

**CONSIDERATIONS:**

1. Four types of Blood Pressure (BP) measurement are described in this procedure:
  - a. BP by auscultation of brachial artery
  - b. BP by palpation (BP cannot be auscultated)
  - c. BP in lower extremities (arms cannot be used)
  - d. Orthostatic BP readings
2. Blood pressure is an index of:
  - a. Elasticity of the arterial walls
  - b. Peripheral vascular resistance
  - c. Efficiency of the heart as a pump
  - d. Blood volume
  - e. Blood viscosity
3. Systolic pressure (upper reading) measures maximum pressure against arteries by left ventricular systole and is a clue to the integrity of the heart, arteries and the arterioles.
4. Diastolic pressure (lower reading) measures the force exerted during ventricular relaxation and filing and indicates blood vessel resistance.
5. Blood Pressure Table indicates values for adults over 18 years old. Numeric values are in mm Hg.

Category	Systolic	Diastolic
Normal	< 120	< 80
Pre- Hypertension	120 - 139	80 - 89
Stage 1 Hypertension	140 - 159	90 - 99
Stage 2 Hypertension	> 160	> 100
Hypertensive Crisis	> 180	> 110
Hypotension	< 95	
Orthostatic Hypotension	Posture change causes systolic pressure ↓ > 20 diastolic pressure ↓ > 10	

6. Cuff size: Width of the cuff should be 40% of the arm's circumference or 20% wider than the diameter of the midpoint of the limb. The bladder should encircle at least 80% of upper arm:
  - a. Cuff too narrow or short: falsely high reading
  - b. Cuff too wide or long: falsely low reading
7. Auscultatory gap: Some patients have an auscultatory gap. During the gap the BP sounds disappear, reappearing 10 - 15 mm Hg later. The auscultatory gap has no clinical significance but if

the cuff is not inflated above the auscultatory gap, a false low systolic reading occurs. If the pressure isn't monitored for about 20 mm Hg after hearing a pause in the taps, a falsely high diastolic reading occurs. To remedy these problems, current guidelines indicate:

- a. Palpate the radial or brachial artery while inflating the cuff. Continue cuff inflation 20 – 30 mm Hg beyond the obliteration of the pulse
  - b. Deflate cuff slowly – about 2 mm Hg/second. Continue listening for at least 20 mm Hg beyond the last tap to assure listening through auscultatory gap
8. In order to obtain accurate BP readings:
    - a. Patient should be allowed to relax for 5 to 10 minutes in a chair or on the bed
    - b. In sitting position, patient's back should be supported, legs should be uncrossed with feet flat on floor, arms should be supported (e.g., on arm rests)
    - c. No smoking or caffeine for 30 minutes
    - d. Cuff should not be applied over a sleeve
    - e. Sleeve should not constrict upper arm (Take arm out of sleeve if needed)
    - f. Arm should be supported (by arm rest or bed)
    - g. Brachial artery should be level to the heart
    - h. Stethoscope should be directly over brachial artery at antecubital crease
    - i. Cuff should be deflated slowly, at about 2 mm Hg/second
  9. Impaired circulation affects BP, causing inaccurate readings. Do not measure blood pressure on an arm affected by:
    - a. Injury to shoulder, arm or hand
    - b. Mastectomy/removal of lymph nodes
    - c. AV fistula, hemodialysis shunt or IV line
  10. At admission, measure BP in both arms, since 6% of patients have differences between arms. Make subsequent readings on arm with higher reading.
  11. Blood pressure by palpation:
    - a. Used when auscultation is not possible
    - b. Systolic pressure is about 5 - 10 mm Hg lower than obtained by auscultation
    - c. No diastolic pressure is obtained
    - d. BP is reported as systolic pressure over "P" for palpation, e.g. 120/P
  12. Blood pressure of lower extremity:
    - a. Used if patient's arms cannot be used
    - b. Auscultates BP at popliteal artery
    - c. Systolic pressure is 10 - 40 mm Hg higher than at brachial artery
    - d. Cuff is applied at mid-thigh. Bladder should be about 40% of the circumference of thigh. Length should be about 75% to 80% of this circumference

13. Orthostatic BP Measurements:

- a. Orthostatic hypotension (OH) is defined as a decrease in systolic pressure > 20mm Hg or decrease in diastolic pressure > 10 mm Hg within 3 minutes of changing from supine to erect position
- b. OH occurs when blood pools into the abdomen and legs when quickly changing from lying to upright position. Many conditions, such as aging and cardiovascular medications, interrupt the compensatory mechanisms, which normally stabilize the BP

**EQUIPMENT:**

Sphygmomanometer (meter with cuff)  
Stethoscope  
Alcohol/disinfectant wipes

**PROCEDURE:**

1. BP by Auscultation at Brachial Artery:
  - a. Adhere to Standard Precautions and explain procedure to patient
  - b. Ask patient to relax in a chair or a bed for 5 to 10 minutes. If sitting, keep back supported and feet flat on floor
  - c. Assure antecubital crease at heart level, with arm well supported
  - d. Expel any air from cuff
  - e. Apply cuff directly on skin:
    - i. Place center of cuff on the upper arm above the brachial artery
    - ii. Lower border of cuff should be about 1 inch above antecubital crease
  - f. Wrap cuff evenly
  - g. Palpate brachial artery
  - h. Inflate cuff rapidly until pulse is gone, and then inflate an extra 20 - 30 mm Hg
  - i. Place diaphragm of stethoscope over the brachial artery and listen carefully
  - j. Release cuff at even rate, no faster than 2 - 3 mm Hg/second
  - k. The systolic pressure is the first tapping sound
  - l. The diastolic pressure is the last sound heard before persistent silence
  - m. After you hear the last sound, deflate the cuff slowly for at least another 15 - 20 mm Hg to ensure that no further sounds are audible
  - n. Deflate and remove cuff
  - o. Clean cuff with a disinfectant wipe
  - p. Clean stethoscope with alcohol pad
2. BP by Palpation:
  - a. Follow "BP by Auscultation of Brachial Artery" Steps a - h
  - b. Continue to palpate brachial artery

- c. Deflate cuff slowly – 2 mm Hg/second – feeling for the return of a palpable brachial pulse
  - d. The reading at which the pulse is palpated is the systolic pressure
  - e. Record BP with systolic pressure as numerator and "P" as denominator
3. BP at Lower Extremity:
    - a. Choose appropriate cuff size for thigh
    - b. Place patient in a prone position. If unable to lie on abdomen, while supine have patient slightly flex the leg so the popliteal pulse can be palpated
    - c. Place cuff on thigh
    - d. Palpate for popliteal pulse
    - e. Inflate cuff until pulse is not palpable and then inflate an extra 20 - 30 mm Hg
    - f. Place stethoscope over the popliteal pulse
    - g. Continue following "BP by Auscultation of Brachial Artery", Steps i – p
  4. Orthostatic BP Measurements:
    - a. Patient lies supine for at least 5 minutes
    - b. Apply BP cuff in place until readings completed
    - c. Take pulse and BP as per "BP by Auscultation of Brachial Artery"
    - d. Keep BP cuff in place until readings completed
    - e. Instruct patient to sit
    - f. Immediately take pulse and BP again
    - g. Instruct patient to stand. (Guard patient in case of dizziness and allow to sit down)
    - h. Immediately support patient's arm in yours, so supported at same angle when supine:
    - i. Take pulse and BP again
    - j. If significant change in blood pressure or pulse is noted, take an additional measure in 2-5 minutes
    - k. Deflate and remove cuff

**AFTER CARE:**

1. Document in patient's record:
  - a. All blood pressure readings
  - b. Indicate which side (right/left) and extremity (arm/leg)
  - c. Position: lying/sitting/standing
  - d. Reason for taken by palpation or at leg
  - e. Any signs/symptoms associated with BP position changes (e.g., dizziness, ataxia)
  - f. Any patient/caregiver teaching, especially if orthostatic hypotension noted
  - g. Any communication with physician
2. Communicate with physician about:
  - a. Parameters and readings outside of parameters
  - b. Differences between BP in right/left side
  - c. Orthostatic readings indicating orthostatic hypotension

## HHVNA Circulatory System – BLOOD PRESSURE

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- d. Need to take BP in alternate way (palpation) or site (leg)

### REFERENCE:

National Heart and Blood Institute, NIH (2003).  
Seventh Report of the Joint National Committee  
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Treatment of High Blood Pressure. Retrieved  
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<http://www.nhlbi.nih.gov/guidelines/hypertension/jnc7full.htm>.

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Adopted from VNAA; approved Policy Committee 08/13