



Measure accurately

Best practices

Instructions

1. Compare results of the “Measure accurately: Pre-assessment” to best practices below.
2. Determine where opportunities for improvement exist.
3. Create plan to implement applicable recommendations.

Blood pressure (BP) equipment used

Device	Recommendation	Rationale
Automated office BP (AOBP) device <i>Can be programmed to take multiple readings without observer in the room.</i>	<ul style="list-style-type: none"> • Preferred device, if available • Unattended reading is ideal (staff sets device for multiple measurements and leaves the room) • Ensure devices are validated for clinical accuracy • Calibrate devices annually (test devices for accuracy) <ul style="list-style-type: none"> – Work with biomedical engineering department or device vendor 	<ul style="list-style-type: none"> • Reduces white coat effect • Performing unattended readings allows staff to perform other tasks during BP measurement • Calibration helps determine if device is measuring accurately
Semi-automated device <i>Takes one reading and requires user to be in the room with patient during the measurement.</i>	<ul style="list-style-type: none"> • When using only a semi-automated device, take > 2 single readings one minute apart and manually average the readings • Use in conjunction with fully automated device if possible <ul style="list-style-type: none"> – Have one fully automated device per every two to three providers in the practice – Use fully automated device to confirm out of range BP readings taken with the semi-automated device • Ensure devices are validated for clinical accuracy • Calibrate devices annually (test devices for accuracy) <ul style="list-style-type: none"> – Work with biomedical engineering department or device vendor 	<ul style="list-style-type: none"> • White coat effect may occur when using a semi-automated device • Confirming BPs with an AOBP device helps rule out white coat effect • Calibration helps determine if device is measuring accurately
Manual device (portable or mounted aneroid)	<ul style="list-style-type: none"> • When using only a manual device, take > 2 single readings one minute apart and manually average the readings • Transition use to automated devices when possible • Work with leadership team to allocate funding to purchase automated devices <ul style="list-style-type: none"> – Purchase upper-arm devices that are validated for clinical accuracy and have a variety of cuff sizes • Work with biomedical engineering department or device vendor to calibrate devices (test devices for accuracy) <ul style="list-style-type: none"> – Portable aneroid devices should be calibrated every four weeks – Mounted aneroid devices should be calibrated every six months 	<ul style="list-style-type: none"> • Automated devices are considered to be more accurate and are preferred over manual to eliminate bias and errors during measurement • Calibration helps determine if device is measuring accurately • Use of portable aneroid is not recommended due to need for frequent calibration
BP cuffs	<ul style="list-style-type: none"> • Purchase multiple cuff sizes • Most devices have multiple adult cuff sizes (small, regular, large, extra-large) 	<ul style="list-style-type: none"> • Ensure correct cuff sizes are available for your patients

Environment where BPs are measured

Factor	Recommendation	Rationale
Noise	<ul style="list-style-type: none"> • Measure BP in a location where patient can sit quietly • If measuring BP in an exam room, close door when possible • No talking during the measurement 	<ul style="list-style-type: none"> • Talking or active listening can add up to 10 mm Hg
Seating type	<ul style="list-style-type: none"> • Chairs with back support and arm rests are preferred • If needed, work with leadership team to purchase chairs for placement in the areas where BP is measured if table or flat surface is not available to support the arm near heart level 	<ul style="list-style-type: none"> • Unsupported back and feet can add up to 6 mm Hg • See below for arm support
Seating placement	<ul style="list-style-type: none"> • Position chairs so patient can comfortably rest the BP arm during measurement • Hard, flat surface should be used to rest the arm • Surface should allow the BP arm to rest with cuff at heart level 	<ul style="list-style-type: none"> • Unsupported BP arm can add up to 10 mm Hg
Seating height	<ul style="list-style-type: none"> • Chairs should allow for most patients to sit with feet flat on the floor • For patients whose feet do not fully reach the floor, use a step stool <ul style="list-style-type: none"> – Step stools that fold flat and have a carrying handle are preferred for easy portability – Step stools can be shared throughout the practice and should be stored in a common area 	<ul style="list-style-type: none"> • Unsupported back and feet can add up to 6 mm Hg
Position of mounted BP device	<ul style="list-style-type: none"> • If using a mounted aneroid device, ensure the gauge or dial is at eye level of the observer while they are measuring BP <ul style="list-style-type: none"> – Relocate dial to a lower position if necessary • Consider mounting the device to a portable stand with the device mounted at eye level 	<ul style="list-style-type: none"> • Having the gauge or dial at eye level allows the observer to more easily view the dial to determine what the BP reading is when the Korotkoff sounds are appearing and disappearing

Actions before BP measurement

Action	Recommendation	Rationale
Advise patient before appointment	<ul style="list-style-type: none"> • Inform patients to avoid exercise, tobacco and caffeine for at least 30 minutes before appointment • If your organization uses pre-visit reminders (by phone, mail or patient portal) consider incorporating this guidance into your messaging • If no pre-visit contact with patient occurs, be sure to educate patients at the visit so they have this knowledge for their next visit 	<ul style="list-style-type: none"> • Exercise, tobacco, stimulants like caffeine can impact patient BP
Determine BP arm	<ul style="list-style-type: none"> • Check BP in both arms at first visit <ul style="list-style-type: none"> – Use arm with higher BP for subsequent measurements (document in EHR, inform patient which arm to use for BP measurements in the future) – Incorporate into new patient workflow 	<ul style="list-style-type: none"> • Patient BP may be different in each arm if vascular changes (such as atherosclerosis) are present
Prepare for attended BP measurement	<ul style="list-style-type: none"> • Rest patient for five minutes, if possible, before taking attended BP measurements <ul style="list-style-type: none"> – Incorporate into workflow • If unable to rest patient for five minutes, perform BP measurement as the last action before leaving the patient in an exam room to wait for the provider 	<ul style="list-style-type: none"> • Resting a patient for five minutes <i>before</i> an attended measurement can help obtain a BP that is more representative of a patient's BP outside of the doctor's office—their "true" BP

Action	Recommendation	Rationale
Ensure patient has empty bladder	<ul style="list-style-type: none"> • Ask patients if they need to void prior to taking vital signs • Consider having patients void into a lab cup if a urinalysis is needed that visit 	<ul style="list-style-type: none"> • Full bladder can add up to 10 mm Hg
Seat patient in chair	<ul style="list-style-type: none"> • Ensure back is supported • Ensure feet supported on flat surface (floor or stool) • Ensure legs are uncrossed 	<ul style="list-style-type: none"> • Unsupported back and feet can add 6 mm Hg • Crossed legs can add 2–8 mm Hg
Place cuff on patient	<ul style="list-style-type: none"> • Ensure appropriate cuff size is used <ul style="list-style-type: none"> – Measure the patient’s arm or use guidance markers on BP cuff • Place BP cuff on patient’s bare upper arm <ul style="list-style-type: none"> – If rolling up a patient’s sleeve, be sure it is not tight (you should be able to slip fingers easily under sleeve if rolled up) – If necessary, provide a patient with a gown or drape – Position cuff so that the bottom of the cuff is two finger widths above the elbow crease • Align artery marker over brachial artery 	<ul style="list-style-type: none"> • Cuff over clothing can add 5–50 mm Hg • BP cuff that is too small can add 2–10 mm Hg
Position patient’s BP arm	<ul style="list-style-type: none"> • Ensure patient’s arm is resting on a hard, flat surface • Ensure middle of cuff is at heart level 	<ul style="list-style-type: none"> • Unsupported arm can add up to 10 mm Hg

Actions during manual BP measurement

Action	Recommendation	Rationale
Use proper technique when performing manual BP measurements	<p>When taking manual BP measurements ...</p> <ul style="list-style-type: none"> • Palpate radial pulse after you apply cuff • Continue to palpate pulse as you inflate BP cuff • Once pulse is no longer palpable, inflate cuff an additional 20–30 mm Hg • Take your finger off the pulse and place your stethoscope onto the antecubital fossa over the brachial artery • Deflate cuff at a rate of 2 mm Hg per second • Identify systolic and diastolic BPs 	<ul style="list-style-type: none"> • Inflating cuff to 20–30 mm Hg over the point where the radial pulse is obliterated can help ensure the observer is not falsely underestimating systolic BP, which happens during the auscultatory gap • Deflating cuff slowly ensures the observer can accurately hear the Korotkoff sounds, and view the level at which the Korotkoff sounds appear and disappear on the dial to determine systolic and diastolic BPs

Actions if *initial* BP is high

Action	Recommendation	Rationale
Perform additional readings (confirmatory measurement)	<p>If initial BP is high, perform additional readings (ideally two or more readings in total)</p> <ul style="list-style-type: none"> • Confirmatory measurements can be done with manual, semi-automated or AOBP devices (AOBP is preferred) • If using AOBP, it is preferred that patient is alone in the room during the readings. Use a timer and return promptly to the patient when the readings are completed. • Wait one minute between each measurement • Average the readings (this is done by the device if using AOBP) 	<ul style="list-style-type: none"> • Taking multiple BP measurements and calculating the average can help obtain a BP that is more representative of a patient's BP outside of the doctor's office—their "true" BP • Failure to wait at least one minute between measurements can impact the reliability of the blood pressure reading
Use semi-automated or AOBP device to recheck BP if initial reading is high	<ul style="list-style-type: none"> • While automated devices are recommended for all readings, this may not be feasible in all settings • If automated device is not available for all readings, use a manual device for initial BP and if high, recheck with automated device 	<ul style="list-style-type: none"> • Manual technique can be affected by various biases and errors that can result in inaccurate readings • Use of automated devices decreases the occurrence of these biases and errors resulting in readings that are more reproducible
Nurse or medical assistant to perform confirmatory measurements	<ul style="list-style-type: none"> • Whenever possible, nurses or medical assistants should perform initial and confirmatory BPs in lieu of the provider 	<ul style="list-style-type: none"> • The alerting response patients experience can result in falsely high BPs and is greater with providers than with nurses and medical assistants

Actions *after* BP measurement

Action	Recommendation	Rationale
Document BP readings	<ul style="list-style-type: none"> • Document average BP readings in the electronic health record (EHR) <ul style="list-style-type: none"> – Use designated field for BP readings in your EHR 	<ul style="list-style-type: none"> • Documenting the BP average in a designated field allows your team to locate the results more easily and use them in performance measures
Notify provider	<ul style="list-style-type: none"> • Ensure provider is notified if BP measurements are out of range for the patient <ul style="list-style-type: none"> – Use your EHR to automatically send an alert <ul style="list-style-type: none"> ▪ If your EHR does not provide an alert for out of range readings, work with your EHR vendor to try to add this feature – Place a colored card on the door or in the exam room that will alert the provider that the patient's documented BP is out of range – Implement pre-visit huddles that allow the nurse or medical assistant to share relevant information about patients with the provider (such as out of range BP readings) 	<ul style="list-style-type: none"> • Providers need to be aware of BPs that are out of range so they can act rapidly to intervene as appropriate

Action	Recommendation	Rationale
<p>Recommend out of office readings if BP is high on two or more occasions</p> <p><i>Can be self-measured BP (SMBP) monitoring or 24-hour ambulatory BP monitoring (ABPM)</i></p>	<ul style="list-style-type: none"> • Recommend SMBP to confirm a diagnosis of white coat, sustained or masked hypertension, or to assess for BP control in patients already diagnosed with high BP • Teach patients how to perform SMBP so they can take their BP correctly when not in the clinical setting • Ensure patients have a method to notify the practice of their BP readings, and what to do if they have a BP measurement outside of their physician recommended safe BP range • 24-hour ABPM can also be used but may not be as feasible as SMBP in some settings 	<ul style="list-style-type: none"> • SMBP or 24-hour ABPM can be used to help differentiate patients with white coat, masked or sustained hypertension to decrease the chance of misclassification