Postural vital signs measurement, ambulatory care

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Introduction

Measuring postural vital signs (also called orthostatic vital signs) allows evaluation of patients who are at risk for hypovolemia (for example, patients with vomiting, diarrhea, or bleeding), have had syncope or a near-syncopal episode (dizziness or fainting), receive medications that cause orthostatic hypotension, or are at risk for falls.[1][2] When a patient stands, blood shifts to the lower body, leading to compensatory increases in heart rate, cardiac output, and systemic vascular resistance. In a healthy person, the pulse rate should increase 10 beats/minute with standing, and the systolic blood pressure should fall slightly. Measurement of postural vital signs should occur with a patient first in a supine position and then standing. If a patient can't stand, measurement can occur while the patient lies supine and then when the patient sits.[2]

Positive postural vital signs include these findings:

- The patient becomes light-headed while standing (or sitting if the patient can't stand).
- The pulse rate increases by 30 beats/minute or more while the patient stands (or sits if the patient can't stand).[3]
- The systolic blood pressure drops by 20 mm Hg or the diastolic blood pressure drops by 10 mm Hg or more while the patient stands (or sits if the patient can't stand).[1][2][3]

The practitioner uses the results of the postural vital sign measurements along with signs and symptoms during the test (dizziness, weakness, visual changes, diaphoresis, pallor, and syncope) to aid diagnosis and guide treatment.

Contraindications to postural vital signs measurement include hypotension while the patient is in a supine position, shock, acute deep vein thrombosis, severe alterations in mental status, and spinal, pelvic, or lower extremity injury.[1]

Equipment

- Aneroid sphygmomanometer (recently calibrated)
- Blood pressure cuff
- Disinfectant pad
- Facility-approved disinfectant
- Gloves
- Stethoscope
- Watch or clock with a second hand or digital timer
- Optional: other personal protective equipment

Preparation of Equipment

Inspect all equipment and supplies. If a product is expired, is defective, or has compromised integrity, remove it from patient use, label it as expired or defective, and report the expiration or defect as

directed by your facility.

Blood pressure cuffs come in sizes that range from neonate to extra-large adult. Choose an appropriately sized cuff for the patient. The bladder should encircle 75% to 100% of the patient's upper arm.[4] *An excessively narrow cuff may cause a false-high pressure reading; an excessively wide one, a false-low reading.*[5] (See *Correcting false-high and false-low blood pressure measurements*.)

TROUBLESHOOTING

CORRECTING FALSE-HIGH AND FALSE-LOW BLOOD PRESSURE MEASUREMENTS

This table lists possible causes of false-high and false-low blood pressure measurements and nursing actions that address the causes.

CAUSES	NURSING ACTIONS
False-high reading	
Cuff too small	Make sure that the cuff bladder length is 75% to 100% of the upper arm circumference and the width is at least 37% to 50% of the arm circumference (a length-to-width ratio of 2:1).[4]
Cuff wrapped too loosely, reducing its effective width	Tighten the cuff.
Slow cuff deflation, causing venous congestion in the arm or leg	Never deflate the cuff more slowly than 2 mm Hg per heartbeat.
Poorly timed measurement—when the patient needs to void or after the patient has eaten, ambulated, appeared anxious, or flexed the arm muscles	Postpone blood pressure measurement and help the patient void or relax before measuring the blood pressure.[4]
False-low reading	
Incorrect position of the arm or leg	Make sure that the patient's arm or leg is level with the heart.[4]
Failure to notice auscultatory gap (sound fades out for 10 to 15 mm Hg and then returns)	Estimate systolic pressure by palpation before actually measuring it. Then check this pressure against the measured pressure.
Inaudible low-volume sounds	Before reinflating the cuff, instruct the patient to raise the arm or leg *to decrease venous pressure and amplify low-volume sounds*. After inflating the cuff, tell the patient to lower the arm or leg. Then deflate the cuff and listen. If you still fail to

	detect low-volume sounds, document the palpated systolic pressure.

Implementation

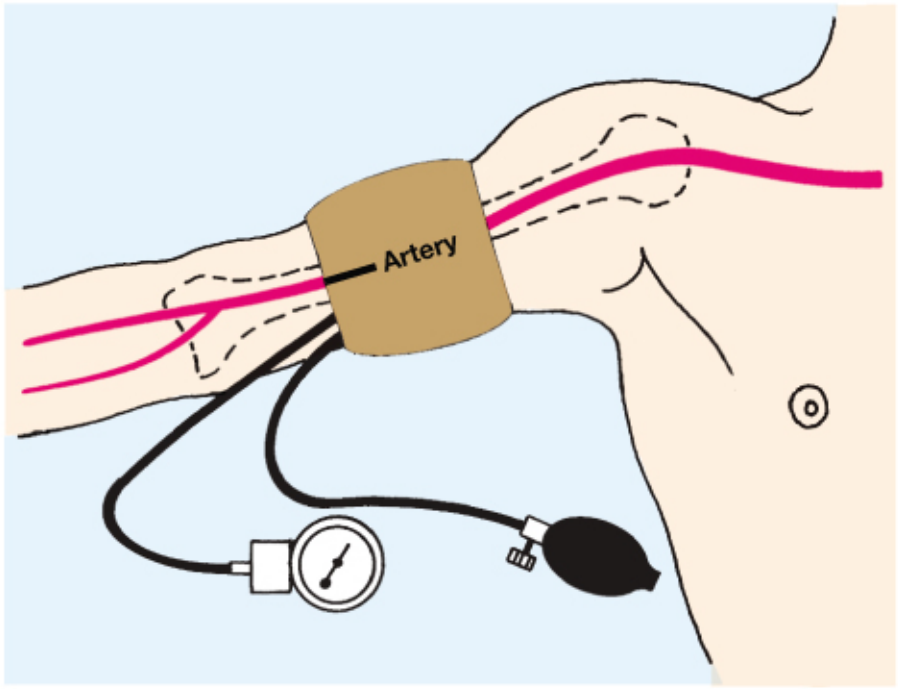
- Review the patient's medical record for contraindications to the procedure, including supine hypotension, shock, severe mental status changes, and spinal, pelvic, or lower extremity injury.[1]
- Gather and prepare the necessary equipment and supplies.
- Perform hand hygiene.[6] [7] [8] [9] [10]
- Confirm the patient's identity using at least two patient identifiers.[11]
- Provide privacy.[12] [13] [14]
- Make sure that the patient hasn't smoked or consumed caffeine within the past 30 minutes *because these can affect vital sign measurements*.[4] [15]
- Have the patient empty the bladder before obtaining the blood pressure measurement *because a distended bladder can cause an increase in systolic and diastolic readings*.[4] [16]
- Explain the procedure to the patient and family (if appropriate) according to their individual communication and learning needs *to increase their understanding, allay their fears, and enhance cooperation*.[17]
- Ensure that the patient is comfortable in a supine position. Have the patient rest for at least 5 minutes in the supine position before obtaining the first blood pressure measurement.[1] [18]

Obtaining an initial blood pressure measurement

- Remain quiet and have the patient remain quiet during the procedure; *blood pressure increases with talking*.[19]
- Extend the patient's arm at heart level (at the phlebostatic axis, in the fourth intercostal space halfway between the anterior and posterior diameter of the chest) and make sure that it's well supported.[19] *If the artery is below heart level, you may get a false-high reading.* Make sure that the patient is relaxed *to avoid a false-high reading.*
- Wrap the deflated cuff snugly around the patient's upper arm. (See *Positioning a blood pressure cuff*.)

POSITIONING A BLOOD PRESSURE CUFF

To position a blood pressure cuff, palpate the brachial artery. Wrap the cuff snugly around the upper arm so that the cuff is ¾" to 1¼" (2 to 3 cm) above the antecubital fossa *to allow room for stethoscope placement*. Align the cuff so that the artery mark on the cuff is placed over the artery (as shown below).[19] [20] [21]



- Determine how high to inflate the blood pressure cuff.
  - First, estimate the systolic blood pressure by palpation. As you feel the radial artery with the fingers of one hand, inflate the cuff until the radial pulse disappears.
  - Read the pressure on the manometer. For an aneroid gauge, you may rest it in any position, but you must view it directly from the front.
  - Add 30 mm Hg to the measured blood pressure.[4] [20] Use this sum as the target inflation *to prevent discomfort from overinflation.*
  - Deflate the cuff completely.
- Insert the stethoscope's earpieces into your ears.
- Locate the brachial artery by palpation. Center the bell of the stethoscope over the part of the artery where you detect the strongest beats; hold it in place with one hand. *The bell of the stethoscope transmits low-pitched arterial blood sounds more effectively than the diaphragm does.*[22]
- Using the thumb and index finger of your other hand, turn the thumbscrew on the rubber bulb of the air pump clockwise *to close the valve.*
- Pump up the cuff to the predetermined level.
- Open the valve of the air pump carefully and then slowly deflate the cuff—no faster than 3 mm Hg/second.[4] [20] While releasing air, watch the aneroid gauge and auscultate for the sound over the artery.
- When you hear the first beat or clear tapping sound, note the pressure on the column or gauge. This is the systolic pressure.[4]
- Continue to release air gradually while auscultating for the sound over the artery.

- Note the pressure when the sound disappears. This is the diastolic pressure—the fifth Korotkoff sound (audible pulse sound).[4]
- After you hear the fifth Korotkoff sound, deflate the cuff slowly for at least another 10 mm Hg *to ensure that no further sounds are audible.*[22]
- Deflate the cuff rapidly, remove the stethoscope's earpieces from your ears, and record the blood pressure.

Obtaining an initial pulse

- Position the patient's arm at the side or across the chest.
- Press your index, middle, and ring fingers gently on the radial artery inside the patient's wrist. Use only moderate pressure *because excessive pressure may obstruct blood flow distal to the pulse site.* Don't use your thumb to take the patient's pulse *because you may confuse your own thumb's strong pulse with the patient's pulse.*
- After locating the pulse, count the beats for 60 seconds, or count for 30 seconds and multiply by 2.[23] *Counting for a full minute provides a more accurate picture of irregularities.*
- While counting the rate, note the pulse rhythm and volume by noting the pattern and strength of the beats. If you detect an irregularity, repeat the count, and note whether it occurs in a pattern or randomly.

Obtaining postural readings with the patient standing

- Have the patient stand upright for 1 minute, if able.[2] (See *Obtaining postural vital signs when the patient can't stand*.)
- Ask the patient about dizziness, weakness, or visual changes associated with the change in position. Observe for diaphoresis or pallor.[24]

◆ ***Clinical alert:*** If the patient becomes light-headed upon standing, help the patient lie down immediately *to prevent injury from syncope.*◆

- Obtain blood pressure while the patient stands, using the same arm and the same equipment as the previous measurement *to ensure accurate results*.[5]
- Obtain the radial pulse again.
- Repeat the blood pressure measurement and radial pulse measurement again at 3 minutes.[1] [25] *Waiting several minutes before repeating the measurements allows time for the autonomic nervous system to compensate for blood volume shifts after a position change in a patient without orthostatic hypotension.* If the patient has symptoms that suggest orthostatic hypotension but doesn't have documented orthostatic hypotension, repeat the blood pressure measurement. Some patients may not demonstrate significant falls in blood pressure until they stand for more than 3 minutes.[26]

OBTAINING POSTURAL VITAL SIGNS WHEN THE PATIENT CAN'T STAND
If the patient can't stand, measure postural vital signs with the patient in a sitting position instead. • Have the patient sit upright for 1 minute.[2] Make sure that the patient sits with the back and arms supported, the legs uncrossed, and both feet on the floor *because crossing the legs can increase blood pressure.*[2]

- Ask the patient about dizziness, weakness, or visual changes associated with the change in position. Observe for diaphoresis or pallor.
- Obtain the blood pressure while the patient is sitting, using the same arm and equipment that you used for the supine position measurement.[2]
- Obtain the patient's pulse again while sitting.[2]
- If the patient has symptoms associated with the position change, return the patient to the supine position.

Completing the procedure

- Assist the patient back to a comfortable lying or seated position.
- Perform hand hygiene.[6][7][8][9][10]
- Clean and disinfect your stethoscope using a disinfectant pad.[27][28]
- Perform hand hygiene.[6][7][8][9][10]
- Put on gloves and, if needed, other personal protective equipment *to comply with standard precautions.*[29][30]
- Clean and disinfect reusable equipment according to the manufacturer's instructions *to prevent the spread of infection.*[27][28]
- Remove and discard your gloves and, if worn, other personal protective equipment.[30]
- Perform hand hygiene.[6][7][8][9][10]
- Report abnormal results to the patient's practitioner.[31]
- Document the procedure.[32][33][34]

Special Considerations

- Patients with venous congestion or hypotension may have an auscultatory gap (a loss of sound between the first and second Korotkoff sounds that may be as great as 40 mm Hg).[20][21] In such patients, palpating the systolic blood pressure helps avoid underestimating the blood pressure.
- If the patient appears upset or anxious, delay blood pressure measurement until the patient becomes calm (if possible) *to avoid falsely elevated readings.*[4][20]
- Don't measure a patient's blood pressure in the arm on the affected side of a mastectomy or lumpectomy if lymphedema is present.[20][21]
- Don't measure blood pressure in the same arm that has deep vein thrombosis, a graft, ischemic changes, an arteriovenous fistula, or a hemodialysis shunt.[20][21]
- Don't place the blood pressure cuff on an extremity with a midline catheter or a peripherally inserted central catheter.[19]
- Don't measure blood pressure in an extremity with trauma or an incision.[21]
- If possible, measure baseline blood pressure in both upper arms. If a difference of more than 10 mm Hg exists, use the arm with the higher pressure.[19][35]

Complications

Complications associated with positive postural vital signs measurement may include:

- dizziness
- nausea
- syncope.[24]

Documentation

Documentation associated with postural vital signs measurement includes:

- date and time
- blood pressure and pulse (as required by your facility)
- patient position during measurement (supine, standing, or sitting)
- arm used for the measurements
- presence of an auscultatory gap (if applicable)
- pulse rate
- rhythm
- volume
- use of the terms "full" or "bounding" to describe a pulse with increased volume and "weak" or "thready" to describe a pulse with decreased volume
- tolerance of the procedure
    - complaints of light-headedness
    - interventions in response to those complaints
        - response to those interventions
- practitioner notification of results
    - name of the practitioner
    - date and time of notification
    - orders received
- teaching provided to the patient and family (if applicable)
    - understanding of that teaching
    - follow-up teaching needed.

This procedure has been co-developed and reviewed by the American Academy of Ambulatory Care Nursing.

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Related Procedures

- Postural vital signs measurement

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(Rating System for the Hierarchy of Evidence for Intervention/Treatment Questions)

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Rating System for the Hierarchy of Evidence for Intervention/Treatment Questions

The following leveling system is adapted from *Evidence-Based practice in nursing & healthcare: A guide to best practice,* Fifth edition, by Bernadette Mazurek Melnyk and Ellen Fineout-Overholt (2023).

Level I	Evidence from a systematic review or meta-analysis of all relevant randomized controlled trials (RCTs)
Level II	Evidence from well-designed single RCTs (experimental)
Level III	Evidence from well-designed nonrandomized controlled trials (quasi-experimental), systematic reviews of a complete body of evidence, and intervention studies using mixed methods
Level IV	Evidence from well-designed case-control and cohort studies (observational)
Level V	Evidence from systematic reviews of qualitative and descriptive studies
Level VI	Evidence from single descriptive and qualitative studies, evidence-based practice implementation, and quality improvement projects
Level VII	Evidence from expert opinion, expert committee reports, and literature reviews

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