

Effective Diagnosis, Treatment, and Monitoring of Hypertension in Primary Care

Participant Guide

2

Measurement of Blood Pressure

Content should be adapted with country-specific information prior to use.

Red text denotes places where modification may be required. Guidance on how to adapt the training is provided in the Course Overview.

Expected competency on completion of session:

Ability to correctly measure blood pressure (BP) and diagnose hypertension

Target users:

Health care workers

Facility managers

In this session you will discover:

- When to measure BP
- How to measure BP
- How to diagnose hypertension.

2.1 When to measure BP

Measuring BP is the only way to diagnose hypertension, as most people with raised BP have no symptoms. Health care workers should measure BP of all adults visiting the clinic.

2.2 How to measure BP

The instructions below describe the ideal method for measuring BP. While the clinic setting may not allow for an ideal BP measurement, it is helpful to learn best practice and what factors can influence the accuracy of the measurement (Table 1).

Preparation

- Take the measurement in a quiet room with a comfortable temperature.
- The patient should avoid smoking, caffeine, and exercise for at least 30 minutes before BP measurement.
- The patient should have an empty bladder.
- Have the patient sitting comfortably with their back supported, their feet uncrossed and flat on the floor.
- If this is the first time that the patient has had their BP measured in your health facility, measure BP on both arms and always use the arm with the highest pressure from then on.
- Check that the cuff is the correct size for the individual (Table 2) and adjust accordingly, using a smaller or larger cuff. Cuff width (shorter side of the cuff) should be at least 40% of mid-arm circumference. If unable to measure the mid-arm circumference with a measuring tape, an alternative method would be to choose a cuff with a width that encircles almost half of the mid arm.



Measure the mid-arm circumference with measuring tape



No measuring tape? Choose a cuff with a width that encircles almost half of the mid-arm.

KEY POINT

Take care to ensure the patient is properly prepared for the blood pressure measurement as this allows for a more accurate reading.

Table 1: Factors that influence blood pressure*

* These factors can affect BP reading but do not necessarily work additively.

Factor	Increase in blood pressure
Talking	7–10 mmHg
Listening	5 mmHg
Crossed legs	2–8 mmHg
No back support	6–10 mmHg
Arms unsupported	Systolic: 1–7 mmHg Diastolic: 5–11 mmHg
Arm positioned with centre of bladder at heart level	Each inch above this level decreases BP by ≥ 2 mmHg and vice versa
Digital (oscillometric) device	Systolic: 10 mmHg Diastolic: 5 mmHg
Full urinary bladder	10–15 mmHg
Recent caffeine intake	Systolic: 10 mmHg Diastolic 5 mmHg
Recent smoking	Systolic: 6 mmHg Diastolic: 5 mmHg
Cuff over clothing	Systolic: 5–50 mmHg
Cuff too small	Systolic: 10 mmHg Diastolic 2–8 mmHg

Table 2: Selection criteria for BP cuff size

Arm circumference	Usual cuff size
22–26 cm	Small adult
27–34 cm	Adult
35–44 cm	Large adult

Step-by-step process

A. Applying the cuff

- Let the patient relax for 2–5 minutes before starting.
- Explain the procedure to the patient.
- If the patient is wearing a thick-sleeved garment, ask the patient to uncover the arm or roll up the sleeve to completely uncover where the cuff will be placed. If the sleeve of clothing is constrictive, and the situation allows, consider having the patient change into a gown.
- Place their arm on the table, relaxed with palm facing upwards.
- Check for the brachial pulse by placing your index and middle fingers of one hand in the crease of a relaxed elbow.
- Make sure the arm cuff is properly deflated (air is out) before placing it around the patient's upper arm.
- Wrap the cuff snugly 2 cm (or two finger widths) above the elbow, allowing for two fingers to slide easily underneath the cuff when secured by the Velcro tape. Ensure that the centre of the cuff bladder is positioned over the brachial pulse.
- Keep the level of the cuff at the heart level during measurement.



B. Taking BP measurement

i. Using a digital BP device

- Ask the individual to stay still, breathing normally without talking, laughing, or using a mobile phone.
- After turning the monitor on with the on/off button, press the START/STOP button to begin the measurement.
- The BP cuff will start to inflate. This might be uncomfortable for some. Reassure the patient that the discomfort is temporary.
- The cuff will slowly deflate to take the measurement.
- When the reading is complete, the systolic and diastolic readings and pulse rate will appear on the monitor screen.



- If the monitor/machine does not record the reading, re-position the cuff and try again after 1–2 minutes, repeating the steps above. Take a minimum of two readings at 1-minute intervals. The average of those readings will represent the patient’s BP. A single high reading does not necessarily mean that the person has high BP. The measurement must be repeated. (It is optional to adopt the first reading if BP is low – systolic BP <140 mmHg and diastolic BP <90 mmHg.)
- Additional readings should be taken if the difference between the first two is greater than 5 mmHg, and then the average of these multiple readings should be used.
- Turn the machine off and remove the cuff.

ii. Using a manual instrument

- Apply the cuff on the patient’s arm, as above. Check for the brachial pulse by placing your index and middle fingers of one hand in the crease of a relaxed elbow. Put your stethoscope on the brachial pulse and hold either the bell or diaphragm of the stethoscope to keep it in place.
- The cuff has a bulb at one end of the tube that you will squeeze to inflate the cuff.
- Screw the bulb valve tight and inflate the cuff, up to 20–30 mmHg above level of radial pulse obliteration or 200 mmHg. Keep holding the stethoscope over the pulse.
- Slowly let air out of the cuff while listening for the sounds of blood flowing. Maintain a rate of deflation of 2–3 mmHg per second (equals one line on the dial every second).
- When you start letting air out, you should not hear any distinct sounds at first. You will then hear a thump, which will be followed by several other similar thumping sounds. The number on the dial when you hear the first two consecutive thumps is the patient’s systolic BP. The thumping sounds will eventually stop. The number on the dial when you heard the last sound is the patient’s diastolic pressure. If the thumping sounds are heard all the way to 0 mmHg then you should use the point at which the sounds become muffled as your diastolic measurement.



Bell of stethoscope placed over the brachial pulse.



Diaphragm of the stethoscope placed over the brachial pulse.

- Take a minimum of two readings at 1–2 minute intervals. The average of those readings will represent the patient’s BP. A single high reading does not necessarily mean that the person has high BP. The measurement must be repeated. (It is optional to adopt the first reading if BP is low – systolic BP <140 mmHg and diastolic BP <90 mmHg.)

2.3 How to diagnose hypertension

Hypertension can be diagnosed with two high readings at least one week apart.

- Systolic BP \geq 140 mmHg and/or diastolic BP \geq 90 mmHg at both visits establishes the diagnosis.
- Treat all individuals if blood pressure is \geq 140 mmHg and/or \geq 90 mmHg at both visits using the standard protocol.

KEY POINT

If only the systolic or only the diastolic measurement is raised, manage according to the raised number.



EXERCISE 1: PRACTISE MEASURING BP

In pairs, practise taking blood pressure on each other, using the steps provided above.

Additional resources

- Million Hearts Hypertension Control Change Package for Clinicians: https://millionhearts.hhs.gov/files/HTN_Change_Package.pdf
- Million Hearts Hypertension Control Action Steps for Clinicians: https://millionhearts.hhs.gov/files/MH_HTN_Clinician_Guide.pdf
- American Heart Association and American Medical Association Tools and Downloads: <https://targetbp.org/tools-downloads>
- **[Additional Resources can be substituted or added]**

Sources

- Improving the screening, prevention and management of hypertension: an implementation tool for clinic practice teams. Olympia, WA: Washington State Department of Health; 2013. https://www.healthit.gov/sites/default/files/13_bptoolkit_e13l.pdf.
- Pickering TG, Hall JE, Appel LJ, et al. Recommendation for blood pressure measurement in humans and experimental animals. Part 1: blood pressure measurement in humans. *Circulation*. 2005; 111:697-716.
- Whelton PK, Carey RM, Aronow WS, et al. 2017 ACC/AHA/AAPA/ABC/ACPM/AGS/APHA/ASH/ASPC/NMA/PCNA Guideline for the prevention, detection, evaluation, and management of high blood pressure in adults. *J Am Coll Cardiol*. 2018; 71 (19) e127-e248.