UW Health
Clinical Laboratory

1507.P009.A4 Order of Draw – Blood Collection Tubes

Effective Date: 4/13/2020

I. Purpose

The procedure follows guidelines set forth by the Clinical and Laboratory Standards Institute™ (CLSI) to ensure quality specimens are collected for laboratory testing.

A. According to CLSI guidelines, all phlebotomy procedures must be performed with the correct order of draw.
B. All tubes must be gently inverted 8 – 10 times to provide thorough mixing of additives.
C. Shaking the tube vigorously may cause hemolysis of the blood (separating of red blood cells).

II. Order of Draw for Vacutainer Collection Tubes

1. **Blood Culture Bottles** – Used for bacterial and fungal cultures. Must be drawn first to reduce the potential hazard of bacterial, fungal, quantitative, CMV, and/or any other specimen contamination.

    a. Aerobic (**Blue** / **Pink**) bottle – Contains enriched Soybean – Casein digest broth medium capable of supporting the growth of aerobic organisms and resins for antibiotic neutralizations.
    b. Anaerobic (**Purple**) bottle – Contains Lytic Anaerobic medium designed to increase the detection and recovery of anaerobes. It contains a detergent to lyse red and white blood cells present in the sample, releasing any intracellular organisms.
    c. **Yellow** stopper Isolator tubes – Contain a nutrient solution
    d. **Black** stopper Isolator tubes – Contain a blood lysis solution

2. **Blue Top** – Tube contains Sodium Citrate. Most often used for coagulation studies. Must be drawn prior to collection of serum tubes to prevent contamination with clot activator and interference with coagulation cascade.

    a. When collecting the following Special Coagulation studies: Platelet Function Screen and Whole Blood Platelet Aggregation of Platelet Mapping, a discard of 1mL of blood must be drawn into a blue top citrate tube. ***Serum tubes should not be used as a discard tube prior to coagulation collection. Another citrate (blue top) tube should be used as the discard tube.***

3. **Serum** – Inside walls of tube are coated with a clot activator to promote coagulation.
    a. **Royal Blue** top with **Red** stripe (non-additive) – Metal-free tube mainly used for toxicology, trace metal analysis, and nutritional studies.
    b. **Red** top – Tube without gel separator, used mainly for serology and chemistry testing. 10mL Red top tubes are used in Blood Bank for antibody screens.
    c. **SST / Gold** top – Tube contains a clot activator / gel separator which separates the cells from the serum for a variety of testing.

4. **Heparin** – Tube used for most tests requiring plasma.
    a. **Light Green** (PST/PLAST) top (Plasma Gel Separator with Heparin) – Tube contains a gel which separates the cells from the plasma for a wide range of testing, including chemistries. An SST tube is an acceptable substitute for most testing that identifies PST/PLAST as the primary tube.
    b. ***Lithium*** Heparin without gel separator (**Dark Green** top) – Tubes containing ***lithium*** heparin are used for most testing that requires plasma. Ammonia (NH3) requires immediate transport.
    c. ***Sodium*** Heparin without gel separator (**Dark Green** top 9mL tube) – Used for special testing such as Cytogenetics and TB QuantiFERON.

5. **EDTA** – Tube used for hematology studies.
    a. **Purple** top – K2 or K3 EDTA tube used for most hematology studies.
    b. **Pink** top – K3 EDTA tube used for testing in Blood Bank (blood typing and cross-matching requires employee ID, date, and time of collection on tube).
    c. **Royal Blue** top with **Purple** stripe – Metal-free EDTA tube used mainly for whole blood heavy metal testing (lead, manganese, chromium, cobalt).

6. ACD Solution A or B (**Yellow** stopper)

7. PICO syringe – Used for blood gas and other whole blood POC testing.

8. Research Kits – Collected after all diagnostic labs have been obtained.

III. Exceptions to the Order of Draw

A. When collecting blood from any VAD which is routinely flushed with heparin, coagulation tubes should be collected via venipuncture. If coagulation testing is collected from a VAD where the line has been heparinized (flushed with heparin), coagulation results may be affected.

B. If venipuncture is not possible:

1. Collect citrate tube (blue top) last, after 20mL of blood has been withdrawn for other testing, or as waste. Just prior to drawing the blue top tube as the last tube, draw 1mL into a discard blue top tube to prevent cross contamination from the additive of previously drawn tubes.
2. For pediatric patients, one must consider the maximum allowable draw volume.
    a. The above procedure can be followed using a 10mL waste instead of 20mL.
    b. Drawing the minimum specimen volume should be the norm for pediatric patients.

IV. Order of Draw for Micro Container Collection Tubes

A. The order of draw for micro container collection tubes differs from that of vacutainer tubes. This procedure follows guidelines set forth by the manufacturer (BD Microtainer® and/or Greiner Bio-One

1. **Capillary tubes** – Used for whole blood tests and/or point of care testing (blood gasses).

2. **Blue** top – Tube contains sodium Citrate. **CANNOT** be collected via capillary collection method; tube **MUST** contain **venous** blood only.

3. **Lavender** – Tube contains K2EDTA additive, used for hematology testing.

    a. Collected first to obtain adequate volume, minimize platelet clumping, and ensure accurate hematology test results.
    b. Inside walls of the microtainer are sprayed with EDTA. To prevent clotting during collection process, blood should run freely down inside wall of container to pick-up EDTA.

- Mix by inverting 10 – 15 times immediately after collection. ***Tube inversions prevent clotting.***

4. **Green** – Tube contains Lithium Heparin, PST™ Gel additive with or without Amber Coating to protect light sensitive assays, used for plasma chemistry testing.
   - Mix by inverting 10 – 15 times immediately after collection. ***Tube inversions prevent clotting.***

5. **SST Gold** – Tube contains Clot Activator / SST™ Gel separator, used for serum chemistry testing.
   - Mix by inverting 5 – 10 times immediately after collection.

6. **Red** – Tube contains no additive, used for serum chemistry testing, serology, and blood bank testing.
   - Mix by inverting 5 – 10 times immediately after collection.

7. **Newborn screening card** – See card for instructions

V. References – CLSI. Collection of Diagnostic Venous Blood Specimens. 7th ed. CLSI standard GP41. Wayne, PA: Clinical and Laboratory Standards Institute; 2017.

VI. Author and/or Revised
Medical Director
Lab Manager(s)

VII. Printed Copy Location(s) – Not Applicable