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|  | **Coagulation Specimen Collection and Handling**  **IPP#16** | **Dept:** | **Inpatient Phlebotomy 324305** |
| **Effective Date:** | **2/17/2011** |
| **Revised Date:** | **March 2019** |
| **Contact:** | **Laurie Watson** |
| **Name & Title: Greg Pomper, MD Medical Director** | | **Date:** |  |
| **Signature:** | | | |

1) **General Procedure Statement:** To give guidelines to staff concerning the proper Process for Coagulation Specimen Collection and Handling.

* 1. **Purpose:** This procedure is to serve as a guide for trained personnel in the Inpatient Phlebotomy Department to perform the services described herein. These guidelines should be used in conjunction with proper training and only by qualified Phlebotomists.
  2. **Responsible Department/Party/Parties:** 
     1. Procedure owner/ Implementer: Inpatient Phlebotomy, Coagulation Lab
     2. Procedure prepared by: Laurie Watson MT(ASCP)
     3. Who Performs procedure: Inpatient Phlebotomy

**2) Procedure: Coagulation Specimen Collection and Handling**

The collection and handling of coagulation test samples are an important preanalytical step in coagulation studies. These specimens are collected and handled as approved by the Coagulation Lab.

**Procedure:**

1. **Policy Guidelines** 
   1. Perform venipuncture as described in the Venipuncture Procedure found in the Phlebotomy Policy and Procedure Manual.
   2. Allow the vacutainer tube to fill completely.
   3. The Sodium Citrate (NaCit) must maintain a specified 1:9 (9 parts blood and on part of 3.2% sodium citrate) ratio in order to test the sample effectively.
   4. Mix the tube by gentle inversion. Invert the tube gently three or four times immediately after venipuncture to ensure thorough and proper mixing of blood and anticoagulant
   5. Maintain the specimen at room temperature during transport to the laboratory.
   6. Deliver the specimen to the laboratory with 1 hour of the collect time.
   7. The specimen is spun and tested as soon as possible when received in the laboratory.
   8. Patients who are being tested for coagulation studies may be prone to excessive bleeding after the venipuncture. The phlebotomist should visually verify that the puncture site has stopped bleeding before allowing the patient to leave the room.
2. **Procedural Notes and Policies**:
   1. The laboratory will reject specimen tubes that are not properly filled or are clotted.
   2. The anticoagulant of all coagulation testing is buffered sodium citrate and the concentration of 3.2% or 0.109 M which is a buffered solution that is a stabilizer for labile factors V and VIII.
   3. Collection for coagulation specimens require that a plain tube or “waste” tube be collected before the coagulation specimen tube when using a butterfly needle.
   4. The light blue top NaCit tube should be collected prior to any additive tube when there are multiple tubes to be collected.
   5. Heparin, EDTA, clot activators and other additives found in collection tubes will all interfere with coagulation testing if contamination of the collection apparatus occurs.
   6. Routine coagulation samples should be the first tube collected, unless sterile samples or a plain redtop tube is to be collected.
   7. Special coagulation test should have a plain read tube before light blue.
   8. If blood is drawn from an indwelling catheter, the line should be flushed with 5.0 ml saline and the first 5 ml of blood is discarded.
   9. The citrate concentration must be adjusted in patients who have hematocrit values above 55%. (see below).
   10. Collection of specimens from IV lines that have been flushed with heparin should be avoided.
   11. The NaCi evacuated tubes are manufactured to draw 2.7 ml (0.3 ml NaCit) or 1.8 ml (0.2 ml NaCit) of blood creating a blood to anticoagulant ratio of 9:1.
   12. If the specimen volume is less than the indicated fill volume on the blood draw tube

(up to the opaque line on BD tubes) it is unsuitable for coag testing.

* 1. The following tests require Sodium Citrate tubes for coagulation testing and are performed at DMC-BR
     1. Prothrombin Time (PT)
     2. Partial Thromboplastin Time (PTT)
     3. D - Dimer test
     4. Fibrinogen
     5. Factor Assays
     6. Thrombin Clotting Time
     7. Thrombophilia screen
     8. Plasminogen
     9. Protein C & S
     10. DIC Panel (requires 2 blue top tubes)
     11. Antithrombin III
     12. Heparin Aggegrate Study (requires 4 blue top tubes)

1. Elevated Hematocrit Procedure
   1. Samples with an elevated Hematocrit ( <55%) require special collections.
   2. The anticoagulant of choice for all coagulation testing is buffered sodium citrate (NaCit). The concentration in use at NCBH is 3.2% or 0.109 M. The buffered solution is a more efficient stabilizer for labile factors V & VIII. Sodium Citrate tubes (2.7 milliliters or 1.8 milliliters) submitted for Coagulation testing must contain a minimum of 90% of the optimal draw volume maintaining a 9:1 ratio of blood to anticoagulant. If the specimen volume is less than 90% of the indicated fill volume on the blood draw tube (within the black arrow on Greiner tubes; up to the opaque line on BD tubes) it is unsuitable for coagulation testing; the floor/unit is notified and the orders for that specimen are canceled with the code QNS. Special testing (any testing other than PT/PTT) will be evaluated on a case-by-case basis by the team coordinator for coagulation or medical director for consideration.  For patients with hematocrit values above 55%, the amount of citrate in a standard 2.7mL or 1.8mL sodium citrate tube (light blue top) must be adjust to yield the proper concentration for the 9:1 blood to anticoagulant ratio. The final citrate concentration in the blood should be adjusted in patients with hematocrit values above 55%. In samples with an elevated hematocrit, the blood-to-anticoagulant ratio drops below 9:1, causing excess citrate for the volume of plasma present in the tube. This leads to excess binding of the calcium added to the clotting test reaction and the possible dilutional effect due to the volume of liquid anticoagulant present, which may lead to an increased clotting time.
   3. For patients with hematocrits greater than 55%, the citrate concentration in the collection tube must be adjusted by removing a portion of the volume of the citrate solution. To calculate the amount of citrate required in the collection tube, use the following formula:

X = (100-PCV) (volume of blood in tube)

(595-PCV)

**X**= Volume of sodium citrate **required** for unit volume of blood

**PCV** = Packed cell volume (hematocrit)

**Volume of blood in tube** = size of the collection tube, either 2.7 or 1.8

For example, for a patient whose hematocrit is 60%, and the blood is collected in a 2.7mL blue-top tube, the calculation should be as follows:

(100-60)x2.7     =        **0.2 mL of sodium citrate that remains in the tube**

   (595-60)

Or the same patient using an 1.8mL tube:

(100-60)x1.8   =     **0.13 mL of sodium citrate that remains in the tube**

                              (595-60)

The BD Vacutainer Citrate tubes contain the following volumes:

·       2.7 mL draw contains 0.3 mL of sodium citrate

·       1.8 mL draw contains 0.2mL of sodium citrate

Thus, by our example above, we would remove 0 .1mL, or 100uL, of citrate from the2.7mL tube using a 100uL MLA pipette, and the person drawing the blood would fill to the regular fill line as indicated on the tube.  For the 1.8mL citrate tube, using our example above, we would remove 70uL .

(Per Coagulation Manual, Wake Forest Baptist Health, Winston Salem, N.C.)

1. If the patient’s elevated hematocrit is discovered after the specimen has been collected, the patient’s physician will be notified and the patient called back for a recollection.

If the physician does not want a re-draw, please document with a comment: “Patient’s hematocrit is >55%. Coagulation results may be affected” then document who you notified.

Ex: “Patient’s hematocrit is >55%. Coagulation results may be affected. Notified Dr. Matthew Cline at 220pm”.

1. Lab staff will be responsible for providing phlebotomist with a sodium citrate corrected tube as necessary.
2. Special Coagulation Procedures being sent to main campus
   * 1. Please call : 716 – 4511
3. **Review/Revision/Implementation:**

All procedures must be reviewed at least every 2 years.

* All new procedures and procedures that have major revisions must be signed by the CLIA Laboratory Medical Director.

* All reviewed procedures and procedures with minor revisions can be signed by the designated section manager.

1. **Related Procedures: IPP#9 Specimen Collection**
2. **References: N/A**
3. **Attachments:** **N/A**
4. **Revised/Reviewed Dates and Signatures:**

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| --- | --- | --- | --- |
| Review Date: | Revision Date: | Reason: | Signature: |
|  | 3/6/2017 | Reformatted to Medical Center standard template | Laurie Watson, MT, ASCP |
|  | 3/5/2019 | Revised signature page | Laurie Watson, MT, ASCP |
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