

Original research article

A Prospective analysis on home blood pressure monitoring

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ABSTRACT

Introduction: Measuring blood pressure (BP) is one of the most common procedures performed by health care providers.[1] Too often, this simple procedure is executed improperly, producing inconsistent or inappropriate readings that can lead to over - or under-treatment of a patient.The working group on high BP recommends the following guidelines for more accurate BP measurements. The American Heart Association (AHA) and other organizations recommend that anyone with high blood pressure monitor his or her blood pressure at home. Home monitoring can help you keep tabs on your blood pressure in a familiar setting, make certain your medication is working, and alert you and your doctor to potential health complications.

Aim of the study : This is a prospective study is to analyze the pit falls measurements of home blood pressure in patients with hypertension and suggest points to correct i

Materials and methods : 46 patients with recently detected hypertension, in various govt medical college hospitals , from Tamilnadu , who purchased bp apparatus for home blood pressure monitoring are taken for study .in which 4 are irregular and they are excluded from this study

Results: of the 42 patients studied 62% of them exhibited there are variations in blood pressure , after correcting the position ,and other settings it reduces to 2%

Conclusion: Errors in blood pressure (BP) measurement are common in the clinical practice. Inaccurate measurements of BP may lead to misdiagnosis and inappropriate treatment of hypertension by teaching the proper methods we can reduce the pit falls in the home bp monitoring and improve the compliance of the patients

Keywords: home blood pressure monitoring, pit falls , hypertension

Introduction

Measuring blood pressure (BP) is one of the most common procedures performed by health care providers The preferred method of BP measurement in the clinical setting is auscultation, using the first and the fifth Korotkoff sounds. Now automatic electronic, battery/ac operated devices

are widely and cheaply available with arm as well as wrist cuffs.

At least 2 readings are recommended (separated by as much time as possible); if the readings vary by >5 mm Hg, take additional readings until the measurement differential narrows. Patient should be relaxed with the arm bared (no constrictive clothing). The patient's back should be supported

.In patients who are already on antihypertensive therapy, check for postural changes in BP by taking readings after 5 min supine, again immediately after standing and then 2 min later. Clinical situations in which home blood pressure monitoring may help in patients with suspected white-coat hypertension, labile hypertension, resistant hypertension or autonomic dysfunction. taking into account the body's normal profile of higher BP levels when awake and active as well as lower levels at rest and sleep, plus early morning increases

Ideal conditions to take bp; to reduce stress and offer a calmer atmosphere for any patient, BP measurements should be taken in a quiet room set at a comfortable temperature. Whenever possible, allow patients to sit and relax in a comfortable setting at least 5-10 min before BP measurement.

Taking the BP in a cool room (12°C) or while the patient is talking can raise the measured value by as much as 8-15 mm Hg.

The use of an automated device is preferred as these can effectively eliminate variances created with a human observer

Patients should be also reminded to forgo a cigarette or a cup of caffeinated coffee less than 30 min before reading; the same advice holds for exercise. All 3 of these common activities will likely raise BP, contributing to an inaccurate reading by as much as 10 mm Hg or even more. Once at the office, give patients the opportunity to urinate before a BP check since bladder distension affects readings

Time of the day may be important, too: Morning BP may be higher if the patient has sleep apnea. In general, BP levels surge in the morning when an individual begins to ambulate, but early morning readings may provide greater insights that could impact patient management. For example,

cardiovascular events are more likely to occur in the early morning hours (after 6 am) than during the rest of the day; modulating morning surges with medication, such as with alpha blockade, may help prevent such events Due to variations in BP that can occur at different times of the day, it's recommended that patients already diagnosed with hypertension take readings both early in the morning and at night

The biggest problem with equipment is ensuring that the cuff size is long enough to accommodate your patient's arm. The length of the BP cuff bladder should be 80% and the width at least 40% of the circumference of the upper arm.

If too small a cuff is used, the BP generated by inflating the cuff may not be fully transmitted to the brachial artery, which can lead to overestimation of the systolic pressure by as much as 15 mm Hg. Although the data are less clear, it appears that using a cuff that is too long can produce artificially low readings

Recent data have shown that, in conjunction with the childhood obesity epidemic, arm sizes of children have increased, meaning that more will require the use of a "large adult" or even "thigh" cuff to obtain an accurate BP reading.

Incorrect positioning

To achieve the most accurate readings, have patients seated with their backs and arms both supported, preferably with the arm approximately at the level of the patient's heart.[4] The common practice of taking a BP reading with a patient sitting on the exam table with neither back nor arm support-produces questionable readings.

Watch the patient's arm position carefully when taking BP readings. If the upper arm falls 15 cm below the level of the right atrium, readings can be artificially high by 10-12 mm Hg. Conversely, if the arm is above the level of the heart, readings will

be falsely low.[4] The mid-portion of the cuff should be placed over the brachial artery.[4] A cuff that is too large or small can impact position as well as accuracy of reading; the patient may position his or her arm inappropriately if the cuff feels too loose or too tight.

One reason to take BP measurements in a quiet, comfortable room is to reduce the “white-coat” effect as much as possible. White-coat effect defines an increase in BP readings due to the medical setting.[4] This effect has been noted in 30-40% of children and adolescents referred for evaluation of mild hypertension.[6] The increase is exacerbated when physicians taking the BP readings, it can also occur when nurses or other staff members perform the reading instead.[13,14]

Home BP monitoring

Having patients take BP readings at home can eliminate many of the errors you see in an office setting: White-coat effect, sitting without support, having the arm in an improper position, taking the reading after an activity that would raise BP levels (drinking coffee), or positioning the cuff improperly.

A home monitor also allows for more around-the-clock readings as needed and greater flexibility and relaxation than in an office.

If readings are taken to diagnose the baseline BP level, instruct patients to take as many readings as possible over the 48-72 h following the appointment, at various times and under various conditions. To check the adequacy of BP treatment, the most important home BP reading is soon after rising from sleep and a few minutes of ambulation, during the “morning surge,” when BP is at the highest level of the day. Once therapy is shown to be adequate, this early morning reading needs to be taken only once a week. To further ensure that

therapy is neither inadequate nor excessive, an occasional evening BP reading should be taken.

Conclusions

Improper readings of BP can lead to over or under treatment of a patient. Health care providers can make measuring BP error free by avoiding the following pitfalls:

1. Inadequate BP equipment. Aneroid gauges should be calibrated every six months against a mercury manometer.
2. Incorrect positioning. The BP should be taken in a sitting position with the patient's back supported for five minutes and the arm supported at the level of heart.
3. Improper cuff bladder size. The length of the BP cuff bladder should be 80 percent (two-thirds of the upper arm length, measured from the acromion to the olecranon process) and the width at least 60% of the upper arm circumference.
4. Incorrect technique. The cuff should be inflated quickly to 20 mmHg above the systolic pressure as estimated from the loss of brachial pulse and it should be deflated 3 mmHg per second.
5. At least two readings are recommended (separated by 10-15 minutes if possible).

Checking blood pressure at home is an important part of managing high blood pressure (hypertension).

Blood pressure monitors are available widely and without a prescription, so home monitoring is an easy step toward improving your health. Before you start, it's important to know the right technique and to find a good home blood pressure monitor.

- **Help with early diagnosis**
- **Help track your treatment.**
- **Encourage better control**
- **Cut your health care costs**

- . If you have an irregular heartbeat, home blood pressure monitors might not give you an accurate reading. you have to take reading three times and calculate the average

Types of home monitors

Most pharmacies, medical supply stores and some websites sell home blood pressure monitors. An automatic or electronic device is recommended. Discuss the choices with your doctor so that you pick the monitor that's best for your situation.

Monitors generally have the same basic parts:

- **Inflatable cuff.** The cuff's inner layer fills with air and squeezes your arm. The cuff's outer layer has a fastener to hold the cuff in place. Heart rate and blood flow are automatically calculated by measuring the changes in the motion of your artery as the blood flows through while the cuff deflates.
- **Gauge for readouts.** Some blood pressure monitors can take multiple readings and report the averages.

Digital monitors that are fitted on the upper arm are generally the most accurate.

- **Cuff size.** Having a properly fitting cuff is the most important factor to consider because poorly fitting cuffs will not give accurate blood pressure measurements. Ask your doctor or nurse what cuff size you need.
- **Display.** The display that shows your blood pressure measurement should be clear and easy to read.
- **Cost.** Prices vary. Ask your health insurance provider if your policy covers the cost of a home blood pressure monitor.

Before buying a blood pressure monitor, check with your doctor to be sure the monitor has been validated.

Tips for accurate use

- **Check your device's accuracy.** Before using a monitor for the first time, have your doctor check its accuracy against the office model. Also have your doctor watch you use the device to see if you're doing it properly. If you drop the device or damage it, have it checked before using it again.
- **Measure your blood pressure twice daily.** The first measurement should be in the morning before eating or taking any medications, and the second in the evening. Each time you measure, take two or three readings to make sure your results are accurate. Your doctor might recommend taking your blood pressure at the same times each day.
- **Don't measure your blood pressure right after you wake up.** You can prepare for the day, but don't eat breakfast or take medications before measuring your blood pressure. If you exercise after waking, take your blood pressure before exercising.
- **Avoid food, caffeine, tobacco and alcohol for 30 minutes before taking a measurement.** Also, go to the toilet first. A full bladder can increase blood pressure slightly.
- **Sit quietly before and during monitoring.** When you're ready to take your blood pressure, sit for five minutes in a comfortable position with your legs and ankles uncrossed and your back supported against a chair. Try to be calm and not

think about stressful things. Don't talk while taking your blood pressure.

- **Make sure your arm is positioned properly.** Always use the same arm when taking your blood pressure. Rest your arm, raised to the level of your heart, on a table, desk or chair arm. You might need to place a pillow or cushion under your arm to elevate it high enough.
- **Place the cuff on bare skin, not over clothing.** Rolling up a sleeve until it tightens around your arm can result in an inaccurate reading, so you may need to slip your arm out of the sleeve.
- **Take a repeat reading.** Wait for one to three minutes after the first reading, and then take another to check accuracy. If your monitor doesn't automatically log blood pressure readings or heart rates, write them down.

Blood pressure varies throughout the day, and readings are often a little higher in the morning. Also, your blood pressure might be slightly lower at home than in a medical office, typically by about five points.

Contact your doctor if you have any unusual or persistent increases in your blood pressure. Ask your doctor what reading should prompt an immediate call to the medical office.

If your blood pressure is well-controlled, you might need to check it at home only a few days each month. If you're just starting home monitoring, if you're making any changes in your medications or other treatments, or if you have another health problem, such as diabetes, you might need to check it more often.

Home blood pressure monitoring is not a substitute for visits to your doctor, and home blood pressure monitors may have some limitations. Even if you get normal readings, don't stop or change your medications or alter your diet without talking to your doctor first. However, if continued home monitoring shows your blood pressure is under control, you might be able to make fewer appointments with your doctor.

Monitoring your blood pressure at home doesn't have to be complicated or inconvenient. In the long run, you might risk fewer complications related to high blood pressure and enjoy a healthier life.

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