

**Blood Pressure Measurement**

Blood pressure is the force exerted by blood against the walls of arteries and veins. It is created by the pumping action of the heart. Blood pressure is measured in millimeters of mercury (mm Hg) and is expressed by two numbers—120/80, for example. The higher number is systolic blood pressure, the maximum pressure that occurs when the heart contracts. The lower number is diastolic blood pressure, the pressure when the heart is relaxed between contractions.

**Aim :** To safely and effectively measure and record a patient's blood pressure

**Indications:** Blood pressure measurement is indicated in any situation that requires assessment of cardiovascular health, including screening for hypertension and monitoring effectiveness of treatment in patients with hypertension. In the routine outpatient setting blood pressure measurement is obtained indirectly, thus it is important that proper techniques be used so as to produce consistent and reliable measurements.

**Methods of Measurement of Blood Pressure****Direct Method**

The direct method of recording blood pressure (BP), in which an artery is punctured with a cannula connected to H<sub>2</sub>O manometer or electronic manometer .

**Indirect Methods**

Obviously, the direct method is not suitable as a routine clinical procedure. Indirect methods were, therefore, introduced.

**Indirect Methods**

A sufficient length of a single artery is selected in the arm (brachial artery), or in the thigh (femoral artery). The artery is first compressed by inflating a rubber bag (connected to a manometer) placed around the arm (or thigh) to stop the blood flow through the occluded section of the artery. The pressure is then slowly released and the flow of blood through the obstructed segment of the artery is studied by:

- i. Feeling the pulse—the palpatory method.
- ii. Listening to the sounds produced in the part of the artery just below the obstructed segment— the auscultatory method.
- iii. Oscillometric method

**Equipment**

1. Sphygmomanometer (A sphygmomanometer consists of an inflatable bag inside a covering called a cuff, an inflating bulb, a manometer from which blood pressure can be read, and a valve that is used for deflation.)
2. Stethoscope
3. Chair
4. Table or other surface to support arm

**Preparation**

For the person being tested: Wear clothing that allows your upper arm to be bare. Avoid heavy exercise or eating prior to the test. Don't smoke or ingest caffeine for at least 30–60 minutes before being tested. Sit quietly for several minutes before the test begins.

**Instructions**

1. The subject should sit comfortably, with the arm slightly flexed, palm up, and the forearm supported at heart level on a table or other smooth surface. If such a surface isn't available, you will need to support the subject's forearm while you take the measurements.
2. Place the deflated cuff on the subject's upper arm, with the lower edge of the cuff about 1 inch above the inner elbow crease. The inflatable bag should rest on the brachial artery, which is on the inner part of the upper arm. The inflatable bag should encircle at least 80% of the arm; if it does not, use a larger cuff.



**3/A. Estimate an approximate systolic blood pressure(palpatory method).**

- Palpate the radial pulse
- Inflate the cuff until you can no longer feel this pulse
- Note the reading on the sphygmomanometer

This is a rough estimate of the systolic blood pressure

**3/B. Estimate systolic blood and diastolic pressure(auscultatory method).**

- Apply the stethoscope lightly to the arm, just at the inner elbow crease. Make sure the stethoscope doesn't touch the cuff or any of the tubing from the sphygmomanometer.
- While watching the manometer and listening for pulse sounds through the stethoscope, inflate the bag about 30 mm Hg above the point at which pulse sounds disappear. (Inflating the bag closes off the blood flow in the brachial artery, causing the pulse sounds to stop.)
- Slowly deflate the bag at a rate of about 3 mm Hg per second (or per heartbeat). As you release the pressure, pulse sounds will become audible, go through several changes in clarity and intensity, and then disappear again. You must listen carefully to the pulse sounds while you watch the readings on the manometer.
- Systolic pressure is the point at which pulse sounds first become audible. You should hear faint but clear tapping sounds.
- Diastolic pressure is the point at which the pulse sounds disappear.

**(Note:** If you are measuring blood pressure as part of an exercise test, Sometimes the sounds are audible all the way down to 0 mm Hg. If this occurs, diastolic pressure is the point at which there is a definite change in the loudness of the sound—an abrupt muffling.)

4. Wait 1–2 minutes and then repeat the test. Record both results and indicate which arm was used for the measurements. For more accurate results, readings should be taken by several different people or on several different occasions.

Systolic Diastolic

\_\_\_\_\_ \_\_\_\_\_ \_\_\_ Right arm \_\_\_ Left arm  
\_\_\_\_\_ \_\_\_\_\_

**Category a Systolic (mm Hg) Diastolic (mm Hg)**

Normal b Below 120 and Below 80

Prehypertension 120–139 or 80–89

Hypertension c

Stage 1 140–159 or 90–99

Stage 2 160 and above or 100 and above



Normal position of patient and instrument .



**Leg (Thigh) :(46-66cm)**

**Adult Large: (33-47cm)**

**Adult :(25 - 35cm)**

**Pediatric: (18-26cm)**

**Infant: (12-19cm)**

**Neonate: (7-13cm)**



Different sizes of arm cuff.

**Precautions**

The following precautions are required for correct measurement of blood pressure:

- At the initial visit, an average of three readings, taken at intervals of 2-3 minutes should be recorded.
- For confirmation of diagnosis of hypertension, record at least 3 sets of readings on different occasions, except in Stage III hypertension.
- Patients should be asked to refrain from smoking or drinking tea/coffee, exercise for at least 30 minutes before measuring the BP.
- Allow the patient to sit for at least five minutes in a quiet room before beginning blood pressure measurement.
- Measurement should be done preferably in a sitting or supine position. Patient's arm should be fully bared and supported at the level of the heart.
- Measure the blood pressure in both arms at the first visit and use higher of the two readings.
- In older persons aged 60 years and above, in diabetic subjects and patients on antihypertensive therapy, the BP should be measured in both, supine/sitting and in standing positions to detect postural hypotension.
- If atrial fibrillation is present, additional readings may be required to estimate the average SBP and DBP.
- Occasionally, thigh BP (popliteal) has to be measured with appropriately large cuff, in prone position especially in younger persons with hypertension. Normally thigh SBP is higher and DBP a little lower than the arm BP because of the reflected pulse wave. This is important for suspected coarctation and nonspecific aortoarteritis, where BP is lower in the lower limb as compared to the upper limb.