

Unit 2, Lab 4

PTA/OTA 106 Regional Anatomy and Physiology

G. Blevins

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Pulse and Blood Pressure:

Maintenance of blood pressure is important to normal health of the body, heart, brain, and other various organs. **High Blood pressure (hypertension)** increases the workload of the heart, because the heart is contracting harder per beat to pump blood. High blood pressure can lead to kidney dysfunction, vascular disease, and increased chance of strokes. **Low Blood Pressure (hypotension)** is a concern for maintaining adequate perfusion (O₂ supply) of your tissues. Decreased blood pressure may lead to dizziness or fainting. In this exercise you will learn how to measure heart rate and blood pressure, as well as review some factors that affecting both.

Materials Needed:

Watch with seconds

Sphygmomanometer

Stethoscope

Alcohol wipes

Pulse Rate:

When the ventricles contract (systole), they push blood in the major arteries that come directly off the heart. As the blood enters arteries under pressure, the blood stretches the elastic tissue in the vessel causing the blood vessels to dilate. This dilation due to the force (systolic pressure) of the blood on the vessel wall is responsible the “bump” you feel while taking a pulse. The force on the blood drops to it lowest level (diastolic pressure) when the ventricles are relaxed and the vessel wall recoils, the time frame between the “bumps.”

Procedures:

Clinically Pulse can be palpated at many locations on the body. The most common are: Radial, Brachial, Common Carotid, Facial, Superficial Temporal, Femoral, Popliteal, Posterior tibial, Dorsal Pedal arteries. In lab you can explore finding a pulse at all these arteries except the femoral artery. Would the pulse change if you compared these different arteries?

1. While the while the subject is sitting quietly, locate the pulse by placing your index and middle fingers over the radial artery on the anterior surface of the wrist. To determine pulse rate, count the number of pulses in 30 seconds and multiply by 2 (measurement is BPM).
2. Note the characteristics of the pulse: regular or irregular, strong or weak, hard or soft.
3. Compare the radial pulse to a Carotid, Superficial Temporal, and Dorsal Pedal pulse.
4. Repeat radial pulse immediately after the subject lying down in the lab table
5. Repeat radial pulse after the subject has been lying down for 3-5 minutes.
6. Repeat radial pulse immediately after standing.
7. Repeat radial pulse after the subject has been standing for 3-5 minutes.
8. Repeat radial pulse after subject as returned to a sitting position for 3-5 minutes.

Sitting radial pulse _____

Carotid pulse _____

S. Temporal pulse _____

Dorsal Pedal _____

Standing _____

Standing (3-5m) _____

Lying down _____

Lying (3-5m) _____

Return to sitting (3-5m) _____

What was the effect of each activity on pulse rate?

Blood Pressure:

Each time the ventricles contract (systole), they send a surge of blood into arteries. The force exerted by this blood against the vessel walls creates systolic blood pressure. When the ventricles relax (diastole), the pressure drops to its lowest level. This lowest pressure mark is referred to diastolic pressure. Blood pressure is expressed by writing: systolic pressure/diastolic pressure, for example, normal blood pressure would be expressed as 120/80.

Blood pressure is not uniform throughout the body. Blood pressure is influenced by distance from the heart and gravity. Clinically blood pressure is most often measured in the **brachial artery**, which is at the level of the heart and has the approximate pressure as that found close to the heart. Dorsal pedal pressures are also used to assess blood flow in the foot.

Blood pressure is indirectly measured by using a sphygmomanometer. Historically, sphygmomanometers had mercury filled glass tubes and the higher the subject's blood pressure, the higher the rise in mercury within the tube. The distance the mercury moved up the tube was measured in millimeters and blood pressure was recorded in "mmHg." Those units "mmHg" are still used for blood pressure today. These mercury filled Sphygmomanometers are still used in some places clinically today. In this lab, we will be using an aneroid (using air) Sphygmomanometer.

A Sphygmomanometer functions by increasing the outside pressure on the walls of the artery. As the pressure starts to pinch or close the artery off it creates turbulence in the blood flowing within the artery. This turbulence produces sounds called **Korotkoff** sounds. Completely open or completely closed arteries do not produce Korotkoff sounds. Auscultatory measurement of blood pressure involves listening for Korotkoff sounds.

When taking a blood pressure, you have to pump the cuff pressure up to a point where the pressure exceeds the pressure of the blood in the artery, thus closing the artery off. As you slowly decrease the pressure in the cuff to a point where cuff pressure equals the

highest blood pressure, blood begins to flow again producing Korotkoff sounds. The first sound you hear will be equal to the highest pressure or **systolic blood pressure**. You will continue to hear Korotkoff sounds as long as cuff pressure is greater than the lowest pressure in the artery. Continue to slowly drop cuff pressure until you hear the last Korotkoff sound. At this sound, cuff pressure will be equal to the lowest blood pressure, **diastolic blood pressure**.

Procedure:

1. Obtain a sphygmomanometer, stethoscope, and an alcohol wipe.
2. Clean earpiece and diaphragm of the stethoscope with alcohol wipe before use.
3. Have subject sit quietly (relaxed) with bare upper arm resting on a table at heart level.
4. Locate brachial artery in the antecubital space. You should be able to feel a brachial pulse.
5. Wrap cuff around the upper arm so that its lower border is about 2.5cm above the bend of the elbow.
6. Palpate the radial pulse. Close air control valve and pump air into the cuff while watching the sphygmomanometer aneroid gauge. Note the pressure when the radial pulse disappears. This will give you a rough estimate of systolic blood pressure.
7. Position the stethoscope over the brachial artery. Reinflate the cuff to a pressure that is 30mmHg above the point you're the radial pulse disappeared in step 6.
8. Slowly open the air control valve allowing the pressure to drop at a rate of about 2 or 3 mmHg per second.
9. Listen closely for the first Korotkoff sound (loud tapping). Record the pressure reading on the aneroid gauge. This will be the subject's systolic blood pressure.
10. Continue to listen to Korotkoff's sounds as you continue to drop the pressure. Note the pressure on the aneroid gauge when the last Korotkoff's is heard. Record this pressure as the subject's diastolic blood pressure.
11. Release all the pressure from the cuff.
12. Repeat taking the subject's blood pressure after 5 minutes. How close are your measurements?

First Blood Pressure _____ Second Blood Pressure _____

13. Repeat after subject as been lying down on the lab table for 3-5 minutes
14. Repeat after subject as been standing quietly for 3-5 minutes.

Blood pressure lying _____ Blood pressure standing _____

How do all of these blood pressures compare??