Thinking Beyond New Clinical Guidelines: Update in Hypertension

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Abstract

Hypertension is one of the most common conditions managed by generalists and is a major risk factor for multiple conditions. Surrounded by great debate, the committee appointed to the Eighth Joint National Committee published their suggestions for new hypertension treatment guidelines in early 2014. We suggest a new target blood pressure (BP) for the general population older than 60 years of less than 150/90 mm Hg, up from less than 140/90 mm Hg as recommended by the Seventh Joint National Committee, and in diabetic patients, a goal of less than 140/90 mm Hg, up from less than 140/90 mm Hg as recommended by the Seventh Joint National Committee recommendation of less than 130/80 mm Hg. Regardless of the BP target recommendations suggested by the Eighth Joint National Committee and other organizations, obtaining accurate BP readings and recognizing white-coat and masked hypertension is imperative. Home and ambulatory BP monitoring are useful tools in addition to proper in-office BP readings. The optimal care of the hypertensive patient involves accurate BP characterization, careful use of guidelines, and good clinical judgment.

difficult. Clinical trials have not consistently found that lowering BP with medications achieves the same outcomes as those seen in epidemiological observations.6,7 Regardless, BP control in the general population is suboptimal, as only 50% of hypertensive individuals have appropriate BP control with treatment.8 Further complicating the issue are growing bodies of evidence suggesting that in-office BP measurements inadequately reflect a patient’s true BP status9 and that antihypertensive therapy can lead to serious adverse effects in certain populations, especially the elderly.10

Several organizations have developed guidelines using a combination of expert opinion and evidence to aid the clinician in treatment decisions.11–14 The recently released guidelines from the committee appointed to the Eighth Joint National Committee (JNC-8), in particular, have met with considerable debate.15–17 The purpose of this review is to summarize these new guidelines and the issues surrounding them. We will also provide information regarding accurate BP measurement and the risks of white-coat HTN (WCH) and masked HTN. Lastly, we will provide recommendations on the appropriate use of home BP monitoring (HBPM) and ambulatory BP monitoring (ABPM).

THE DEBATE SURROUNDING THE JNC-8 RECOMMENDATIONS

The recommendations of the Seventh Joint National Committee (JNC-7) were released in 2003 and remained in place for over a decade.18 Since that time, several important studies on HTN have been published, and the Institute of Medicine has developed standards for developing trustworthy clinical guidelines.19 These standards include a systematic review of the available literature, transparency, the inclusion of multidisciplinary experts, and revision if necessary.19 The JNC-8 was appointed in 2008 by the National Heart, Lung, and Blood Institute (NHLBI) and was tasked with reviewing the literature and providing updated recommendations. In June 2013, the NHLBI elected to discontinue their work in developing guidelines and refocus their efforts on supporting the development of systematic reviews to be used by major subspecialty organizations in guideline development.20 However, the members appointed to the JNC-8 ultimately decided to publish their work in JAMA rather than involve major subspecialty organizations in the field of HTN, most notably the American Heart Association and the American College of Cardiology, in the review or publication of the document.14 Additionally, several members of the committee, specifically 1 member from the National Institute of Diabetes and Digestive and Kidney Diseases and 2 from the NHLBI, withdrew authorship from the published document before its release for undisclosed reasons.14

Critics of the committee’s approach have concern about the potential for bias in the recommendations because important stakeholders were not involved, most notably the American College of Cardiology and the American Heart Association. Nevertheless, in contrast to the methods for JNC-7 development, these guidelines were developed with strict adherence to the Institute of Medicine standards. Only large (>100 patients) randomized controlled trials with long-term follow-up (>1 year) were considered for recommendations.14 However, these strict inclusion criteria led the authors to disregard all nonrandomized and epidemiological studies, which account for over 99% of the literature in the HTN field.

The long-term implication of these guidelines is unclear. The proportion of older adults who meet the threshold for needing BP treatment will decrease with the implementation of the JNC-8 recommendations.21 One of the most controversial differences between the JNC-7 and JNC-8 guidelines is the increase in BP target for the elderly and in those with diabetes or chronic kidney disease (CKD).16 Critics have asserted that the limited evidence from randomized controlled trials does not provide reason to change the JNC-7 guidelines.16 Furthermore, concern has been raised about the discrepancy between BP treatment goals and achieved BP that already exists. Thus, increasing the BP target further could potentially negatively impact cardiovascular outcomes.16

Regardless of the debate surrounding the updated set of guidelines, it is important to remember that they should not be a substitute for good clinical judgment. Clinicians are increasingly less likely to deviate from guidelines, likely because they may be linked to “performance measures” in the future. However, individual patients and unique circumstances may
warrant guideline exceptions. Guidelines are meant to provide a population-based minimum standard but are useful for treating most patients in the general medicine clinic.

RECOMMENDATIONS OF THE COMMITTEE APPOINTED TO THE JNC-8

In contrast to guidelines set forth by previous committees and organizations, the panel members appointed to the JNC-8 wanted to make the guidelines simple to understand and easy to apply to patient care. Accordingly, the guidelines address only a limited number of topics considered to be of utmost importance to clinicians. Treatment goals are largely similar whether the patient has “complicated” vs “uncomplicated” HTN, and there are fewer drug class recommendations based on comorbid conditions. In contrast to the JNC-7, the authors of the JNC-8 recommend that BP treatment thresholds and treatment goals be the same to avoid confusion.14

Blood pressure treatment goals differ when compared with those of the JNC-7. In elderly patients (>60 years) in the general population, the JNC-8 authors recommend a new BP treatment goal of less than 150/90 mm Hg, as compared with less than 140/90 mm Hg recommended by the JNC-7.14 In diabetic patients, the suggested treatment goal is now less than 140/90 mm Hg, as compared with less than 130/80 mm Hg recommended by the JNC-7. Furthermore, the goal BP in patients with CKD is less than 140/90 mm Hg for all age groups. The Figure displays a simple treatment algorithm based on the JNC-8 suggestions that can be used for patient care.14

One of the goals of the committee appointed to the JNC-8 was to make treatment recommendations simple. This especially applies to pharmacological treatment selection. For most patients, the initial therapy could include a thiazide-type diuretic, calcium channel blocker, angiotensin-converting enzyme inhibitor (ACEI), or angiotensin II receptor blocker (ARB) regardless of the patient’s underlying medical conditions.14 It is recommended that all patients with CKD take an ACEI or ARB, but it does not have to be the initial therapy used to lower BP. Of note, a thiazide-type diuretic or calcium channel blocker is recommended as initial therapy in black patients because of their particular effectiveness in this population. In the rare instance that a black patient with CKD has BP control with a single agent, it is recommended that an ACEI or ARB be initial therapy if the patient has proteinuria.14

An important consideration is that if pharmacological treatment results in a lower BP than the recommended treatment target without serious adverse effects, the pharmacological therapy should be continued.14 In other words, do not discontinue medications just because a patient’s BP is below target. Again, the recommendations should be viewed as minimal standards for most patients.

The guidelines published by the Joint National Committee substantially influence treatment decisions by many if not most primary care physicians in the United States. However, it is noteworthy that several other influential societies have published recommendations.

FIGURE. Algorithm for the management of hypertension according to recommendations outlined by the members appointed to the Eighth Joint National Committee. Chronic kidney disease (CKD) is defined as either kidney damage or a glomerular filtration rate of less than 60 mL/min per 1.73 m² for 3 or more months. BP = blood pressure. *All such patients should be taking an angiotensin-converting enzyme inhibitor or angiotensin II receptor blocker. These need not be the initial agent unless blood pressure control is achieved with a single agent and the patient has proteinuria. **Initial pharmacological management for a black patient should consist of a thiazide-type diuretic or calcium channel blocker. Initial management for a white patient can be an angiotensin-converting enzyme inhibitor, angiotensin II receptor blocker, thiazide-type diuretic, or calcium channel blocker.
to guide HTN management\(^8,11,13,22\). The availability of multiple published recommendations underscores the point that the ideal BP treatment target is not completely clear, especially for diverse patient populations with multiple comorbidities. Overall, the treatment goals for most groups of patients are similar among organizations (Table). Additionally, most organizations support a higher treatment goal for elderly patients (although the definition of “elderly” differs among groups) and the addition of an ACEI or ARB for patients with CKD and/or diabetes, especially if proteinuria is present. There are differences in the specific treatment goals for elderly patients and patients with comorbidities, especially diabetes and CKD. Understandably, the experts in the field of HTN interpret the available evidence differently, and the various organizations incorporate different degrees of expert opinion when formulating guidelines. When deciding what guidelines to use in any clinical situation, it is best to look at the grade of evidence used to develop a particular recommendation.

**DO NOT UNDERESTIMATE THE VALUE OF ACCURATE AND RELIABLE BP MEASUREMENTS**

The topics in this section are not addressed by JNC-8. They represent an additional review by the authors. Undoubtedly, the use of HTN guidelines is inappropriate without accurate and reliable BP readings. Patients, nurses, and other care providers must be trained in appropriate technique to avoid falsely low or high readings because overtreatment and undertreatment of HTN can lead to adverse outcomes. Furthermore, WCH and masked HTN must be identified to avoid the unique risks in these situations. Both HBPM and ABPM are useful adjuncts to in-office BP readings.

**Appropriate BP Measurement Technique**

Optimally, the patient should avoid exercise, caffeine, alcohol, and smoking within 30
minutes of BP measurement. The patient should be positioned with both feet on the floor and the arm comfortably supported at the level of the heart.\textsuperscript{23} Patients should be at rest for at least 5 minutes before taking readings, and all thick and extraneous clothing should be removed from the site of measurement. The bladder of the cuff should cover at least 80% of the arm circumference snugly, and upper arm measurements are optimal.\textsuperscript{23}

Cuffs come in several different sizes, and it is important to choose a cuff of the appropriate size for accuracy. An upper arm cuff does not fit uniformly over the upper arm in some patients, especially in obese individuals. In such cases, a cuff of appropriate size can be placed over the lower arm. Wrist cuffs are less reliable and extremely sensitive to body position. If a patient is going to use a wrist cuff at home, they must remember to keep it at heart level at the time of measurement, and it should be routinely tested for accuracy by trained personnel. Although finger measurement devices are currently on the market, they are often inaccurate and their use is discouraged.

An average of 3 to 5 readings taken 1 to 2 minutes apart is ideal because BP can fluctuate.\textsuperscript{23} At some point, all patients should have their BP measured in both arms because there is some normal variability that is important to recognize. A variation of less than 10 mm Hg is acceptable. In patients with vascular disease, this variation could be greater.\textsuperscript{23} Additionally, patients should regularly take their BP monitoring device to the clinic to make sure that it is measuring the BP adequately.

**The Risks of WCH and Masked HTN**

Commonly, a patient’s BP is considered high in the office but returns to normal when measured outside the clinic setting. This discrepancy is referred to as WCH, which is formally defined as having average office readings of more than 140/90 mm Hg and reliable out-of-office readings of less than 135/85 mm Hg. The numbers differ slightly because on average, self-measured BP outside the clinic setting is 5 mm Hg lower than office-measured BP.\textsuperscript{24,25} This condition occurs in 10% to 20% of patients seen in a primary care office, and the prevalence is related to the office BP reading. Specifically, up to 55% of patients with an office-measured systolic BP of 140 to 149 mm Hg have WCH, whereas only 10% of patients with systolic office readings higher than 180 mm Hg have WHC.\textsuperscript{24} In other words, the higher the office BP reading, the less likely the patient’s BP is actually controlled out of the office. The prevalence is higher in females, nonsmokers, children, and the elderly.\textsuperscript{24,25}

Ambulatory BP monitoring is recommended for confirmation of the condition if it is available. Patients with this condition are at risk for development of sustained HTN over time.\textsuperscript{24,26}

The prognostic importance of WCH is not completely clear, but studies have increasingly found that WCH may be a predictor of the development of true HTN\textsuperscript{26,27} and ultimately cardiovascular mortality.\textsuperscript{24,27-29} A cohort of 2050 patients from Italy was followed up for an average of 16 years to better understand WCH. Each patient had office readings, ABPM, and HBPM at baseline and at follow-up.\textsuperscript{25} The important findings were that while only 10% of the patients who were “normotensive” at baseline had development of HTN over 10-year follow-up, up to 35% of those with true WCH (high office measurements but normal ambulatory and home measurements) had development of HTN over time.\textsuperscript{26} Moreover, patients with high office BP and abnormal ambulatory or home BP measurements at baseline had almost 3 times the risk of cardiovascular mortality over follow-up.\textsuperscript{26} The take-home message is that WCH is an important finding and should not be ignored. Patients with this condition should be educated about their risk for development of true HTN and the possible risk for cardiovascular mortality. At the very least, these patients should be followed up closely and be trained to reliably monitor their BP out of the office.

Less commonly, patients have high BP outside the clinic and are normotensive in the office. This condition is called masked HTN, and the prevalence reportedly ranges from 10% to 40%.\textsuperscript{30,31} The physiology behind this phenomenon is not fully understood, but the condition may be due to factors that raise BP outside the office, including smoking and physical activity. Taking medications shortly before a consultation to hide medication nonadherence has also been suggested.\textsuperscript{23} Recognizing this condition is especially important because the prognosis is the same as that for true HTN.\textsuperscript{26} Unfortunately, masked HTN is often missed unless the patient has reliable out-of-office or ambulatory BP readings. Masked
HTN should be suspected in the setting of unexplained end-organ damage.23

When Should I Recommend Out-of-Office BP Monitoring or ABPM?

Even when proper technique is utilized, in-office BP measurements may give misleading or inadequate information. Home BP monitoring and ABPM are useful adjuncts to office BP measurement. In fact, both methods have been found to correlate better with end-organ damage than in-office BP measurement.9,32 Home BP monitoring involves having patients regularly take BP measurements in their usual environment. Modern HBPM machines are automated and can take multiple measurements and report the average. Patients should be educated about appropriate BP measurement technique and advised about which models to purchase (ie, avoid finger cuffs). Importantly, BP measurement on “one size fits all” automated cuffs at the local pharmacy is unreliable and should be avoided if possible. At minimum, HBPM should be recommended to most patients with HTN, WCH, heart disease, diabetes, CKD, or stroke.23 However, patients with atrial fibrillation or other arrhythmias may not be good candidates for home monitoring because the most common BP measuring devices use oscillometric methods that may be unreliable in these cases.

Depending on an individual patient’s degree of BP control and/or comorbidities, recommendations for the frequency of out-of-office readings vary. To make optimal treatment decisions based on out-of-office BP readings, it is recommended that BP be measured on at least 12 to 14 occasions over a period of 1 week.23 Preferably, both morning and evening BP are recorded before any antihypertensive medications are prescribed.23

The advantage of HBPM as compared to ABPM is its decreased cost and increased availability.22 Home BP monitoring is also useful because it detects day-to-day BP variability in an individual’s familiar environment. Ambulatory BP monitoring involves measuring BP at regular intervals for a period of 24 hours. In addition to providing an average BP over a time period, ABPM can provide valuable information about nighttime values.23,32 Detecting the absence of nocturnal decreases in BP (>10% of the average daytime value) is important because it is associated with increased cardiovascular mortality.33

Ambulatory BP monitoring is recommended in the following situations: suspected WCH or masked HTN, suspected episodic HTN, HTN resistant to increasing medications, autonomic dysfunction, end-organ damage despite normal in-office readings, and cases referred to an HTN specialist.23

CONCLUSION

Hypertension is a widespread and treatable condition, but BP control in the community continues to be suboptimal, leading to increased rates of myocardial infarction, stroke, and other serious comorbidities. The guidelines recommended by the committee appointed to the JNC-8 are fairly simple to understand and use in general practice, but they should not be a substitute for good clinical judgment. Furthermore, proper BP measurement technique and recognition of WCH or masked HTN are of utmost importance for appropriate application of clinical guidelines and HTN treatment. Both HBPM and ABPM techniques are useful tools in addition to proper office BP readings to optimally care for the hypertensive patient.

Abbreviations and Acronyms: ABPM = ambulatory blood pressure monitoring; ACEI = angiotensin-converting enzyme inhibitor; ARB = angiotensin II receptor blocker; BP = blood pressure; CKD = chronic kidney disease; HBPM = home BP monitoring; HTN = hypertension; JNC-7 = Seventh Joint National Committee; JNC-8 = Eighth Joint National Committee; NHLBI = National Heart, Lung, and Blood Institute; WCH = white-coat HTN

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