

**CME CREDIT** **EDUCATIONAL OBJECTIVE:** Readers will understand the strengths and limitations of the guidelines issued by the panel appointed to the eighth Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure

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# New hypertension guidelines: One size fits most?

## ABSTRACT

The report of the panel appointed to the eighth Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure (JNC 8) is more evidence-based and focused than its predecessors, outlining a management strategy that is simpler and, in some instances, less aggressive. It has both strengths and weaknesses.

## KEY POINTS

JNC 8 focuses on three main questions: when to begin treatment, how low to aim for, and which antihypertensive medications to use. It does not cover many topics that were included in JNC 7.

In patients age 60 or older, JNC 8 recommends starting antihypertensive treatment if the blood pressure is 150/90 mm Hg or higher, with a goal of less than 150/90.

For everyone else, including people with diabetes or chronic kidney disease, the threshold is 140/90 mm Hg, and the goal is less than 140/90.

The recommended classes of drugs for initial therapy in nonblack patients without chronic kidney disease are thiazide-type diuretics, calcium channel blockers, angiotensin-converting enzyme (ACE) inhibitors, and angiotensin receptor blockers (ARBs), although the last two classes should not be used in combination.

For black patients, the initial classes of drugs are diuretics and calcium channel blockers; patients with chronic kidney disease should receive an ACE inhibitor or ARB.

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THE REPORT OF THE PANEL appointed to the eighth Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure (JNC 8),<sup>1</sup> published in December 2013 after considerable delay, contains some important changes from earlier guidelines from this group.<sup>2</sup> For example:

- The blood pressure goal has been changed to less than 150/90 mm Hg in people age 60 and older. Formerly, the goal was less than 140/90 mm Hg.
- The goal has been changed to less than 140/90 mm Hg in all others, including people with diabetes mellitus and chronic kidney disease. Formerly, those two groups had a goal of less than 130/80 mm Hg.
- The initial choice of therapy can be from any of four classes of drugs: thiazide-type diuretics, calcium channel blockers, angiotensin-converting enzyme (ACE) inhibitors, or angiotensin receptor blockers (ARBs). Formerly, the list also contained beta-blockers. Also, thiazide-type diuretics have lost their “preferred” status.

The new guidelines are evidence-based and are intended to simplify the way that hypertension is managed. Below, we summarize them—how they were developed, their strengths and limitations, and the main changes from earlier JNC reports.

## WHOSE GUIDELINES ARE THESE?

The JNC has issued guidelines for managing hypertension since 1976, traditionally sanctioned by the National Heart, Lung, and Blood Institute (NHLBI) of the National Institutes of Health. The guidelines have generally been updated every 4 to 5 years, with the

last update, JNC 7,<sup>2</sup> published in 2003.

The JNC 8 panel, consisting of 17 members, was commissioned by the NHLBI in 2008. However, in June 2013, the NHLBI announced it was withdrawing from guideline development and was delegating it to selected specialty organizations.<sup>3,4</sup> In the interest of bringing the already delayed guidelines to the public in a timely manner, the JNC 8 panel decided to pursue publication independently and submitted the report to a medical journal. It is therefore not an official NHLBI-sanctioned report.

Here, we will refer to the new guidelines as “JNC 8,” but they are officially from “panel members appointed to the Eighth Joint National Committee (JNC 8).”

### ■ THREE QUESTIONS THAT GUIDED THE GUIDELINES

Epidemiologic studies clearly show a close relationship between blood pressure and the risk of heart disease, stroke, and kidney disease, these risks being lowest at a blood pressure of around 115/75 mm Hg.<sup>5</sup> However, clinical trials have failed to show any evidence to justify treatment with antihypertensive medications to such a low level once hypertension has been diagnosed.

Patients and health care providers thus face questions about when to begin treatment, how low to aim for, and which antihypertensive medications to use. The JNC 8 panel focused on these three questions, believing them to be of greatest relevance to primary care providers.

### ■ A RIGOROUS PROCESS OF EVIDENCE REVIEW AND GUIDELINE DEVELOPMENT

The JNC 8 panel followed the guideline-development pathway outlined by the Institute of Medicine report, *Clinical Practice Guidelines We Can Trust*.<sup>6</sup>

Studies published from January 1966 through December 2009 that met specified criteria were selected for evidence review. Specifically, the studies had to be randomized controlled trials—no observational studies, systematic reviews, or meta-analyses, which were allowed in the JNC 7 report—with sam-

ple sizes of more than 100. Follow-up had to be for more than 1 year. Participants had to be age 18 or older and have hypertension—studies with patients with normal blood pressure or prehypertension were excluded. Health outcomes had to be reported, ie, “hard” end points such as rates of death, myocardial infarction, heart failure, hospitalization for heart failure, stroke, revascularization, and end-stage renal disease. Post hoc analyses were not allowed. The studies had to be rated by the NHLBI’s standardized quality rating tool as “good” (which has the least risk of bias, with valid results) or “fair (which is susceptible to some bias, but not enough to invalidate the results).

Subsequently, another search was conducted for relevant studies published from December 2009 through August 2013. In addition to meeting all the other criteria, this bridging search further restricted selection to major multicenter studies with sample sizes of more than 2,000.

An external methodology team performed the initial literature review and summarized the data. The JNC panel then crafted evidence statements and clinical recommendations using the evidence quality rating and grading systems developed by the NHLBI. In January 2013, the NHLBI submitted the guidelines for external review by individual reviewers with expertise in hypertension and to federal agencies, and a revised document was framed based on their comments and suggestions.

The evidence statements are detailed in an online 300-page supplemental review, and the panel members have indicated that reviewer comments and responses from the presubmission review process will be made available on request.

### ■ NINE RECOMMENDATIONS AND ONE COROLLARY

The panel made nine recommendations and one corollary recommendation based on a review of the evidence. Of the 10 total recommendations, five are based on expert opinion. Another two were rated as “moderate” in strength, one was “weak,” and only two were rated as “strong” (ie, based on high-quality evidence).

**The NHLBI withdrew from guideline development in June 2013**

**Only randomized controlled trials with hard clinical end points were used**

**Recommendation 1:  
< 150/90 for those 60 and older**

In the general population age 60 and older, the JNC 8 recommends starting drug treatment if the systolic pressure is 150 mm Hg or higher or if the diastolic pressure is 90 mm Hg or higher, and aiming for a systolic goal of less than 150 mm Hg and a diastolic goal of less than 90 mm Hg.

**Strength of recommendation**—strong (grade A).

**Comments.** Of all the recommendations, this one will probably have the greatest impact on clinical practice. Consider a frail 70-year-old patient at risk of falls who is taking two antihypertensive medications and whose blood pressure is 148/85 mm Hg. This level would have been considered too high under JNC 7 but is now acceptable, and the patient’s therapy does not have to be escalated.

The age cutoff of 60 years for this recommendation is debatable. The Japanese Trial to Assess Optimal Systolic Blood Pressure in Elderly Hypertensive Patients (JATOS)<sup>7</sup> included patients ages 60 to 85 (mean age 74) and found no difference in outcomes comparing a goal systolic pressure of less than 140 mm Hg (this group achieved a mean systolic pressure of 135.9 mm Hg) and a goal systolic pressure of 140 to 160 mm Hg (achieved systolic pressure 145.6 mm Hg).

Similarly, the Valsartan in Elderly Isolated Systolic Hypertension (VALISH) trial<sup>8</sup> included patients ages 70 to 84 (mean age 76.1) and found no difference in outcomes between a goal systolic pressure of less than 140 mm Hg (achieved systolic pressure 136.6 mm Hg) and a goal of 140 to 150 mm Hg (achieved systolic pressure 142 mm Hg).

The Hypertension in the Very Elderly Trial (HYVET)<sup>9</sup> found lower rates of stroke, death, and heart failure in patients age 80 and older when their systolic pressure was less than 150 mm Hg.

While these trials support a goal pressure of less than 150 mm Hg in the elderly, it is unclear whether this goal should be applied beginning at age 60. Other guidelines, including those recently released jointly by the American Society of Hypertension and the International Society of Hypertension, recommend a systolic goal of less than 150 mm Hg in people age 80 and older—not age 60.<sup>10</sup>

The recommendation for a goal systolic pressure of less than 150 mm Hg in people age 60 and older was not unanimous; some panel members recommended continuing the JNC 7 goal of less than 140 mm Hg based on expert opinion, as they believed that the evidence was insufficient, especially in high-risk subgroups such as black people and those with cerebrovascular disease and other risk factors.

A subsequent minority report from five panel members discusses in more detail why they believe the systolic target should be kept lower than 140 mm Hg in patients age 60 or older until the risks and benefits of a higher target become clearer.<sup>11</sup>

**Corollary recommendation:  
No need to down-titrate if lower than 140**

In the general population age 60 and older, dosages do not have to be adjusted downward if the patient’s systolic pressure is already lower than 140 mm Hg and treatment is well tolerated without adverse effects on health or quality of life.

**Strength of recommendation**—expert opinion (grade E).

**Comments.** In the studies that supported a systolic goal lower than 150 mm Hg, many participants actually achieved a systolic pressure lower than 140 mm Hg without any adverse events. Trials that showed no benefit from a systolic goal lower than 140 mm Hg were graded as lower in quality. Thus, the possibility remains that a systolic goal lower than 140 mm Hg could have a clinically important benefit. Therefore, medications do not have to be adjusted so that blood pressure can “ride up.”

For example, therapy does not need to be down-titrated in a 65-year-old patient whose blood pressure is 138/85 mm Hg on two medications that he or she is tolerating well. On the other hand, based on **RECOMMENDATION 1**, therapy can be down-titrated in a 65-year-old whose pressure is 138/85 mm Hg on four medications that are causing side effects.

**Recommendation 2:  
Diastolic < 90 for those younger than 60**

In the general population younger than 60 years, JNC 8 recommends starting pharmacologic treatment if the diastolic pressure is 90

mm Hg or higher and aiming for a goal diastolic pressure of less than 90 mm Hg.

**Strength of recommendation**—strong (grade A) for ages 30 to 59, expert opinion (grade E) for ages 18 to 29.

**Comments.** The panel found no evidence to support a goal diastolic pressure of 80 mm Hg or less (or 85 mm Hg or less) compared with 90 mm Hg or less in this population.

It is reasonable to aim for the same diastolic goal in younger persons (under age 30), given the higher prevalence of diastolic hypertension in younger people.

**Recommendation 3:  
Systolic < 140 for those younger than 60**

In the general population younger than 60 years, we should start drug treatment at a systolic pressure of 140 mm Hg or higher and treat to a systolic goal of less than 140 mm Hg.

**Strength of recommendation**—expert opinion (grade E).

**Comments.** Although evidence was insufficient to support this recommendation, the panel decided to keep the same systolic goal for people younger than 60 as in the JNC 7 recommendations, for the following two reasons.

First, there is strong evidence supporting a diastolic goal of less than 90 mm Hg in this population (**RECOMMENDATION 2**), and many study participants who achieved a diastolic pressure lower than 90 mm Hg also achieved a systolic pressure lower than 140. Therefore, it is not possible to tease out whether the outcome benefits were due to lower systolic pressure or to lower diastolic pressure, or to both.

Second, the panel believed the guidelines would be simpler to implement if the systolic goals were the same in the general population as in those with chronic kidney disease or diabetes (see below).

**Recommendation 4:  
< 140/90 in chronic kidney disease**

In patients age 18 and older with chronic kidney disease, JNC 8 recommends starting drug treatment at a systolic pressure of 140 mm Hg or higher or a diastolic pressure of 90 mm Hg or higher and treating to a goal systolic pressure of less than 140 mm Hg and a diastolic pressure of less than 90 mm Hg.

Chronic kidney disease is defined as either

a glomerular filtration rate (estimated or measured) less than 60 mL/min/1.73 m<sup>2</sup> in people up to age 70, or albuminuria, defined as more than 30 mg/g of creatinine at any glomerular filtration rate at any age.

**Strength of recommendation**—expert opinion (grade E).

**Comments.** There was insufficient evidence that aiming for a lower goal of 130/80 mm Hg (as in the JNC 7 recommendations) had any beneficial effect on cardiovascular, cerebrovascular, or mortality outcomes compared with 140/90 mm Hg, and there was moderate-quality evidence showing that treatment to lower goal (< 130/80 mm Hg) did not slow the progression of chronic kidney disease any better than a goal of less than 140/90 mm Hg. (One study that did find better renal outcomes with a lower blood pressure goal was a post hoc analysis of the Modification of Diet in Renal Disease study data in patients with proteinuria of more than 3 g per day.<sup>12</sup>)

We believe that decisions should be individualized regarding goal blood pressures and pharmacologic therapy in patients with chronic kidney disease and proteinuria, who may benefit from lower blood pressure goals (<130/80 mm Hg), based on low-level evidence.<sup>13,14</sup> Risks and benefits should also be weighed in considering the blood pressure goal in the elderly with chronic kidney disease, taking into account functional status, comorbidities, and level of proteinuria.

**Recommendation 5:  
< 140/90 for people with diabetes**

In patients with diabetes who are age 18 and older, JNC 8 says to start drug treatment at a systolic pressure of 140 mm Hg or higher or diastolic pressure of 90 mm Hg or higher, and treat to goal systolic pressure of less than 140 mm Hg and a diastolic pressure of less than 90 mm Hg.

**Strength of recommendation**—expert opinion (grade E).

**Comments.** Moderate-quality evidence showed cardiovascular, cerebrovascular, and mortality outcome benefits with treatment to a systolic goal of less than 150 mm Hg in patients with diabetes and hypertension.

The panel found no randomized controlled

**In the absence of diabetes or chronic kidney disease, treat to < 150/90 mm Hg in patients age 60 and older, and < 140/90 in everybody else**

trials that compared a treatment goal of less than 140 mm Hg with one of less than 150 mm Hg for outcome benefits, but decided to base its recommendations on the results of the Action to Control Cardiovascular Risk in Diabetes—Blood-pressure-lowering Arm (ACCORD-BP) trial.<sup>15</sup> The control group in this trial had a goal systolic pressure of less than 140 mm Hg and had similar outcomes compared with a lower goal.

The panel found no evidence to support a lower blood pressure goal (< 130/80) as in JNC 7. ACCORD-BP showed no differences in outcomes with a systolic goal lower than 140 mm Hg vs lower than 120 mm Hg except for a small reduction in stroke, and the risks of trying to achieve intensive lowering of blood pressure may outweigh the benefit of a small reduction in stroke.<sup>12</sup> There was no evidence for a goal diastolic pressure below 80 mm Hg.

**Recommendation 6: In nonblack patients, start with a thiazide-type diuretic, calcium channel blocker, ACE inhibitor, or ARB**

In the general nonblack population, including those with diabetes, initial drug treatment should include a thiazide-type diuretic, calcium channel blocker, ACE inhibitor, or ARB.

**Strength of recommendation**—moderate (grade B).

**Comments.** All these drug classes had comparable outcome benefits in terms of rates of death, cardiovascular disease, cerebrovascular disease, and kidney disease, but not heart failure. For improving heart failure outcomes, thiazide-type diuretics are better than ACE inhibitors, which in turn are better than calcium channel blockers.

Thiazide-type diuretics (eg, hydrochlorothiazide, chlorthalidone, and indapamide) were recommended as first-line therapy for most patients in JNC 7, but they no longer carry this preferred status in JNC 8. In addition, the panel did not address preferential use of chlorthalidone as opposed to hydrochlorothiazide, or the use of spironolactone in resistant hypertension.

The panel did not recommend beta-blockers as first-line therapy because there were no differences in outcomes (or insufficient evidence) compared with the above medication classes; additionally, the Losartan Interven-

tion for Endpoint Reduction in Hypertension study<sup>16</sup> reported a higher incidence of stroke with a beta-blocker than with an ARB. However, JNC 8 did not consider randomized controlled trials in specific nonhypertensive populations such as patients with coronary artery disease or heart failure. We believe decisions should be individualized as to the use of beta-blockers in these two conditions.

The panel recommended the same approach in patients with diabetes, as there were no differences in major cardiovascular or cerebrovascular outcomes compared with the general population.

**Recommendation 7: In black patients, start with a thiazide-type diuretic or calcium channel blocker**

In the general black population, including those with diabetes, JNC 8 recommends starting drug treatment with a thiazide-type diuretic or a calcium channel blocker.

**Strength of recommendation**—moderate (grade B) for the general black population; weak (grade C) for blacks with diabetes.

**Comments.** In the black subgroup in the Antihypertensive and Lipid-Lowering Treatment to Prevent Heart Attack trial (ALLHAT),<sup>17</sup> a thiazide-type diuretic (chlorthalidone) was better than an ACE inhibitor (lisinopril) in terms of cerebrovascular, heart failure, and composite outcomes, but similar for mortality rates and cardiovascular, and kidney outcomes. Also in this subgroup, a calcium channel blocker (amlodipine) was better than the ACE inhibitor for cerebrovascular outcomes (there was a 51% higher rate of stroke with the ACE inhibitor as initial therapy than with the calcium channel blocker); the ACE inhibitor was also less effective in reducing blood pressure in blacks than the calcium channel blocker.

For improving heart failure outcomes, the thiazide-type diuretic was better than the ACE inhibitor, which in turn was better than the calcium channel blocker.

Evidence for black patients with diabetes (graded as weak) was extrapolated from ALLHAT, in which 46% had diabetes.<sup>17</sup> We would consider using an ACE inhibitor or ARB in this population on an individual basis, especially if the patient had proteinuria.

**Five of the 10 recommendations in JNC 8 are based on expert opinion**

### Recommendation 8: ACEs and ARBs for chronic kidney disease

In patients age 18 and older with chronic kidney disease, irrespective of race, diabetes, or proteinuria, initial or add-on drug treatment should include an ACE inhibitor or ARB to improve kidney outcomes.

**Strength of recommendation**—moderate (grade B).

**Comments.** Treatment with an ACE inhibitor or ARB improves kidney outcomes in patients with chronic kidney disease. But in this population, these drugs are no more beneficial than calcium channel blockers or beta-blockers in terms of cardiovascular outcomes.

No randomized controlled trial has compared ACE inhibitors and ARBs for cardiovascular outcomes in chronic kidney disease, and these drugs have similar effects on kidney outcomes.

The panel did not make any recommendations about direct renin inhibitors, as there were no eligible studies demonstrating benefits on cardiovascular or kidney outcomes.

In black patients with chronic kidney disease and proteinuria, the panel recommended initial therapy with an ACE inhibitor or ARB to slow progression to end-stage renal disease (contrast with **RECOMMENDATION 7**).

In black patients with chronic kidney disease and no proteinuria, the panel recommended choosing from a thiazide-type diuretic, calcium channel blocker, ACE inhibitor, or ARB. If an ACE inhibitor or ARB is not used as initial therapy, then one can be added on as a second-line medication (contrast with **RECOMMENDATION 7**).

The panel found no evidence to support this recommendation in people over age 75 and noted that although an ACE inhibitor or ARB may be beneficial in this group, a thiazide-type diuretic or calcium channel blocker can be considered.

### Recommendation 9: If not at goal, step up

The main objective of pharmacologic treatment of hypertension is to attain and maintain the goal blood pressure. Lifestyle interventions should be maintained throughout treatment (**TABLE 1**). Medications can be initiated and titrated according to any of three strate-

gies used in the randomized controlled trials selected by the panel (detailed below). Do not use an ACE inhibitor and ARB together in same patient.

If blood pressure is not at goal using all medication classes as in **RECOMMENDATION 6** (ie, the triple combination of a thiazide-type diuretic, calcium channel blocker, and either an ACE inhibitor or an ARB), if there is a contraindication to any of these medication classes, or if there is need to use more than three medications to reach the goal, drugs from other classes can be used.

Referral to a hypertension specialist may be indicated for patients who are not at goal using the above strategy or for whom additional clinical consultation is needed.

**Strength of recommendation**—expert opinion (grade E).

**Comments.** Blood pressure should be monitored and assessed regularly, treatment adjusted as needed, and lifestyle modifications encouraged.

The panel did not recommend any monitoring schedule before or after goal blood pressure is achieved, and this should be individualized.

### ■ ADDITIONAL TOPICS IN JNC 8

A supplemental report covered some additional topics for which formal evidence review was not conducted but which the panel considered important.

#### Measuring and monitoring blood pressure

The panel recommended measuring the blood pressure with an automated oscillometric device that is properly calibrated and validated, or carefully measuring it manually.

Blood pressure should be measured in a quiet and relaxed environment with the patient seated comfortably for at least 5 minutes in a chair (rather than on an examination table) with feet flat on the floor, back supported, and arm supported at heart level. Blood pressure should be taken on the bare upper arm with an appropriate-sized cuff whose bladder encircles at least 80% of the mid-upper arm circumference, and patients should avoid caffeine, smoking, and physical activity for at least 30 minutes before measurement. In addi-

**The panel believed that goals would be easier to implement if they were the same for everyone**

**TABLE 1**

**Goals of hypertension<sup>a</sup> treatment according to the JNC 8 recommendations**

	General population		With diabetes	With chronic kidney disease
<b>Age (years)</b>	≥ 60	18–59	≥ 18	≥ 18
<b>Goal blood pressure (mm Hg)</b>	< 150/90	< 140/90	< 140/90	< 140/90

**Initial antihypertensive drugs to use**

	General population		With diabetes	With chronic kidney disease
<b>Race</b>	Nonblack	Black	Nonblack	Black
<b>Initial drugs<sup>b</sup></b>	ACE inhibitor, ARB, calcium channel blocker, or diuretic	Calcium channel blocker or diuretic	ACE inhibitor, ARB, calcium channel blocker, or diuretic	ACE inhibitor or ARB

<sup>a</sup> Hypertension is defined as office blood pressure ≥ 140/90 mm Hg on more than two visits<sup>2</sup>

<sup>b</sup> Lifestyle modifications should be emphasized throughout treatment, including a low-sodium Dietary Approaches to Stop Hypertension (DASH) diet, physical activity, and weight loss

ACE = angiotensin-converting enzyme; ARB = angiotensin receptor blocker; diuretic = thiazide-type diuretic

COMPILED FROM INFORMATION IN JAMES PA, OPARIL S, CARTER BL, ET AL. 2014 EVIDENCE-BASED GUIDELINE FOR THE MANAGEMENT OF HIGH BLOOD PRESSURE IN ADULTS: REPORT FROM THE PANEL MEMBERS APPOINTED TO THE EIGHTH JOINT NATIONAL COMMITTEE (JNC 8). JAMA 2013; DOI:10.1001/JAMA.2013.284427.

tion, patients should be asked about the need to empty the bladder (and encouraged to do so if they have to).

To establish the diagnosis of hypertension and to assess whether blood pressure goals are being met, two or three measurements should be taken at each visit as outlined above, and the average recorded.

At the first visit, blood pressure should be measured in both arms, and the arm with the higher pressure should be used for subsequent measurements.

**Appropriate dosing of antihypertensive medications**

Dosing should be individualized for each patient, but in general, target doses can be achieved within 2 to 4 weeks, and generally should not take longer than 2 months.

In general, to minimize potential adverse effects, treatment is started at a lower dose than the target dose and is then titrated up. This is especially important in older patients and patients on multiple medications with other co-

morbidities, and if two antihypertensive medications are being started simultaneously.

The panel reviewed evidence-based dosing of antihypertensive medications that were shown to improve cardiovascular outcomes from the studies that were selected for review. Hydrochlorothiazide gets a special mention: although doses up to 100 mg were used in some studies, the panel recommended an evidence-based dose of 25 or 50 mg daily to balance efficacy and safety.

**Three strategies for dosing antihypertensive medications** that were used in the selected randomized controlled trials were provided. These strategies were not compared with each other, nor is it known if one is better than the others in terms of health outcomes. In all cases, avoid combining an ACE inhibitor and an ARB.

- Start one drug from the four classes in **RECOMMENDATION 6**, titrate to the maximum dose, then add a second drug and titrate, then add a third drug and titrate to achieve the goal blood pressure.

- Start one drug from the four classes in **RECOMMENDATION 6** and add a second drug before increasing the initial drug to its maximal dose. Titrate both to maximal doses, and add a third drug if needed and titrate to achieve the goal blood pressure.
- Start with two drugs at the same time from the four classes in **RECOMMENDATION 6**, either as separate pills or in a fixed-dose combination. Add a third drug if needed to achieve the goal blood pressure.

### Lifestyle modification

The panel did not extensively review the evidence for lifestyle modification but endorsed the recommendations of the Lifestyle Work Group, which was convened by the NHLBI to focus on the effects of diet and physical activity on cardiovascular disease risk factors.<sup>18</sup>

**Diet.** The Lifestyle Work Group recommends combining the Dietary Approaches to Stop Hypertension (DASH) diet with reduced sodium intake, as there is evidence of a greater blood-pressure-lowering effect when the two are combined. The effect on blood pressure is independent of changes in weight.

The Lifestyle Work Group recommends consuming no more than 2,400 mg of sodium per day, noting that limiting intake to 1,500 mg can result in even greater reduction in blood pressure, and that even without achieving these goals, reducing sodium intake by at least 1,000 mg per day lowers blood pressure.

**Physical activity.** The Lifestyle Work Group recommends moderate to vigorous physical activity for approximately 160 minutes per week (three to four sessions a week, lasting an average of 40 minutes per session).

**Weight loss.** The Lifestyle Work Group did not review the blood-pressure-lowering effect of weight loss in those who are overweight or obese. The JNC 8 panel endorsed maintaining a healthy weight in controlling blood pressure.

**Alcohol intake** received no specific recommendations in JNC 8.

### ■ JNC 8 IN PERSPECTIVE

JNC 8 takes a rigorous, evidence-based approach and focuses on a few key questions. Thus, it is very different from the earlier re-

ports: it has a narrower focus and does not address the full range of issues related to hypertension.

### Strengths of JNC 8

The panel followed a rigorous process of review and evaluation of evidence from randomized controlled trials, adhering closely to standards set by the Institute of Medicine for guideline development. In contrast, JNC 7 relied on consensus and expert opinion.

The JNC 8 guidelines aim to simplify recommendations, with only two goals to remember: treat to lower than 150/90 mm Hg in patients age 60 and older, and lower than 140/90 mm Hg for everybody else. The initial drug regimen was simplified as well, with any of four choices for initial therapy in nonblacks and two in blacks.

Relaxing the blood pressure goals in elderly patients (although a cutoff of age 60 vs age 80 is likely to be debated) will also allay concerns about overtreating hypertension and causing adverse events in this population that is particularly susceptible to orthostatic changes and is at increased risk of falls.

### Limitations and concerns

While the evidence-based nature of the recommendations is a strength, information from observational studies, systematic reviews, and meta-analyses was not incorporated into the formulation of these guidelines. This limits the available evidence, reflected in the fact that despite an extensive attempt to provide recommendations based on good evidence, five of the 10 recommendations (including the corollary recommendation) are still based on expert consensus opinion. Comparing and combining studies from different time periods is also problematic because of different methods of conducting clinical trials and analysis, and also because clinical care in a different period may differ from current standard practices.

Blood pressure targets in some subgroups are not clearly addressed, including those with proteinuria and with a history of stroke. Peterson et al,<sup>19</sup> in an editorial accompanying the JNC 8 publication, commented on the need for larger randomized controlled trials to compare different blood pressure thresholds in various patient populations.

**In all cases, avoid combining an ACE inhibitor and an ARB**



Some health care providers will likely be concerned that relaxing blood pressure goals could lead to higher real-world blood pressures, eventually leading to adverse cardiovascular outcomes, particularly on a population level. This is akin to the “speed limit rule”—people are more likely to hover above target, no matter what the target is.

In another editorial, Sox<sup>20</sup> raised concerns about the external review process, ie, that the guidelines were not published in draft form to solicit public comment. Additionally, although the recommendations underwent extensive review, they were not endorsed by the specialty societies that the NHLBI designated to develop guidelines. In its defense, however, the JNC 8 panel has offered to share records of the review process on request, and this should serve to increase confidence in the review process.

The original literature search was limited to studies published through December 2009, which is more than 4 years before the publication of the recommendations. Although a bridge search was conducted until August 2013 to identify additional studies, this search used different inclusion criteria than the original criteria.

With its narrow focus, JNC 8 does not address many relevant issues. The American Society of Hypertension/International Society of Hypertension guidelines, published around the same time that the JNC 8 report was released, provide a more comprehensive review that will be of practical use for health care providers in the community.<sup>10</sup>

Ambulatory blood pressure monitoring is increasingly being used in clinical practice to detect white coat hypertension and, in many cases, to assess hypertension that is resistant to medications. It has also been shown to have better prognostic value in predicting cardiovascular risk and progression of kidney disease than office blood pressures.<sup>21,22</sup> The UK National Institute of Health and Care Excellence guideline recommends ambulatory monitoring for the diagnosis of hypertension.<sup>23</sup> However, JNC 8 did not provide specific recommendations for the use of this technology. Additionally, the JNC 8 evidence review is based on studies that used office blood pressure readings, and the recommendations are not necessarily applicable to measurements obtained by

ambulatory monitoring.

Other topics covered in JNC 7 but not in JNC 8 include:

- Definitions and stages of hypertension (which remain the same)
- Initial treatment of stage 2 hypertension with two medications
- The J-curve phenomenon
- Preferred medications for patients with coronary artery disease or congestive heart failure
- A detailed list of oral antihypertensive agents—JNC 8 confines itself to the drugs and doses used in randomized controlled trials
- Patient evaluation
- Secondary hypertension
- Resistant hypertension
- Adherence issues.

### Contrast with other guidelines

While the goal of these recommendations is to make treatment standards more understandable and uniform, contrasting recommendations on blood pressure goals and medications from various groups muddy the waters. Other groups that have issued hypertension guidelines in recent years include:

- The American Diabetes Association<sup>24</sup>
- The American Society of Hypertension and the International Society of Hypertension<sup>10</sup>
- The European Society of Hypertension and the European Society of Cardiology<sup>25</sup>
- The Canadian Hypertension Education Program<sup>26</sup>
- The Kidney Disease: Improving Global Outcomes initiative<sup>14</sup>
- The National Institute for Health and Clinical Excellence (UK)<sup>23</sup>
- The International Society on Hypertension in Blacks<sup>27</sup>
- The American Heart Association, the American College of Cardiology, and the US Centers for Disease Control and Prevention.<sup>28</sup>

### Future directions

Despite the emphasis on making treatment decisions on an individual basis and using guidelines only as a framework for a safe direction in managing difficult clinical

**Start at  
a low dose  
and titrate up**

scenarios, guideline recommendations are increasingly being used to assess provider performance and quality of care, and so they assume even more importance in the current health care environment. As specialty organizations review and decide whether to endorse the JNC 8 recommendations, reconciling seemingly disparate recommendations from various groups is needed to send a clear and concise message to practitioners taking care of patients with high blood pressure.

Although a daunting task, integrating guidelines on hypertension management with other cardiovascular risk guidelines (eg, cholesterol, obesity) with assessment of overall cardiovascular risk profile would likely help in developing a more effective cardiovascular prevention strategy.

Despite the panel's best efforts at providing evidence-based recommendations, many of the recommendations are based on expert opinion, reflecting the need for larger well-conducted studies. It is hoped that ongoing studies such as the Systolic Blood Pressure Intervention Trial<sup>29</sup> will provide more clarity about blood pressure goals, especially in the elderly.

### Final thoughts

Guidelines are not rules, and while they provide a framework by synthesizing the best available evidence, any treatment plan should be formulated on the basis of individual patient characteristics, including comorbidities, lifestyle factors, medication side effects, patient preferences, cost issues, and adherence. ■

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