: Phlebotomy Chair with Lockable Arm Rest
- Comfortable with arm straight or slightly bent downward
Performing the Venipuncture:
Locating a Vein for Venipuncture

- Apply tourniquet
  - 3-4 inches above selected site
- Locate vein by order of preference
  - Antecubital Fossa
    - Median Cubital
    - Cephalic
    - Basilic
- Veins on backside of hand
- Remove tourniquet
- Clean site with appropriate disinfectant
- Prepare equipment
Performing the Venipuncture:

Sites to Avoid:

- Area over joints
- Present or old dialysis shunts/fistulas/PICC line
- Lower extremities in adults
  - These veins contain more valves and are more prone to thrombosis formation
- Arms with limited mobility and circulation or affected by:
  - Stroke
  - Mastectomy
  - Injury
- Previously used veins
  - Sclerotic or inflamed areas
  - Areas of hematoma formation
Performing the Venipuncture: Tourniquet Application

- **Apply tourniquet:**
  - Position tourniquet 3-4 inches above intended site
  - Bring two sides together crossing the left over the right
  - Hold the crossover point close to the skin
  - Tuck a portion of one end under the crossover
  - One end should point to the shoulder
  - A slight tug should release it

*Excessively tight – will impede blood flow

Do not leave the tourniquet in place longer than 1 minute due to hemoconcentration at the site leading to an alteration in lab values.
Performing the Venipuncture: Technique

- Clean the site with appropriate disinfectant, allow to dry 30 sec
- Anchor the skin 1-2 inches below puncture site
- Quickly insert the needle at a 30 degree angle or less with the bevel facing up
- Release the tourniquet using the one handed technique when blood starts flowing into the tube and before withdrawing the needle
  - If flow is sluggish, leave tourniquet on for no more than 1 minute
Performing Venipuncture: Proper & Improper Needle Positioning

A. Correct insertion technique; blood flows freely into needle

B. Bevel on vein upper wall does not allow blood to flow

C. Bevel on vein lower wall does not allow blood to flow

D. Needle inserted too far

E. Needle partially inserted and causes blood leakage into tissue

F. When a vein rolls, the needle may slip to the side of the vein without penetrating it
Performing the Venipuncture: Technique

- Collect the specimen, filling the tubes in the correct order, inverting 8-10 times for most tubes
- Remove last tube from holder and activate the needle safety device
  - For Butterfly needles, activate the push button while needle remains in patient arm
  - For Straight needle, remove needle and IMMEDIATELY activate the safety device using the thumb of the hand holding the needle
- Apply pressure to venipuncture site with gauze
  - Do 2 point check to confirm no longer bleeding before applying bandage
- Dispose of needle in sharps container
- Label the specimens using the Mysis labels at the bedside
Performing the Venipuncture: Post-Procedure

- Clean up any spilled blood in the patient area
- Clean up any leftover supplies
- Remove personal protective gear and discard immediately
- Wash hands
- Thank the patient

Send specimen in biohazard bag;
1 patient’s specimens per bag
Lab Automation

- LUMC has a Robotic Line and Mysis Lab computer system
  - Receives bar coded blood specimens and prepares labeled aliquot tubes for technologist
  - Automatically loads specimens for chemical analysis
  - Tracks specimens once received

- Improves:
  - Test turnaround time
  - Quality for nursing units and satellite physician offices

***Totally dependent on the Bar Coded Lab label***
Important Tips for Tube Labeling

- Order tests in EPIC
- Draw full tubes, one per label
- Place bar coded label near the cap
  - Smooth label down the length of the tube
- Place initials and ID number on EVERY specimen collected
- Send “uncollected blood” labels from set with labeled tubes
- NEVER!!!!!!!
  - Pre-label prior to collection
  - Leave the bedside until all specimens are labeled
  - If tubes are not labeled, the specimen must be redrawn
Placement of Label

Barcode near the cap
Guidelines for Labeling

ID number first 7 digits after the zeroes
Guidelines for Labeling

- Tube color
- Patient information
- Test ordered
- Employee initials/ID
Potential Complications

- **Pain**
  - Blind sticks or probing

- **Infection**
  - Site is not properly cleaned
  - Touching site after disinfectant
  - Re-puncturing the skin with same needle

- **Bleeding**
  - Accidental arterial puncture
  - Patient on blood thinners

- **Syncope (Fainting)**
  - Physiological response (pain) or phobia

- **Seizures**
Potential Complications (Cont.)

- **Hematoma**
  - Pooling of blood under the skin due to leakage from vessel

- **Hemolysis (Hemolyzed)**
  - Rupture of RBC’s that alters the results of certain specimens making them invalid
  - Caused by vigorously shaking the tubes

- **Hemoconcentration**
  - Increase in the number of red blood cells, other cells and solids in the specimen due to loss of fluid in the surrounding tissue
  - Usually related to tourniquet left in place >1 minute

- **Lymphedema**
  - Drawing from the same side of the body that has had a mastectomy/lymph node removal
General Policies

- Never attempt to draw blood more than twice on a patient
- Patient has the right to refuse
- Phlebotomy equipment taken into isolation rooms remains in the room
- Do not perform venipuncture on a patient receiving a blood transfusion
- LIP order required for a lower extremity draw
- Do not draw above an IV site
  - Below is OK only if tourniquet is also below
Blood Cultures

- For (FUO) fever of unknown origin or septicemia
- Should be drawn around febrile episode BEFORE antibiotics are given but should not delay their administration
- Usually 2 sets from 2 different sites for an adult
- Essential that culture is collected aseptically
  - Chloraprep 30-60 second scrub with a 30-60 second dry time (not to be used on infants < 2 months or those with known allergies)
  - Never touch site after cleaning
  - Clean rubber stoppers on bottles with alcohol
  - Apply sterile gloves after cleaning the top of the bottles
Blood Cultures (Cont.)

- Infants: 0.5-3.0 ml in Aerobic adult blood culture bottle (one bottle only)
- Children: 3-5 ml in Aerobic adult blood culture bottle (one bottle only)
- Adults: 20 ml per venipuncture from two sites
  - 10 ml per anaerobic and 10 ml per aerobic blood culture bottle
IV Insertion with Fluid Administration
Indications for IV Therapy

- Medication administration
- Hydration
- Transfusion of blood products
- Surgery
- Emergency care

Needle gauge selected based on medical indication and patient
“Over the Needle” Catheter Sizes
To activate the safety on the angio-catheter:

1. Press the white button on the device once catheter advanced
2. The needle is retracted into the plastic holder
3. The plastic catheter remains inside the vein
IV Sites to Avoid

- Sites over joints
  - Or those that have shunts, fistulas or PICC lines

- Lower extremities in adults
  - They contain more valves and are more prone to thrombosis formation

- Arms with limited mobility or affected by:
  - CVA
  - Mastectomy
  - Injury

- Previously used veins
  - Sclerotic or inflamed areas
Peripheral Catheter Insertion:

- Gather equipment
  - IV Starter Kit
    - Chloraprep
    - Gauze
    - Sterile tape
    - Tegaderm with label
    - Tourniquet
  - IV catheter – appropriate gauge for:
    - Age/size of patient and/or vessel
    - Treatment required (IV antibiotics, blood transfusion, bolus)
  - J-Loop
  - Saline flush
  - Primes IV tubing using aseptic technique in advance
Peripheral Catheter Insertion: Priming IV Fluid

- Maintain aseptic technique
- Prime tubing
  - Close roller clamp on IV tubing
  - Using aseptic technique insert spike into port on IV fluid (verify that spike penetrates seal)
  - Fill drip chamber
  - Slowly open roller clamp to allow fluid to flow, leaving end cap on tubing. Watch fluid travel length of tubing to ensure all air is removed.
  - Close roller clamp once fluid drips from end of tubing cap
  - Apply orange swab caps to tubing ports
  - Connect IV tubing to IV catheter or extension set once vein cannulated
Peripheral Catheter Insertion

- Introduction and inform patient of procedure
- Wash hands before and after:
  - Insertion
  - Maintenance of IV line
  - Removal
- Don personal protective gear
  - Gloves
  - Goggles
- Identify patient
  - Name
  - Date of Birth
- Verify arm to use and patient allergies
  - Chlorhexidine/Betadine
  - Alcohol
  - Tape
Peripheral Catheter Insertion

- Position Patient
  - Phlebotomy chair (outpatient)
  - Supine in bed (Inpatient)
- Apply tourniquet and select IV insertion site
- Release tourniquet
- Cleans insertion site with Chloraprep in back and forth motion for 30 seconds (allow it to air dry for 30 seconds)
  - Use povidone-iodine if allergic to Chlorhexidine or alcohol
- Assemble equipment
  - Prime J-Loop with saline
  - IV starter kit & angio-catheter
  - Chevron tape
Peripheral Catheter Insertion

- Reapply tourniquet
- Remove needle cover and rotate the colored catheter cap 360 degrees to release trapped air
- Stabilize vein without touching prepped area
- Insert catheter (10°- 45°) and advance properly into vein
  - Bevel up
  - Note blood return in the hub of catheter (verifies catheter is within vein)
  - Advance plastic catheter (1/8) and stabilize stylet (prevents air from entering vein)
Peripheral Catheter Insertion (Cont.)

- Release tourniquet
- Apply pressure above the site of puncture to stop blood flow
- Activate safety mechanism before removing stylet (white button)
- Apply primed J-Loop
- Check for blood return and flush catheter with saline-10 ml
- Secure catheter (Chevron technique)
- Apply tegaderm dressing and label site correctly:
  - Initials, date, time
- Tape J-Loop tubing
Peripheral Catheter Insertion (Cont.)

- Attaches primed IV tubing to J-Loop using aseptic technique
- Opens control valve and notes quality of flow:
  - Inspects surrounding tissues for signs of infiltration (i.e. pain, swelling, cold)
  - Adjusts IV flow rate as ordered
- Maintain asepsis throughout procedure:
  - Clean up any spilled blood on patient or patient area
  - Properly discard needle in a biohazard container
  - Remove personal protective gear and discard appropriately
- Wash hands
- Thank the patient
Catheter Insertion Guidelines

- Perform blood collection from peripheral IV ONLY at the time of initial insertion

- Note: An exception may be made in the Peds population requiring frequent blood draws
Catheter Site Assessment

- The IV insertion site is inspected at least every 8 hours & PRN for signs of complications:
  - Tenderness at site
  - Fever without obvious source
  - Discoloration (i.e. erythema)
  - Pain or numbness
  - Edema or localized swelling
  - Exudate (i.e. drainage)
  - Increase in skin and basal temperatures
  - Induration with palpable cord

- Remove IV for abnormal findings

- Report conditions to RN, Licensed Independent Practitioner: Attending Physician, APN, Medical & Dental House Staff
IV Infiltration

- Inadvertent administration of non-vesicant solution into surrounding tissues
Infiltration Prevention

- Avoid flexion areas for site location
- Test IV site for fluid flow
- Stabilize the dressing
- Monitor IV site for edema
- Instruct patient to report any discomfort
Infiltration Interventions

- Stop the infusion and remove IV
- Note what solutions/medications were infiltrated
- Leave site open to air unless otherwise ordered
- Elevate extremity
- Report infiltration to RN and LIP
- Document appearance of site & actions taken in EMR
- When inserting new cannula use opposite arm if possible or insert above infiltration
- Educate patient on signs and symptoms to report to RN
IV Extravasation

- Inadvertent administration of a vesicant solution or medication into surrounding tissues
Extravasation Prevention

- Stop the infusion immediately
- Keep cannula in place (temporarily)
- Notify RN and LIP (may need to give antidote)
- Elevate extremity & initiate LIP’s interventions per order
Phlebitis

- Inflammation of vein characterized by pain and tenderness along course of vein pathway

- Classified according to causative factors:
  - Mechanical – caused by physical irritation of the vein
    - Manipulation of the catheter
    - Large catheter in a small vein
  - Chemical – caused by a medication or solution irritating the vein
    - Medications improperly mixed/diluted
    - Rapid infusion rate
    - Catheter material & dwell time
Phlebitis Interventions

- Remove peripheral IV catheter
- If ordered, obtain culture of catheter and/or site drainage
- Clean surrounding skin with 70% alcohol and allow to air dry
- Apply warm moist packs
- Elevate extremity
- Restart IV above site or in opposite arm
- Grade severity of phlebitis using the phlebitis scale
# Phlebitis Scale

<table>
<thead>
<tr>
<th>Grade</th>
<th>Clinical Criteria Scale</th>
</tr>
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<tbody>
<tr>
<td>0</td>
<td>No clinical symptoms</td>
</tr>
<tr>
<td>1</td>
<td>Erthema at access site with or without pain</td>
</tr>
<tr>
<td>2</td>
<td>Pain at access site with erythema and/or edema</td>
</tr>
<tr>
<td>3</td>
<td>Pain at access site with erythema, streak formation, and/or palpable venous cord</td>
</tr>
<tr>
<td>4</td>
<td>Pain at access site with erythema, streak formation, palpable venous cord &gt;1 inch in length, and/or purulent drainage</td>
</tr>
</tbody>
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References

- Loyola Policy Intravascular Devices # EQP-017