Purpose: MCDOH nursing staff will obtain and measure the systolic and diastolic BP (BP) for all adult clients, on admission and on every home visit. Infant and child BP’s may be obtained per MD order.

Date Adopted: February 2001

Revised: October 2011

Policy:
1. BP 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.

2. The systolic pressure (the upper reading) measures the maximum pressure against the arteries by the left ventricular systole and is a clue to the integrity of the heart, arteries and the arterioles.

3. The diastolic pressure (the lower reading) measures the force exerted during ventricular relaxation and filing and indicates blood vessel resistance.

Adults:
1. BP values for adults aged 18 years or greater:

<table>
<thead>
<tr>
<th>Category</th>
<th>Systolic</th>
<th>Diastolic</th>
</tr>
</thead>
<tbody>
<tr>
<td>Normal</td>
<td>&lt; 120 mm Hg</td>
<td>&lt; 80 mm Hg</td>
</tr>
<tr>
<td>Pre-Hypertension</td>
<td>120 – 139 mm Hg</td>
<td>80 – 89 mm Hg</td>
</tr>
<tr>
<td>Hypertension Stage 1</td>
<td>140 – 159 mm Hg</td>
<td>90 – 99 mm Hg</td>
</tr>
<tr>
<td>Hypertension Stage 2</td>
<td>≥ 160 mm Hg</td>
<td>≥ 100 mm Hg</td>
</tr>
<tr>
<td>Hypertensive Crisis</td>
<td>&gt; 180 mm Hg</td>
<td>&gt; 110 mm Hg</td>
</tr>
<tr>
<td>Hypotension</td>
<td>&lt; 95 mm Hg</td>
<td></td>
</tr>
<tr>
<td>Orthostatic Hypotension</td>
<td>Decrease in systolic pressure &gt; 20 mm Hg and the diastolic pressure &gt; 10 mm Hg with posture changes</td>
<td></td>
</tr>
</tbody>
</table>

2. Hypertension is defined as systolic pressure equal to, greater than 140 mm Hg.
3. Hypotension is a persistent systolic reading below 95 mm Hg.

4. Orthostatic hypotension is a change of > 20 mm Hg in BP reading with posture changes.

5. BP is usually lowest in the early morning after sleep.

6. BP rises after meals, during exercise, with emotional upsets and/or disease processes.

7. BP is normally slightly lower when lying down than sitting or standing. In postural hypotension, pressure decreases when position is from lying to sitting or standing.

8. BP is slightly higher when monitored in the lower extremities.

9. Because pressure differences of more than 10 mm Hg exist between the arms of 6% of hypertensive patients. BP should be measured in both arms at the initial assessment and in the arm with the higher pressure for future BP measurements.

10. Ideally, the width of the cuff should be 40% of the circumference or 20% wider than the diameter of the midpoint of the limb. The bladder should encircle at least 80% of the adult upper arm.

11. The cuff should be wide enough to reach from just below the armpit to the inside of the elbow. The cuff size is based on the distance from the shoulder to the elbow. If the distance is less than 13 inches the cuff size is 5 by 9 inches (small), 13 to 16 inches the cuff size is 6 by 13 inches (medium) and greater than 16 inches the cuff size is 7 by 14 inches.

12. A falsely high reading may result when a cuff is too narrow or short. A falsely low reading may result when a cuff is too wide or long.

13. In some clients, an auscultatory gap may be present. During the auscultatory gap the sounds disappear, reappearing 10 – 15 mm Hg later. This auscultatory gap has no clinical significance, but if the cuff is not inflated to a point above the auscultatory gap, a falsely low systolic reading may occur.

14. Avoid taking BP in the arm on the affected side of a mastectomy, an arteriovenous fistula, hemodialysis shunt or IV.

15. Placement of brachial artery below heart level may result in BP being falsely
high, and conversely if the artery is above the heart level the BP may be falsely low.

Infants:

1. The Korotkoff sounds are not heard over the brachial artery in infants.

2. Measurement of BP provides baseline data and may indicate cardiovascular problems.

3. BP is most easily and accurately assessed using an electronic BP machine that uses oscillometry or with palpation.

4. The appropriate sized cuff will provide the most accurate reading. The cuff width to arm ratio should be 45-70%.

5. Oscillometry readings are most reliable when mean arterial pressure is greater than 40 mm Hg.

6. Best results are obtained when infant is quiet or sleeping.

7. Crying may raise the systolic pressure of an infant. Crying is a normal response for an infant.

8. DO NOT measure BP in an extremity with damaged or altered blood flow or an IV.

9. If using a manual BP cuff, an accurate systolic reading can be obtained by palpation of:
   a. Brachial artery if using upper arm.
   b. Radial artery, if using lower arm.
   c. Dorsalis pedis or posterior fibial arteries, if using calf.

10. A diastolic pressure reading cannot be measured when obtaining a manual BP by palpation.

Children:

1. The systolic pressure of the child may be raised by crying, vigorous exercise or anxiety. It is therefore appropriate to choose a time when the child is quiet and comfortable.

2. BP measurement by noninvasive methods is part of a routine vital sign determination.
3. BP monitoring in children is a valuable method for assessing and managing suspected hypertension.

4. The most important factor in accurate measurement of BP is the use of an appropriately sized cuff.

5. The width of the cuff bladder should be approximately 40% of the arm circumference measuring at a point midway between the olecranon and the acromion. Bladder cuff length should cover 80-100% of the circumference of the arm but not overlap.

6. If the appropriate size is not available use an oversized cuff rather than an undersized cuff.

7. DO NOT measure BP in an extremity with damaged or altered blood flow or an IV.

8. The recommended method of BP determination is by auscultation.

Equipment:
Sphygmomanometer
Stethoscope

**PROCEDURE:**

**Adults:**

1. Adhere to standard precautions.

2. Explain procedure to client.

3. Choose an appropriate-sized cuff for the client; the bladder should encircle at least 80% of the upper arm.

4. Keep client in a stable, relaxed position for 5 to 10 minutes. Make sure that he/she has not had caffeine or smoked for at least 30 minutes.

5. The client may lie supine or sit erect during BP measurement. If the client is sitting erect, make sure that she/he has both feet flat on the floor because crossing the legs may elevate BP.

6. Place arm at heart level and keep well supported. If the artery is below heart level, you may get a false-high reading.

7. Expel any air from cuff.
8. Place center of cuff over the brachial artery and wrap cuff evenly. The lower border of the cuff should be about 2.5 cm above the antecubital crease.

9. Apply the cuff snugly. A falsely high reading can result if the cuff is too loose.

10. Avoid constriction of the arm by a rolled sleeve above the cuff.

11. Palpate radial artery. Palpating the radial pulse while inflating the cuff helps prevent the underestimation of the BP if an auscultatory gap is present.

12. Inflate cuff as rapidly as possible until pulse is gone, and then inflate an extra 20-30 mm Hg.

13. Place diaphragm of stethoscope over the brachial artery, listen carefully and release cuff at even rate, no faster than 2-3 mm Hg per /second. The systolic pressure is the reading at the first return of the pulse sound.

14. The diastolic pressure is the reading at which sounds stop (if there is a "muffling" or damping of the sound prior to loss of sound, record both readings). After you hear the last sound, deflate the cuff slowly for at least another 10 mm Hg to ensure that no further sounds are audible.

15. Occasionally, BP must be measured in both arms or with the patient in two different positions (such as lying and standing or sitting and standing). In such cases, observe and record significant differences between the two readings.

16. Deflate and remove cuff.

Infants:

1. Adhere to standard precautions.

2. Identify patient and explain procedure to caregiver.

3. Properly sized cuff is placed around the infant's upper arm, lower arm or calf.

4. Expose extremity to be used for BP measurement while maintaining proper body temperature of infant.

5. If using manual cuff, locate appropriate artery.

6. Inflate cuff to 20-30 mm Hg above where pulse no longer palpable or above expected systolic pressure.

7. The cuff pressure is decreased at a rate of 2-3 mm Hg while palpating for
8. Continue to release pressure until pulse is palpable. This is the systolic pressure reading.

9. The diastolic pressure is recorded as “P.”

10. Deflate cuff rapidly and completely; remove from arm.

11. Wait 2 minutes before taking another BP.

Children:

Measurement in the arm:

1. Securely place the cuff around the upper arm, so that the bladder of the cuff is midline over the brachial artery.

2. The pressure should be measured with the cubital fossa of the arm at heart level.

3. Palpate the radial artery. Place the diaphragm or bell of the stethoscope over the brachial artery below the bottom edge of the cuff. Inflate the cuff to approximately 20 mm Hg above the point where the radial pulse disappears.

4. Deflate cuff at 2-3 mm Hg/second.
   a. The systolic reading is the onset of the Korotkoff sounds or the point when the initial tapping sound is heard. At least two consecutive beats should be heard as the pressure falls.
   b. The onset of muffling is the best index of diastolic pressure in children up to 12 years of age. In children and adolescents, diastolic reading is the disappearance of the Korotkoff sounds.

5. When all sounds have disappeared, the cuff should be deflated rapidly and completely. One to two minutes should elapse before further determinations are made, to allow release of blood trapped in veins.

Measurement in the thigh (popliteal artery):

1. The child should lie face down and the cuff applied with the bladder over the posterior aspect of the mid-thigh. If the child is unable to lie face down, obtain the pressure reading with the child supine, by flexing the knee just enough to permit application of the stethoscope over the popliteal space.
2. Place the stethoscope over the popliteal fossa to obtain the reading.

3. The larger bladder usually records systolic pressure in the thigh as 10-40 mm Hg higher than that in the arm, but the diastolic pressure is essentially the same for both.

Measurement in the calf (posterior tibial artery):

1. Position the distal border of the cuff at the malleoli, the bony prominence on each side of the ankle.

2. Auscultate over the posterior tibial or dorsalis pedis artery.

Measurement in the lower arm (radial artery):

1. Secure the cuff at mid-lower arm above the wrist.

2. Place the stethoscope over the radial artery to obtain the reading.

3. Position limb at level of heart.

4. Rapidly inflate the cuff to about 20 mm Hg above point at which radial pulse disappears.

5. Release cuff at a rate of 2-3 mm per second.

6. Record systolic - clear tapping sound (first Korotkoff sound).

7. Record diastolic pressure as low pitched muffled sound (fourth Korotkoff sound).

Palpable pressure:

1. Inflate the cuff to approximately 20-30 mm Hg above where pulse is no longer felt.

2. Slowly release pressure until a pulse is felt. This is the systolic pressure.

3. The diastolic pressure is recorded as “P” for palpation. The systolic pressure obtained by palpation is 5-10 mm Hg lower than obtained by auscultation.

After care:

1. Document in client's record:
Madison County Health Department  
Blood Pressure Auscultation  
Policy & Procedures  
Prevent Division

- BP reading.
- Position.
- Site.

2. Report changes in BP to the physician if not within physician designated range.

3. Clean equipment after each use with cleansing wipes, per MCDOH protocol.

Complications:

Impaired circulation can affect BP and cause an inaccurate reading. Therefore, DO NOT measure BP on a patient's affected site if the:

1. Shoulder, arm or hand is injured or diseased.
2. Arm has a cast or bulky bandage.
3. Patient has had a mastectomy or removal of lymph nodes on that side because it may decrease already compromised lymphatic circulation, worsen edema, and damage the arm.
4. Patient has an arteriovenous fistula or hemodialysis shunt because blood flow through the vascular device may be compromised.

References: