

I. Purpose:

Knowledge of the proper techniques to be used when performing a venipuncture is necessary to assure collection of a blood specimen suitable for testing with a minimum amount of trauma to the patient. Accuracy of each test performed in the laboratory is relative to the quality of the specimen.

Obtaining blood via venipuncture from infants may be difficult and potentially hazardous.

Obtaining large quantities of blood, especially from premature infants, may result in anemia (see table below). Puncturing deep veins in children may cause:

- A. Cardiac arrest
- B. Hemorrhage
- C. Venous thrombosis
- D. Reflex arteriospasm and gangrene of an extremity
- E. Damage to surrounding tissue or organs (e.g., puncturing the apex of the lung or piercing the trachea)
- F. Infection
- G. Injury from restraining the infant or child during the collection procedure

CAUTION: All specimen material should be considered potentially hazardous and thereby handled according to practices of Universal Precautions. Use of proper personal protective equipment (i.e. Lab coats, gloves) must be used for procedures in which exposure to blood or other potentially infectious material is reasonably anticipated to occur.

II. Responsibility:

All health care workers who collect blood on pediatric patients.

III. Materials:

23 gauge push button Butterfly Blood Collection Set with luer adapter

Vacutainer holder

3-5 ml syringe

BD Transfer Safety Device

Pediatric size tourniquet

70% isopropyl alcohol swab

2 x 2 gauze sponges

Pediatric vacutainer tubes

Tube holder

Paper tape (for older children only)

Disposable gloves

IV. Procedure:

In order to reduce the risks associated with phlebotomy draws on pediatric patients the following guidelines have been established:

- Skin puncture is the recommended collection method however, there may be times when a venipuncture is necessary (i.e. blood cultures, lead levels).
- If a venipuncture is done on a child younger than two years of age, the site should be limited to superficial veins (i.e., the femoral vein is not recommended).
- A 23g push button Butterfly Blood Collection Set attached to a syringe should be used.
- The vacuum tube method is acceptable if using pediatric vacuum tubes.

Obtaining large quantities of blood from an infant, especially from premature infants, may result in anemia or cardiac arrest. To ensure that maximum volume has not been exceeded, the total volume drawn at one time must be recorded in the child's chart.

Maximum Amounts of Blood to be Drawn From Patients Younger than 14 Years

RECOMMENDED MAXIMUM ALLOWABLE TOTAL BLOOD DRAW VOLUMES (CLINICAL + RESEARCH)			
Body Wt (Kg)	Body Wt (lbs)	Total blood volume (mL)	Maximum allowable volume (mL) in one blood draw (= 2.5% of total blood volume)
1	2.2	100	2.5
2	4.4	200	5
3	6.3	240	6
4	8.8	320	8
5	11	400	10
6	13.2	480	12
7	15.4	560	14
8	17.6	640	16
9	19.8	720	18
10	22	800	20
11-15	24-33	880-1200	22-30
16-20	35-44	1280-1600	32-40
21-25	46-55	1680-2000	42-50
26-30	57-66	2080-2400	52-60
31-35	68-77	2480-2800	62-70
36-40	79-88	2880-3200	72-80
41-45	90-99	3280-3600	82-90
46-50	101-110	3680-4000	92-100
51-55	112-121	4080-4400	102-110
56-60	123-132	4480-4800	112-120
61-65	134-143	4880-5200	122-130
68-70	145-154	5280-5600	132-140
71-75	156-185	5680-6000	142-150
76-80	167-176	6080-6400	152-160
81-85	178-187	6480-6800	162-170
86-90	189-198	6880-7200	172-180
91-95	200-209	7280-7600	182-190
96-100	211-220	7680-8000	192-200

Based on blood volume of:		
kg	mL/kg	
1-2	100	Pre-term infant
> 2	80	Term infant - adult

This information is similar to that used by the Committee on Clinical Investigations, Children's Hospital in Los Angeles, CA; Baylor College of Medicine, Dallas, TX; and Cincinnati Children's Hospital Institutional Review Board, OH. These charts were adapted by: Rhona Jack, Ph.D. Children's Hospital and Regional Medical Center Laboratory, Seattle, WA in August 2001.

Age specific behavior should be considered prior to collection.

Stage (age)	Fears and Concerns	Proper Parent Behavior
Newborns (0-12 months)	Totally dependent on parents and other adults. Trust that adults respond to basic needs.	Parent should hold infant as an aid to collector and to comfort child.
Infants and toddlers (12-24 months)	Little fear of danger. Fear of separation from mother. Limited language and understanding.	Parent should assist in holding, explaining to and comforting child.
Preschoolers (3-6 years)	Greater body awareness. Fear injury to body. Play years.	Parent may be present to provide emotional support and assist in obtaining child's cooperation.
School-age (7-12 years)	Fear loss of self-control. Less dependent on parent. More willing to participate.	Child may not want parent present.
Teenagers (13-18 years)	Actively involved in anything concerning the body. Embarrassed to show fear. May act hostile to mask fear.	Child may not want parent present.
Special problems Mentally Challenged	Fears similar to age-appropriate behaviors above, based on developmental level.	Parent should stay with patient and assist if necessary.

A. Approach and identify the patient.

1. Knock on the door before entering.
2. As indicated, observe contact precautions, verify patient diet restrictions (i.e., patient fasting), site restrictions, time of drug administration, (i.e. trough level) and /or latex sensitivity.
3. Introduce yourself. Be warm and friendly, establish eye contact, and show concern about the patient's health and comfort.
4. If a physician or nurse is present, ask permission to enter the room.
5. Patient who is a child:

- a. Introduce yourself. Be warm and friendly, establish eye contact, and show concern about the child's health and comfort. You first should instill a trust and confidence in parent and child.
 - b. Correctly identify the patient referencing two patient identifiers. These can include patient's name, date of birth and/or medical record number.
 - c. Find out about the child's past experience with blood drawing.
 - d. Ask parent how cooperative the child might be.
 - e. Explain and demonstrate the procedure in a language the child will understand. Proper preparation with help alleviate fear and diminish the "hurt". Be honest with the child who asks whether the puncture will hurt.
 - f. Explain that if the child holds still, you will more likely be successful.
 - g. Encourage parent involvement, which has been found to be beneficial in easing the child's anxiety. Parental behavior influences the child's behavior during the procedure.
 - h. The best location for a painful procedure is a treatment room away from the child's bed or playroom. If the child cannot be removed, draw the curtain for privacy and to avoid upsetting the roommate as well.
6. Seek assistance from another healthcare provider when patient is a combative child.

B. Dorsal Hand Vein Technique

1. The dorsal hand technique is appropriate for neonates and infants who are younger than 2 years old.
2. Wash hands and place on gloves.
3. Identify the patient.
4. Prepare and organize venipuncture equipment. A 23g Butterfly Blood Collection Set attached to a 3-5 ml syringe is preferred when performing a dorsal hand venipuncture. Keep equipment out of the view of toddlers.
5. Select the hand that has easily visible veins. Warm the site if hand is cold. No tourniquet is necessary. The blood collector's middle and forefinger will encircle the infant's wrist and are used to apply pressure to distend the dorsal veins. By placing the blood collector's thumb against the infant's fingers, the infant's wrist can be flexed downward as the dorsum of the infant's hand is examined.
6. Be careful not to bend the wrist too much or the vein may collapse. Lightly palpate for a vein. Once the vein has been located, release the finger tourniquet.

7. Disinfect the site with 70% isopropyl alcohol swab in concentric circles. Let alcohol air dry.
8. Reposition fingers around infant's wrist and flex infant's hand. The needle should be angled 15 degrees to the skin. The skin should be pierced 3-5 mm distal to the vein, then advanced slowly and carefully until vein is punctured.
9. As soon as blood appears in the tubing of the butterfly, pull the syringe plunger to fill with blood. Make sure not to exceed maximum daily blood volume.
10. For push button activated Butterfly devices, depress the button. The needle will slide out of the venipuncture site and lock into place. Do not impede device retraction.
11. Insert the syringe tip into the hub of the BD Vacutainer Blood Transfer device. Rotate the syringe clock-wise until it fits securely on the hub
12. With the syringe tip held facing down, center the blood collection tube over the holder portion of the Blood Transfer Device and push it in.
13. After removing the last tube, discard the entire assembly into a sharps container.
14. Gently invert additive tubes and label tubes with:
 - a. Patient's name
 - b. Medical record number
 - c. Date
 - d. Time of draw
 - e. Blood collector's initials
15. Notify the infant's nurse of the total blood volume collected, or record in appropriate log.

C. Venipuncture at Other Sites

1. The procedure for performing venipunctures on children older than 2 years is similar to that of adults. The differences include the necessary preparation of the child and parent, assistance in restraining the child, and the size of the venipuncture equipment.
2. Wash hands and place on gloves.
3. Identify the patient.
4. Prepare and organize venipuncture equipment. A 23g butterfly attached to a pediatric vacutainer holder. Pediatric vacuum tubes can be used on prominent veins. For smaller veins use a 23g butterfly attached to a 3-5 ml syringe.

5. Restrain the child if necessary according to above recommendations.
6. Place a pediatric size tourniquet around the bicep muscle in the upper arm. Palpate for a vein in the antecubital fossa.
7. Once the vein has been located cleanse site in concentric circles with 70% isopropyl alcohol. Let air dry.
8. Anchor the vein by pulling skin down with thumb or index finger.
9. Make sure to keep needle out of sight from child. Enter vein with butterfly needle at a 15 to 30 degree angle. Check for “flash” of blood in the tubing. If no blood appears, gently redirect until “flash” appears.
10. As soon as blood appears in the tubing of the butterfly, pull the syringe plunger to fill with blood (butterfly/syringe method) or engage vacuum tubes into luer/holder (vacutainer method) and fill to capacity. Make sure not to exceed maximum daily blood volume. **(See volume chart)** After collection is completed activate the safety mechanism on the Butterfly device. Hold direct pressure on the puncture site with 2 x 2 gauze sponges until bleeding has stopped. Apply a clean 2 x 2 gauze sponge folded into fourths and apply paper tape.
11. Insert the syringe tip into the hub of the BD Blood Transfer Device. Rotate the syringe until it fits securely on the hub
12. With the syringe tip held facing down, center the blood collection tube over the holder portion of the BD transfer device and push it in. After removing the last tube, discard the entire assembly device in an approved sharps disposal container.
13. Gently invert additive tubes and label tubes with:
 - a. Patient’s name
 - b. Medical record number
 - c. Date
 - d. Time of draw
 - e. Blood collector’s initials
14. Notify the infant’s nurse of the total blood volume collected, or record in appropriate log.

D. Order of draw

1. Butterfly/Vacutainer Method

- a. Waste Tube
- b. Blood Cultures
- c. Blue (3.2% Sodium Citrate)
- d. SST/Gold

- e. Red
- f. Green (Sodium Heparin)
- g. Lavender (EDTA)
- h. Gray (Sodium Fluoride)

2. Butterfly/Syringe Method

- a. Blood Cultures
- b. Blue (3.2% Sodium Citrate)
- c. SST/Gold
- d. Red
- e. Green (Sodium Heparin)
- f. Lavender (EDTA)
- g. Gray (Sodium Fluoride)

E. Waste and Needle Disposal

1. Paper wrappers or gloves may be discarded in the wastebasket of the room if they are not visibly contaminated with blood.
2. Dispose of needles into biohazard sharps container and contaminated material into biohazard red bag (if saturated with blood or body fluids).
 - DO NOT re-sheath used or unsterile needles into their plastic covers.
 - DO NOT remove the used needle from the holder or syringe with your fingers nor bend or clip the needle.
 - Needle, syringe, and holder can be discarded as a unit into a slotted sharp's container. Never use force when the sharp's container is full.
 - If a loose needle is left or dropped on patient's bed or phlebotomy cart, use forceps to pick up and dispose of in Sharps container.



F. Labeling



1. Label tubes with the following information:
 - a. At least 2 appropriate patient identifiers.
The mandatory pieces of information for specimen identification are:
 - b. Patient's full name (first and last name).
 - c. Date of collection
 - d. Time of collection

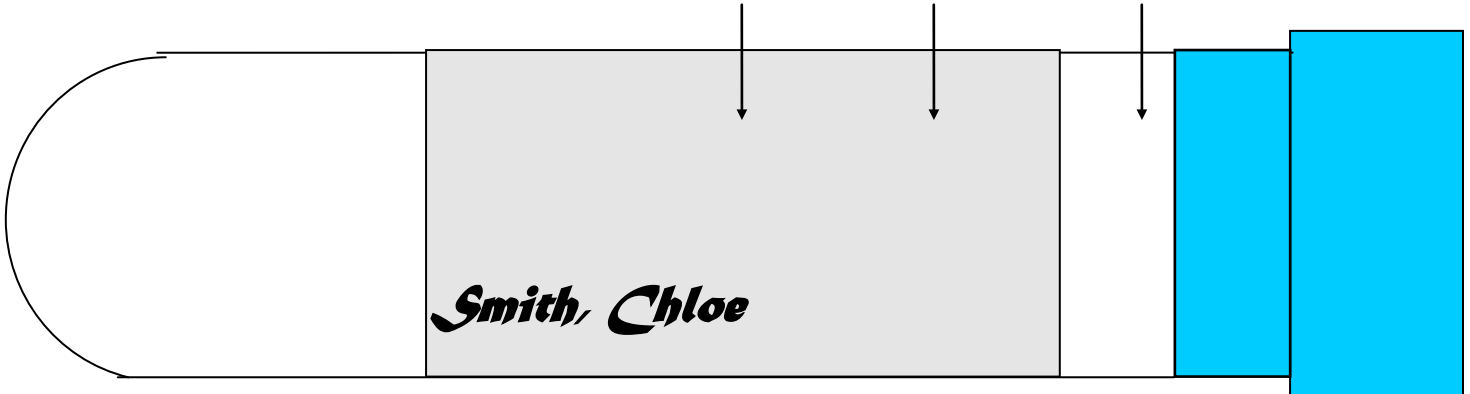
- e. Patient identification number can include, date of birth, medical record number and/or account number.
- f. Collector's initials



NOTE 1:

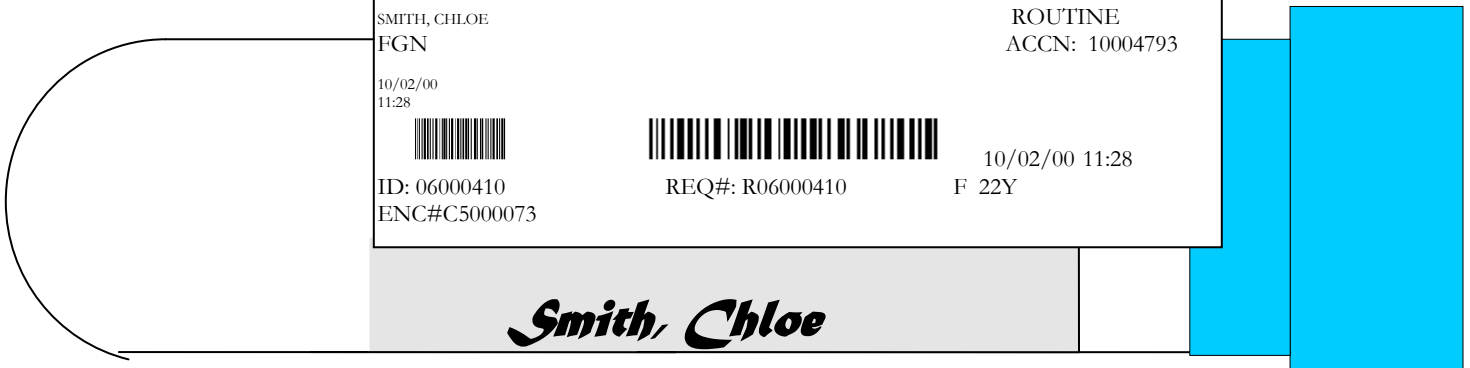
Label all tubes appropriately at the patient's bedside. Do not take unlabeled tubes from the patient's presence. Do not pre-label tubes.

2. Use an indelible marker (sharpie) so that the information on the label does not smear or wipe off. Do not use pencil or gel pens.
3. Do not label tubes prior to venipuncture.
4. Do not leave the patient before labeling is complete.
5. Addressograph labels.
 - a. When addressograph labels are used, the time and date the specimen was collected needs to be written as well as blood collector's initials.
 - b. When using addressograph labels make sure all stamped information is legible.
6. Proper placement of Zebra labels.
 - a. You must check the name and date of birth or identification number on the specimen and match it with the Zebra labels before placing label(s) on the specimen(s).
 - b. Affix one barcode label on appropriate specimen tube as shown.
 - c. If multiple labels print, place extra labels in the transport bag with the specimen. **DO NOT PLACE MULTIPLE LABELS ON ONE SPECIMEN.**
 - d. Only one patient per transport bag.
 - e. Please record initials on Zebra label to document who collected specimen

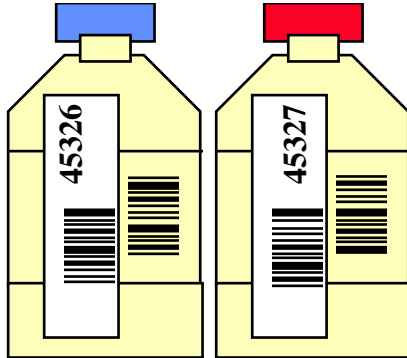
TUH_COAG	BLUE	(Refrig)
06000410	F 22Y	C6S
SMITH, CHLOE		ROUTINE
FGN		ACCN: 10004793
10/02/00		
11:28		
		10/02/00 11:28
ID: 06000410	REQ#: R06000410	F 22Y
ENC#C5000073		



TUH_COAG	BLUE	(Refrig)
06000410	F 22Y	C6S
SMITH, CHLOE		ROUTINE
FGN		ACCN: 10004793
10/02/00		
11:28		
		10/02/00 11:28
ID: 06000410	REQ#: R06000410	F 22Y
ENC#C5000073		



7. Proper placement of Zebra labels on Blood Cultures
 - a. A barcode label on each bottle vertically, near but not covering the manufacturer's barcode.
 - b. Place the number to the top of the bottle.
 - c. Do not cover the patient or specimen information.



Blood Culture Bottles

G. Hand Washing

Remove gloves and cleanse hands using the appropriate product. Refer to your hospital hand hygiene policy for guidelines.

H. Thank the patient

For in-patients, make sure side rails are back up, the bed has been lowered and trays, TV, telephone, etc, have been returned to position.

I. Check area

Check the area to be sure that all used equipment has been removed.

J. Transport the specimen to the laboratory.

1. To prevent leakage, insert the specimen into a seal biohazard specimen transportation bag. **Make sure to send the extra labels or requisition in the outer pocket of the plastic bag.**
2. If multiple labels print, place extra labels in the transport bag with the specimen. **DO NOT PLACE MULTIPLE LABELS ON ONE SPECIMEN.**
3. **Only one patient's specimens are to be transported in each bag.**
4. Determine if the specimen can be transported by the tube station or by central transportation.

K. Rejection of specimen will occur when:

1. There's a discrepancy between the requisition and the labeled tubes
2. There's more than one patients blood in a specimen bag.

3. Unlabeled or improperly labeled tubes
4. Hemolyzed specimens
5. Specimens collected into the wrong collection tube
6. Use of outdated supplies
7. Improper transport
8. Clotted specimens in anticoagulated tubes
9. Insufficient quantity
10. Instrument malfunction
11. Lost sample
12. Broken tube

L. Unsuccessful attempts to draw blood

The person drawing blood should not make more than two venipuncture attempts on one patient. After two unsuccessful attempts, ask another phlebotomist to attempt to collect the blood. The second phlebotomists should only make two attempts to collect the blood. After two attempts by one phlebotomist and one attempt by a second phlebotomist notify the nurse or doctor by completing a “Report of Unsuccessful Attempt to Draw” form (Attachment A). Both the phlebotomist and the patients nurse sign the form. The nurse then notifies the appropriate person (doctor). One copy of the form will stay on the unit, the second copy is returned to the laboratory

An “unsuccessful attempt” form is to be filled out and nurse notified if:

1. Employee missed the vein
2. Employee did not locate any venous access
3. Patient refused
4. Patient was not available
5. Patient was found in condition to compromise the accuracy of test (ex. non-fasting, having blood infused)

V. References:

1. CLSI, Procedures for the Collection of Diagnostics Blood Specimens by Venipuncture H3-A6, Vol. 27, No. 26.
2. CAP General checklist 09272007
3. Lippincott Williams & Wilkins. Ernst Applied Phlebotomy 2005, page 67-86.
4. Phlebotomy Handbook, Blood Collection Essentials, Garza & Becan-McBride fifth edition, 1999 “Pediatric Procedures” pp. 311-315