# Laboratory Procedures and Tasks

*Table of Contents*

## Introduction

The purpose of pre-diagnostic cardiovascular screening is to uncover the earliest stages of Cardiovascular Disease (CVD). Current technological advances make it possible to catch this devastating disease when the vessels begin to fail or stiffen. Before these advances, diagnosing **high blood pressure** constitutes the earliest clue that the cardiovascular system suffers damage from inflammation.

Diagnosing CVD at the earliest stages allows early intervention, thereby slowing its advance or even reversing the damage. Simple diet changes like eating more vegetables, limiting sugar and processed foods, promote a healthier body. Including more aerobic activity, reducing stress, and incorporating better eating habits also reduces CVD risk.

### Requisition Slips

Specimen collection occurs after a positive Cardio101 test score is above two points. Each patient will have **three** requisition forms, one for each aliquot of specimen (plasma, serum, and urine). See Figure 1.

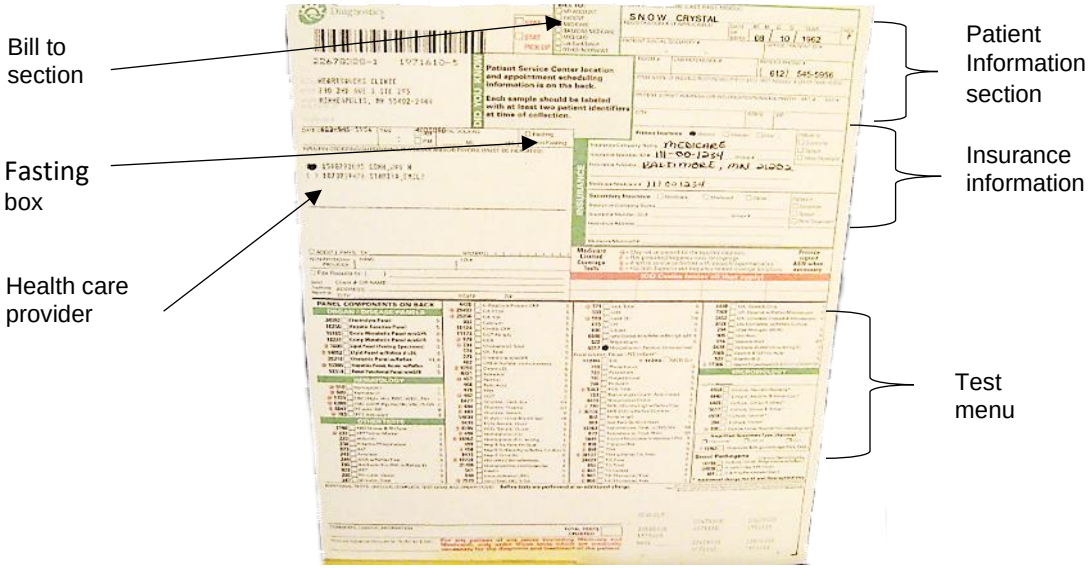



Figure 1. Requisition Form

**Patient Information–Requisition Slips**

The Medical Laboratory Scientist or Medical Laboratory Technician (MLS/MLT) escorts the patient to the phlebotomy area. Then the MLS/ MLT completes the following tasks:

1. Ask the patient to say their name and birthdate while looking at the patient's license or state ID.
2. Fill out the top, right-hand section of all three-requisition forms with the patient's:

   - Last Name, First Name
   - Date of Birth
   - **Clinic** Phone Number (Figure 2)

Make copies of both the **front** and **back** of the insurance and ID cards.

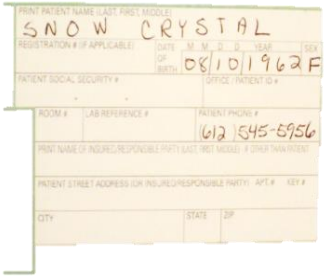
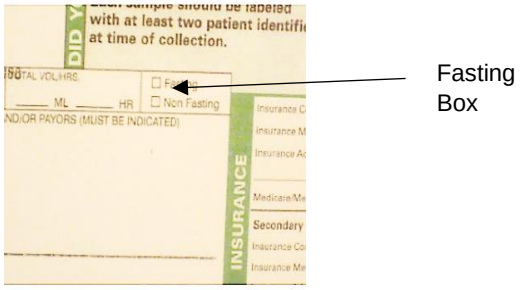



Figure 2. Patient Section

Always compare the information written on the requisition form with the patient's **license** or **ID.**

3. Verify how many hours the patient fasted. ** **Needs to be ≥ 12 hours**. **
4. Mark the appropriate box on the patient's requisition sheet. See Figure 3.

   - If fasting is less than 12 hours – they may need to reschedule the test
   - If the patient brought blood work results done within 6-months, use those results




Fasting Box

Figure 3. Requisition Form – Fasting Section

**Note**: Medicare patients may only have certain tests run every six months. An example would be the cholesterol test. Otherwise, the patient pays out of pocket for tests outside of these parameters.

## Billing–Requisition Slips

Patients will have four different medial insurance scenarios: Private, Medicare, Medicare with a Supplement, and Medicaid.

### Private and Senior Select Insurance

1. Fill in the **Billing Section** located at the top, center of the form. See Figure 4.
2. Mark “My Account” for the following:

    - Private Insurance
    - Senior Select (Care)

> **Note:** Senior Select is a Medicare substitute but their card doesn’t say “Medicare.” It is not a supplemental insurance.

My Account

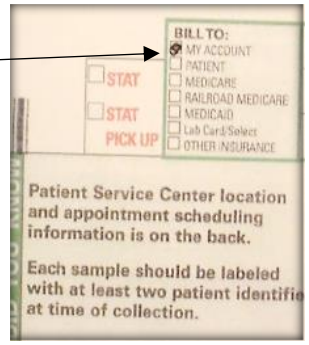



Figure 4. Billing Section

### Medicare with a Supplement

1. Mark “Medicare” and “Other Insurance” if applicable. See Figure 5.
2. Fill in the Insurance section if not already completed. See Figure 6.

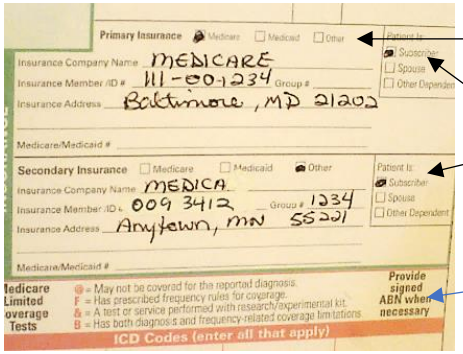



Figure 6. Insurance

Mark the type of insurance

Choose if the patient represents the subscriber, spouse, or other dependent

Patient fills out the **ABN** form. See page 8.

Medicare

Other Insurance

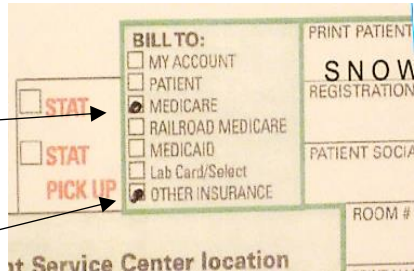



Figure 5. Billing Section

**Billing–Requisition Slips**

When patients have Medicare or Medicare with a supplement insurance, they need to fill out an Advanced Beneficiary Notice of Noncoverage (ABN) form. This form states that if test costs are not covered by Medicare or their insurance supplement, the patient will pay the balance due. See page 8.

**Medicare**

1. Mark “Medicare” in the Billing Section. See Figure 7.
2. Fill in the Insurance section if not already completed. See Figure 8.

Mark “Medicare”

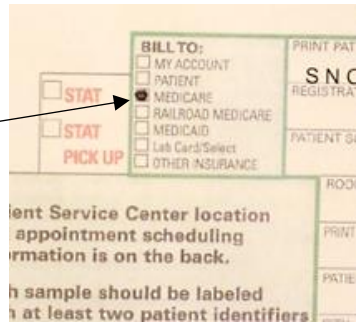



Figure 7. Billing Section

Mark Insurance Type

Choose if the patient represents the subscriber, spouse, or other dependent

Supply Insurance Information

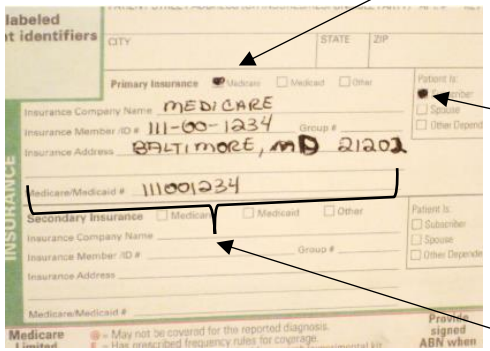



Figure 8. Insurance Section

Patient fills out an **ABN** form. See page 8.

**Billing–Requisition Slips** *Continued*

Patients with Medicaid insurance have requisition forms similar to those with private insurance. **No ABN form is needed**.

**Medicaid**

3. Mark “Medicaid” in the Billing Section. See Figure 9.
4. Fill out the Insurance section. See Figure 10.

> **Note:** Medicaid insurance usually has “MNSure” after the provider’s name.

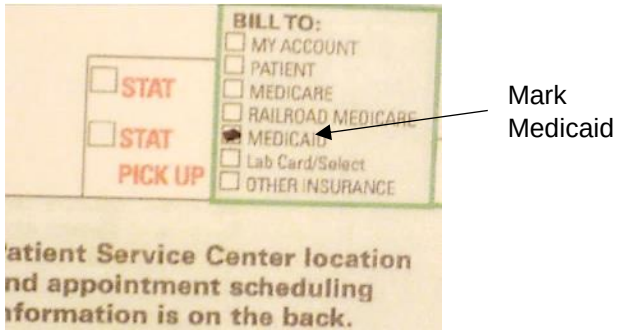



Figure 9. Billing Section

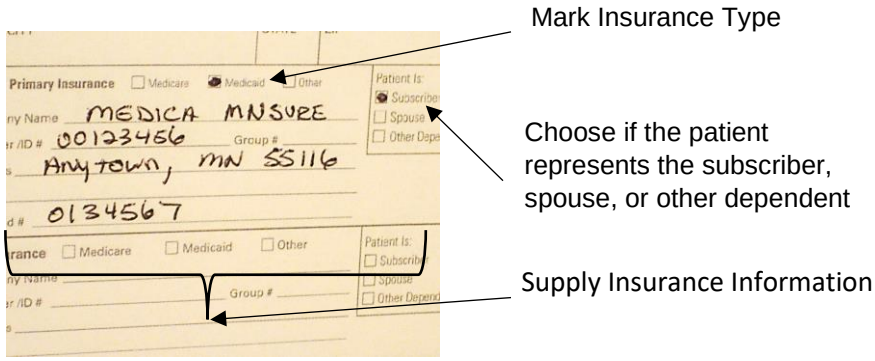


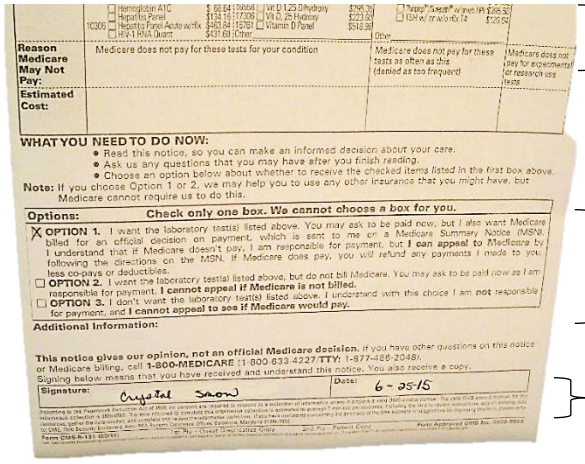

Figure 10. Insurance Section

**ABN–Requisition Slips**

The Advanced Beneficiary Notice of Noncoverage or ABN form is used with the Medicare and Medicare plus supplemental insurance patients. Legally, this document notifies patients that their insurance may not cover certain tests and that they will be responsible for paying the costs. Fill in the laboratory section with the following information for each patient: **Lipid Panel 7600, Glucose 483, and write in (other section) BNP 37386.** See Figure 11.

1. Always filled out with **Medicare Insurance patients**.
2. Photocopy form and keep it with the patient's send out records.
3. Yellow copy- patient keeps for their records.
4. White copy- sent with lab requisitions to Quest.
5. Send a photocopy of patient's ID and insurance cards - front and back to Quest.

If patients have supplemental insurance, the insurance may pick up the cost of the BNP test. Diabetics are only allowed glucose tests quarterly and lipid profiles every 6 months.




Laboratory personnel fill in this section for the Lipid Panel 7600, Glucose 483, and the BNP 37386

Make sure the patient has chosen option 1, 2, or 3

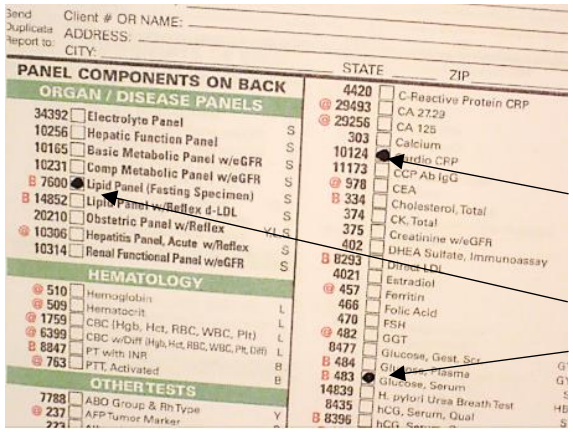
Patients must sign and date the form

Figure 11. ABN Form

**Laboratory-–Requisition Slips**

Because there are three different specimen aliquots, each specimen type is packaged with its own requisition slip. One reason deals with specimen storage. The **Brain Natriuretic Peptide** (BNP) plasma specimen is frozen for transport. The **Lipid Panel**, **Cardio-CRP,** and **Glucose** serum specimens are stored either refrigerated or at room temperature, and the urine **Micro Albumin** test is sent at room temperature.

The largest section on the **Requisition Slip** contains the laboratory test choices. For most patients, the following tests will be marked every time. The exception includes patients who have valid laboratory results from their doctors. See Figures 12 and 13.



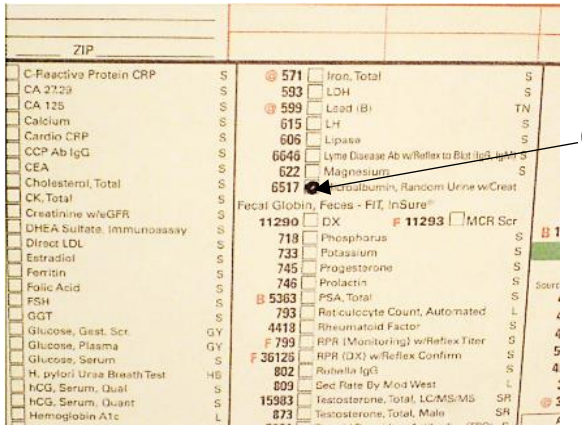

Fill in the boxes

**10124** Cardio CRP (also known as hs-CRP)

**600** Lipid Panel

**483** Glucose

Figure 12. Requisition Form Number One



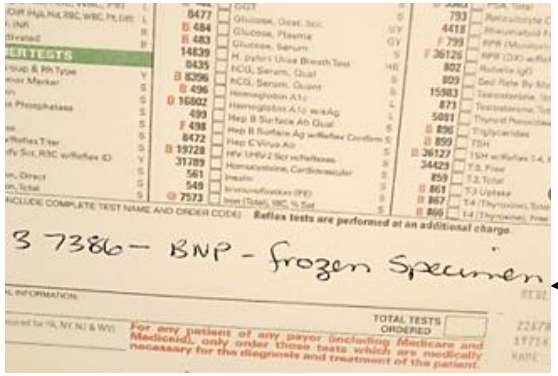

Fill in the box

**6517** Microalbumin, Random Urine with Creat.

Figure 13. Requisition Form Number Two

**Laboratory–Requisition Slips** *Continued*

The third requisition slip will be the same for every patient. Write the following in the space located beneath the lab test section. See Figure 14.




**37386** – BNP – Frozen Specimen

Figure 14. Requisition Slip Number Three

**Form Distribution**

At this point, there are three requisition slips, one ABN form if applicable, and two copies of the patient's insurance and ID cards. After the patient fills out the ABN and the requisition slips are completed, photocopy them too. The following table outlines where each of these documents go after the specimens are obtained. See Table 1.

Table 1. Document Distribution

| Documents | Patient | Patient's Chart | Lab Record Book | Specimen |
|---|---|---|---|---|
| Requisition Slip | | | | One for each specimen type (3) |
| Requisition Slip photocopy | | | ✓ | |
| ABN form | Yellow copy only | | | White copy |
| ABN form photocopy | | | ✓ | |
| Insurance and Photo ID copy | | ✓ | | ✓ (Medicare insurance) |

**Urine Collection and Phlebotomy**

Urine Specimen Collection

The microalbumin creatinine ratio tests kidney function. Albumin is a protein found in the blood. Normally, no albumin should be excreted by patients with normal kidney function. This test is usually done on patients who have diabetes, high blood pressure, or kidney disease. Creatinine excretion happens at a steady rate throughout the day, while albumin amounts vary.

1. Hand the patient a urine specimen cup labeled with their name, birthdate, date, and time collected. See Figure 15.
2. Escort them to the bathroom.
3. Show the patient where the specimen pass-through door is located.
4. Invite the patient to sit in the phlebotomy chair when finished.


Figure 15. Urine Specimen Cup
https://www.youtube.com/watch?v=T9eOPhpUeF8&t=53s

Phlebotomy

Phlebotomy is the procedure in which blood samples are drawn through venipuncture. Four categories of laboratory professionals are proficient in venipuncture. They are Medical Assistants (MAs), Phlebotomists, Medical Laboratory Technicians (MLTs), and Medical Laboratory Scientists/ Medical Technologists (MLS/MT). Sometimes the Physician Assistant (PA) draws blood samples.

It is important to gather all supplies needed for the procedure. Check the phlebotomy tray for needed supplies and replace them before the first scheduled patient arrives. Always have extra tubes available in case there is an issue. Examples of issues are an incomplete blood draw or the patient's blood clots before the tube is filled.

**Phlebotomy** *Continued*

*Tubes for Phlebotomy*

The only three tubes will be drawn on each patient. **Two SST Tubes** or red and gray mottled gel tubes are used for the glucose, lipid panel, and the hs-CRP tests. The SST or serum separator tubes will clot for about 30 to 60 minutes, spin in the centrifuge for 15 minutes, and then is bagged for transport. They do not need to be poured over into a transport tube.

**One EDTA Lavender-Top Tube** is drawn for the BNP test. Only one lavender–top tube is needed to collect enough plasma. The lavender–top tube is spun as soon as possible, the plasma pipetted off, and put into a screw-top transport container. Place the labeled specimen in the freezer. See Table 2. For specimen processing, see page 15.

Table 2. Laboratory Draw Needs

| Number of Tubes | Tube Type | Tests | Sample Needed | Storage |
|---|---|---|---|---|
|  | SST Tube | Lipid Panel | Serum | Room Temperature |
| | SST Tube | Glucose, hs-CRP | Serum | Room Temperature |
|  | Lavender – Top Tube | BNP | Plasma | Freeze |

**Phlebotomy** *Continued*

*Venipuncture Procedure*

1. Ask the patient to state their name and birthdate.
2. Verify information matches the patient requisitions and labels.
3. Prepare all supplies needed for venipuncture.
4. Ask the patient to roll up their sleeve to access the veins.
5. Talk about the patient's pet or favorite vacation spot to help them relax.
6. Put gloves on.

*Blood Specimen Collection Process*

1. Tie the tourniquet around the upper arm.
2. Wipe antecubital area with an alcohol wipe using concentric circles/spirals.
3. Uncap needle while the alcohol dries.
4. Draw **2 SST tubes** (red-topped tubes with gel in the bottom).
5. Draw **1 full lavender-top tube**.
6. Mix tubes by gentle inversion 10 times.

*Tubes Filled*

1. Release the tourniquet.
2. Grab gauze squares with a free hand and place gently over puncture site.
3. Remove needle quickly, then apply pressure over the venipuncture site.

*Labeling tubes*

1. Ask the patient to hold pressure on the puncture site.
2. Write phlebotomist's initials, date, and time drawn on the labels.
3. Place labels on the tubes.
4. Ask the patient to read out loud the name and birthdate on the tubes.
5. Place specimens in the phlebotomy tray

*Venipuncture Care*

1. Lift up the gauze to access bleeding, then replace the gauze and continue holding pressure on the site.
2. Take a piece of paper tape and place it over the site if bleeding has stopped.
3. Instruct the patient to keep pressure on the site for 5 minutes.
4. Escort the patient to the Vascular Technician (VT) or to the 4-Test Procedure.

If bleeding doesn't stop, apply pressure for a few more minutes. Recheck for bleeding. Repeat steps 1 through 3 until bleeding stops.

When patients are on anticoagulant therapy, their blood may take longer to stop bleeding. The other common reasons for continued patient bleeding are:

- Arthritis medication or medicine containing aspirin
- Low platelet count
- Accidentally drawing an artery

Remember that arteries have a pulse. **Do not draw an artery.**

**Specimen Processing**

Specimen integrity may be affected when plasma or serum remains in contact too long with RBC's or red blood cells. The BNP or brain natriuretic peptide results tend to rise with heart failure. Therefore, it is important to follow the processing guidelines to ensure accurate test results. See Table 3.

1. Centrifuge **lavender-top tubes** within 15 minutes of the blood draw.
2. Separate plasma from the RBCs within 30 minutes of the blood draw or test results will be affected.
3. Clotting in **SST tubes** takes 30 to 60 minutes.
4. Tilt **SST tubes** to see if the serum in has separated from the clot.
5. Centrifuge **SST tubes** when ready.

Table 3. Specimen Processing

| Test Name | When to Centrifuge | Minutes for Centrifuging | Specimen type: Plasma, Serum or Urine | Storage Requirements | Medical Condition |
|---|---|---|---|---|---|
| **Lipid Profile**<br>Total Cholesterol<br>HDL<br>LDL<br>Total Chole/HDL ratio<br>Triglycerides<br>% of chylomicrons, VLDL, LDL, HDL | 30 to 60 minutes and the specimen are clotted | 15 minutes | Serum | Room Temperature | CVD – cardiovascular disease |
| Glucose | 30 to 60 minutes until clotted | 15 minutes | Serum | Room Temperature | CVD/ Diabetes |
| Hs-CRP | 30 to 60 minutes until clotted | 15 minutes | Serum | Room Temperature | Shows persistent levels of inflammation—CVD |
| BNP | Spin within 15 minutes | 15 minutes | Plasma | Frozen | CVD |
| Micro-albumin with Creatinine Ratio | N/A | N/A | Urine | Room Temperature | Kidney disease |

**Specimen Processing** *Continued*

*Lavender Top Tube*

1. Mark transfer vial *plasma,* and place specimen and requisition labels on the vial.
2. Put on PPE (personal protective equipment: disposable lab coat, gloves, and face shield).
3. Pipette the plasma off the RBCs in the **lavender-topped tube** and transfer to the labeled vial.
4. Place capped specimen in the large pocket of the transport bag marked *frozen specimen* (orange stickers).
5. Make sure specimen label barcode is visible through the pouch.
6. Photocopy all requisition and ABN slips, mark **Lab Test Sent** on copies and place In 3-ring binder marked *Lab Test Sent.*

    - Place original corresponding paperwork in the pocket (barcode is visible).
    - Lab **ABN** form (if needed, see appendix)
    - **Requisition Slip**

7. Place specimen in the freezer ASAP (as soon as possible).

*SST Tubes*

1. Check **SST tubes** for clotting (serum should be visible when the tube is tilted).
2. Place specimen label from the requisition on each tube before spinning.
3. Spin tubes for 15 minutes in the centrifuge.
4. Remove 2 SST tubes from one patient at a time.
5. Place both tubes into one transport bag labeled *room temperature* (large pocket).

    - Photocopy all requisition and ABN slips, mark **Lab Test Sent** on copies and place in 3-ring binder marked *Lab Test Sent*
    - Place original corresponding paperwork in the pocket (barcode is visible).
    - Lab **ABN** form (if needed: see appendix)
    - **Requisition Slip**
    - Leave at room temperature until specimen pick-up

**Specimen Processing** *Continued*

*Urine*

1. Mix **urine** specimen by gently swirling collection cup about 3 to 5 times.
2. Label transport urine vial with the patient ID and requisition label.
3. Pipette urine and fill transport vial to the line and screw on the cap.
4. Place vial in transport bag labeled *room temperature* (large pocket).

- Photocopy all requisition and ABN slips, mark **Lab Test Sent** on copies and place in 3-ring binder marked *Lab Test Sent*
- Place original corresponding paperwork in the pocket (barcode is visible)
- Lab **ABN** form (if needed: see appendix)
- **Requisition Slip**
- Leave at room temperature until specimen pick-up

**Laboratory and Phlebotomy Area Disinfection**

While tubes are spinning and clotting, cleaning and disinfection can be done in the phlebotomy area.

1. Disinfect phlebotomy area (if last draw is completed or if blood and body fluids spilled).
2. Carry needle waste container back to the lab.
3. Disinfect the phlebotomy chair with CaviWipes XL.
4. Disinfect countertops and floor area with a 1:16 bleach solution (made fresh each morning).

See page 21 for making the 1:16 bleach solution.

**Laboratory and Bathroom Clean-up**

1. Empty urine specimens in the toilet (at shift end).
2. Destroy labels and discard urine cups in the appropriate waste container.
3. Disinfect bathroom:

   - Use CaviWipes XL on specimen pass through, light switch, faucet handles, and door knob
   - Use 1:16 bleach solution for the toilet, the floor around the toilet, and sink

4. Disinfect Lab.

   - Use CaviWipes XL on stainless steel work benches and centrifuge (inspect rotors for cracks)
   - Use 1:16 bleach solution on the floor

5. Disinfect specimen pick-up areas on the bench and refrigerator with CaviWipes XL after specimen pick-up.
6. Turn off lights and shut the lab door.

**Call Quest Diagnostics**

1. Call Quest Diagnostics for specimen pick-up **before 11:00 am**. 1-866-697-8378.

   - Select option1 (for healthcare providers)
   - Select option 6 for specimen pick-up (have clinic ID number ready)

See instructions for making fresh 1:16 bleach solution daily on page 21.

**Maintenance Records**

*Refrigerator*

Recording the refrigerator and freezer temperatures daily ensures proper temperatures for specimen storage. **Frozen** specimens, such as the plasma, need to be maintained between **0° to 14° F**, and the **refrigerator** temperature is between **35° to 45° F**. Record the temperatures on the log sheet. See page 19.

*Centrifuge*

When properly maintained, used, and inspected, the **centrifuge** remains a safe piece of equipment. However, severe accidents may occur if the centrifuge is allowed to run while unbalanced. Running a centrifuge while unbalanced causes the rotors to wear and break, damaging the centrifuge. It is important to consult and follow the manufacturers instructions for routine checks and care.

After **500** hours of use, the Octofuge will be sent to the manufacturer and be inspected by a trained technician. They will inspect and test the centrifuge for any defects, worn bearings, and rotors. The speed will be checked with a tachometer to ensure the speed matches 3,000 rpms. See Figure 16.

See page 20 for the log sheet and record the date, hours, and maintenance done.

Figure 16. Example of a Six Place Swing Out Rotor Without Buckets
Source: https://www.youtube.com/watch?v=LrBsS1agd2A

**Refrigerator Temperature Log**

| Month: | | | |
|---|---|---|---|
| Date | Refrigerator Temp (35° to 45° F) (2° to 7° C) | Freezer Temp (0° to 14° F) (-17° to -10° C) | Action Needed |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| Notes: | | | |

**Centrifuge Log**

| Date | Time | Action Needed |
|---|---|---|
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| Notes: | | |

**Bleach Solution**

The following **1:16 bleach solution** is considered an intermediate-strength germicide. According to Scungio (2017), this bleach solution ”will eliminate most bacteria (including Mycobacterium tuberculosis) and all fungi, and it inactivates viruses” (Routine Decontamination, para 2). To ensure proper efficacy, the bleach solution is made **daily**.

1. Use protective equipment when diluting bleach.

   - Lab coat
   - Gloves
   - Chemistry goggles
   - Hood with an exhaust fan

2. Gather supplies

   - Bleach with **8.25%** sodium hypochlorite
   - Distilled water
   - Graduated cylinders (1-500 ml and1-100 ml)
   - Funnel
   - Laboratory safety wash bottle (16 oz or 500 ml)

3. Measure **444 ml of distilled water** using the **500 ml graduated cylinder.**
4. **Pour 244 ml of distilled water** into the laboratory **safety wash bottle** using the funnel.
5. Measure **30 ml of 8.25% bleach** into the **100 ml graduated cylinder** and pour into the safety wash bottle.
6. Pour in the remaining **200 ml of distilled water** into the laboratory safety wash bottle, cap and gently swirl to mix.
7. Label the bottle with the date made.

443 ml distilled water + 30 ml of 8.25% bleach = 1:16 dilution of 8.25% bleach solution

Remember to add **acids** to **water**.

**References**

Cohn, Jay N., Duprez, Daniel A., Grandits, Gregory A. (2005, July). Arterial elasticity as part of a comprehensive assessment of cardiovascular risk and drug treatment. *Hypertension,* 2017-2020*.* doi:10.1161/01.HYP.0000165686.50890.c3

Miller, Michael J., Astles, Rex, Baszler, Timothy, Chapin, Kimberle, Carey, Roberta . . . Wiedbrauk, Danny. (2012, January 6). Guidelines for safe work practices in human and animal medical diagnostic laboratories: Recommendations of a CDC-convened, biosafety blue ribbon panel. In *Morbidity and Mortality Weekly Report (MMWR).* Retrieved from https://www.cdc.gov/mmwr/preview/mmwrhtml/su6101a1.htm?s_cid=su6101a1_w

Scungio, Daniel. (2017, June). Lab decontamination tools and practices. *Medical Laboratory Observer.* Retrieved from https://www.mlo-online.com/diagnostics/pathology/article/13009199/lab-decontamination-tools-and-practices