Commentary on the 2014 BP Guidelines from the Panel Appointed to the Eighth Joint National Committee (JNC 8)

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ABSTRACT

The recently published article “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)” (James et al., JAMA 311: 507–520, 2014) has generated considerable controversy. In this commentary, we evaluate the document and compare the recommendations contained within it with those of the JNC 7 and other national and international guidelines. The evidence quality rating approach followed by the article “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)” (James et al., JAMA 311: 507–520, 2014) disqualified nearly 98% of previous studies from review; as a result, some of the key recommendations were on the basis of expert opinion alone. We are especially concerned that the recommendation to raise the systolic/diastolic BP levels at which treatment is initiated to \( \geq 150/90 \) mmHg in adults \( \geq 60 \) years old may affect cardiovascular and renal health in these patients. Additionally, we recommend that hypertension guidelines should be updated every 3–4 years with a fresh approach to the definition of target BP levels, the use of modern technology in the diagnosis of hypertension, and the treatment of hypertension in special populations not addressed in earlier guidelines.

Hypertension remains a major contributing factor to morbidity and mortality in the general population and patients with CKD. Therefore, the optimal management of hypertension is an important aspect of nephrology practice. Practice guidelines play a significant role in synthesizing complex, sometimes conflicting information in the literature into cogent recommendations that can be implemented at the bedside and in the clinic. In addition, with increasing emphasis on quality of care and pay for performance, national guidelines form the basis of evaluation of performance in the clinical setting. In the hypertension arena, the Joint National Committee (JNC) guidelines have played this role since the 1960s. The most recent “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)” (referred to as the 2014 Guidelines) has generated considerable controversy with regard to process and content. The most controversial recommendation of the 2014 Guidelines was the increase in the BP goal to \( <150/90 \) mmHg in adults over the age of 60 years old. Although there is less evidence for benefit of tight BP control in older adults, most of the studies have chosen the age of 80 years as the cutoff for a higher BP target. This distinction is important, because a large proportion of patients with hypertension are in the 60- to 80-year-old age range, where there is now conflicting recommendations with regard to target BP levels.

The purposes of this commentary are to evaluate the 2014 Guidelines and discuss its implications for clinical practice and future research.

COMPARISON BETWEEN JNC 7 AND 2014 GUIDELINES

There are important differences in the evidence review approach used in the 2014 Guidelines compared with JNC 7. The 2014 Guidelines evidence review was

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restricted to randomized clinical trials (RCTs) involving at least 100 subjects; the panel then assessed these RCTs using a standardized protocol. In contrast, the recommendations of JNC 7 were derived from a consensus panel and were on the basis of a nonsystematic review of the literature, including observational studies. The strict evidence quality rating review system used by the 2014 Guidelines limited the authors to approve five of nine recommendation included in the guidelines “by expert advice only.” In contrast, JNC 7 has published a document that included not only treatment recommendations but also, a classification and diagnostic approaches that were very useful for implementation to the clinician and not immediately challenged by other national authorities.

Although the 2014 Guidelines adopt the hypertension definition established by JNC 7 and endorse the lifestyle treatment recommendations of the 2013 American College of Cardiology and the American Heart Association Task Force (ACC/AHA) Life Style Task Force; the 2014 Guidelines differ in recommendations regarding medication types and treatment approaches for different patient groups. The 2014 Guidelines recommend the use of four types of medication—calcium channel blockers (CCBs), angiotensin-converting enzyme inhibitors (ACEIs), angiotensin receptor blockers (ARBs), and diuretics—on the basis of RCT evidence, with specific recommendations according to race, CKD, or diabetic status. In contrast, JNC 7 recommended a fifth medication class (β-blockers) but stressed that thiazide diuretics should be the initial choice for most patients; it also included a recommendation for the treatment of patients with compelling indications: diabetes, CKD, heart failure, myocardial infarction, stroke, and high cardiovascular (CV) risk. The 2014 Guidelines also have changed the systolic BP/diastolic BP (SBP/DBP) levels to initiate antihypertensive treatment to ≥150/≥90 mmHg in the population ≥60 years old and the treatment goals to <150/90 mmHg. In the population ≥18 years old with CKD with or without diabetes, the 2014 Guidelines recommended a treatment goal of <140/<90 mmHg. JNC 7 discussed methods to diagnose patients with hypertension, initial evaluation for primary and secondary hypertension, compliance with treatment, and resistant hypertension, which are subjects that are not included in the 2014 Guidelines. The JNC 7 final report was reviewed before publication by 39 major professional, public, and voluntary organizations and seven federal agencies; in contrast, the 2014 Guidelines were reviewed by a group of selected experts in the field of hypertension and five federal agencies, but more importantly, they did not receive endorsement by the national Heart Lung and Blood Institute (NHLBI), the agency that originally convened this group.

As a consequence of the collapse of the coalition that included the National High Blood Pressure Education Program, 39 professional, public, and voluntary organizations, and seven federal agencies that previously existed, we do not now have a clear leader in the publications of guidelines to increase awareness, prevention, treatment, and control of high BP, and the publications of other national recommendations supported by previous members of the coalition may well create a confusion in this very important public health initiative.

**COMPARISON BETWEEN THE 2014 GUIDELINES AND OTHER NATIONAL AND INTERNATIONAL HYPERTENSION GUIDELINES**

Several international guidelines for the evaluation and management of hypertension have been published recently. Table 1 provides a comparison between these guidelines and the 2014 Guidelines. There is general agreement across different guidelines that the BP goal should be <140/90 mmHg in younger patients, although the exact age cutoffs vary. Similarily, most guidelines, with the exception of the Canadian guidelines, agree with a target BP <140/90 mmHg in patients with diabetes, consistent with the lack of benefits on CV outcomes of the intensive treatment

<table>
<thead>
<tr>
<th>Guideline</th>
<th>Younger Target (mmHg)</th>
<th>Older Target (mmHg)</th>
<th>Diabetes Target (mmHg)</th>
<th>CKD Target (mmHg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2014 Evidence-Based Guidelines for the Management of High Blood Pressure¹</td>
<td>&lt;140/90</td>
<td>&gt;60 years of age: &lt;150/90</td>
<td>&lt;140/90</td>
<td>&lt;140/90</td>
</tr>
<tr>
<td>2013 Canadian Hypertension Education Program⁶</td>
<td>&lt;140/90</td>
<td>SBP=150</td>
<td>&lt;130/80</td>
<td>&lt;140/90</td>
</tr>
<tr>
<td>2013 ESH/ESC Guidelines¹³</td>
<td>&lt;140/90</td>
<td>&lt;80 years of age: 140–150; consider &lt;140 if tolerated; &gt;80 years of age: 140–150</td>
<td>&lt;140/85</td>
<td>&lt;140/90</td>
</tr>
<tr>
<td>American Society of Hypertension and the International Society of Hypertension⁷⁰</td>
<td>&lt;140/90</td>
<td>&gt;80 years of age: &lt;150/90</td>
<td>&lt;140/90</td>
<td>&lt;140/90; consider &lt;130/80 if albuminuria</td>
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<tr>
<td>American Diabetes Association¹⁷</td>
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<td>KDIGO Blood Pressure Work Group¹¹</td>
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<td>ACR&lt;30: 140/90; ACR&gt;30: 130/80</td>
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</tbody>
</table>

ACR, albumin/creatinine ratio.

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goal in the Action to Control Cardiovascular Risk in Diabetes study. In an important change from previous guidelines, there is now uniformity that goal BP in patients with CKD without proteinuria should be <140/90 mmHg rather than <130/80 mmHg. This change is supported by Modification of Diet in Renal Disease and the American African Study of Kidney Disease and Hypertension, which proved that BP of 140/90 mmHg was not better than 125/75 mmHg in showing progression of CKD. The American Society of Hypertension and the International Society of Hypertension and Kidney Disease Improving Global Outcomes (KDIGO) guidelines recommend a lower goal of ≤130/80 mmHg in patients with CKD and significant proteinuria, a recommendation supported by strong but post hoc analysis suggesting that a lower BP in those patients may slow down their decline in renal function.

2014 GUIDELINES RECOMMENDATIONS

Recommendation 1
This recommendation to initiate treatment for patients older than age 60 years with SBP ≥150 mmHg or DBP ≥90 mmHg has major implications for practice and public health. The first recommendation is the most controversial of nine recommendations. It engendered a rebuttal from some members of the 2014 Guidelines committee who disagreed with the majority decision. This recommendation is on the basis of the very small number of RCT studies that survived the rigorous evidence review system; these studies represented only 1.87% of 1980 articles screened by the panel that addressed the following question formulated by the panel: “In adults with hypertension, does treatment with antihypertensive pharmacologic therapy to a specified BP goal lead to improvements in health outcomes?” The evidence cited by the 2014 Guidelines in recommending this major change is, thus, not compelling.

Given a prevalence of hypertension in the United States population of 65%–67%, implementation of this recommendation may well result in an upward shift in population BP. The concern articulated by the minority opinion with regard to its effect on CV health seems rational. We agree and have another concern: the increased SBP target recommended by the 2014 Guidelines may also hasten the progression of CKD. The National Health and Nutrition Examination Survey (NHANES) 2005–2010 studies have shown that the prevalence of hypertension in the Medicare population age ≥65 years with CKD was 92%. These studies also underline that, in the last decade, the control of BP, defined as <130/80 mmHg for those with CKD and diabetes and <140/90 mmHg otherwise, has improved but mention that “among those with CKD, however, treatment and control is lagging.”

Recommendation 2
Recommendation 2 strongly advises initiating pharmacologic treatment in the 30–59-year-old population with DBP ≥90 mmHg, with the goal of attaining a DBP of <90 mmHg. Among the 18- to 29-year-old population, the 2014 Guidelines report recommends the same BP levels but with only an expert opinion recommendation graded E. Recommendation 2 is similar to the European Society of Hypertension and the European Society of Cardiology (ESH/ESC) guidelines that strongly advise initiating pharmacologic treatment in the younger population with a DBP ≥90 mmHg. The ESH/ESC recommendation is on the basis of a Swedish observational study of >1.2 million Swedish military conscripts with an average age of 18±4 years old who were followed for 24 years. The Swedish study showed that CV mortality increased with an SBP >130 mmHg and strongly increased with DBP levels >90 mmHg.

The ESH/ESC guidelines also use the Systemic Coronary Risk Evaluation (SCORE) model, which estimates the risk of dying from CV disease over 10 years on the basis of various parameters, such as age, sex, smoking habits, total cholesterol, and SBP. By assessing relative risk, the SCORE model is useful in determining the need for treatment. Using this model, the ESH/ESC guidelines advise starting BP drug treatment with a goal of SBP/DBP <140/90 mmHg within months, weeks, or immediately after the failure of lifestyle modifications in patients with hypertension grades I, II, and III (SBP/DBP of 140–159/90–99, 160–179/100–109, and ≥180/≥110 mmHg, respectively).

We believe that 2014 Guidelines recommend 2 for a target DBP <90 mmHg for all of the population <60 years old may be an important factor in decreasing CV mortality and also, may decrease the prevalence of CKD. However, as previously mentioned, we agree with KDIGO that the evidence supporting these guidelines is weak.

Recommendation 3
The third recommendation concerns the general population <60 years old, for whom the 2014 Guidelines recommend, with a weak expert opinion graded E, the initiation of pharmacologic intervention in patients with SBP ≥140 mmHg to achieve a BP goal <140 mmHg. This approach does not differ from other national or international treatment guidelines.

Recommendation 4
The fourth recommendation advises, with a weak expert opinion graded E, pharmacologic treatment for the population ≥18 and <70 years old with CKD and without diabetes who have SBP/DBP levels ≥140/≥90 mmHg, with the goal of decreasing these levels to SBP/DBP <140/ <90 mmHg. In its discussion of this recommendation, the 2014 Guidelines noted that it applies to not only individuals ≥18 and <70 years old but also, people of any age with >30 mg albumin/creatinine in urine.

We believe that the presence of albuminuria is an important part of the recommendation and that its inclusion only in the discussion section and not in the recommendation itself weakens its effect. This recommendation also differs from other guidelines, including KDIGO guidelines, which recommend a BP goal of ≤130/≤80 mmHg for individuals with albuminuria ≥30–300 mg/24 h. We believe that the inclusion of individuals over age 70 years in this recommendation is essential, because SBP is an important
predictor of the decline in kidney function in the elderly, and the presence of hypertension and proteinuria in these patients is associated with a rapid decline in kidney function.

Noting the lack of studies addressing this issue in the elderly, the 2014 Guidelines advise in the discussion of the fourth recommendation that antihypertensive treatment "should be individualized, taking into consideration factors such as frailty, co-morbidities, and albuminuria," but this advice was not included in the recommendation.

**Recommendation 5**
The fifth recommendation addresses the population aged 18 years old with diabetes and (again, with a weak expert opinion graded E) advises initiating treatment when SBP/DBP is ≥140/≥90 mmHg to achieve the BP goal of <140/<90 mmHg.

The KDIGO guideline agrees with the BP goal levels advised in recommendation 5 but further recommends that such levels apply only to those with albuminuria ≥30 mg/24 h and that the goal should be ≤130/≤80 mmHg in patients with albuminuria >30 mg/24 h.

The American Diabetes Association recommends BP levels <140/<80 mmHg for all patients and SBP <130 mmHg for patients "with long life expectancy or having high stroke risks." The SBP/DBP levels of <140/<80 mmHg are recommended on the basis of the analysis of the diabetes subgroup of the Hypertension Optimal Treatment trial and United Kingdom Prospective Diabetes Study. Neither study satisfied the strict criteria used by the 2014 Guidelines, and therefore, neither was included in its evidence review. The ESC/ESH recommends a goal of SBP/DBP <140/<80 mmHg, giving this recommendation an A grade that is supported by the results of multiple RCTs and meta-analysis studies. Again, the strict evidence criteria used by the 2014 Guidelines did not allow them the flexibility found in other guidelines to address the treatment of patients with special conditions. As previously mentioned, the highest percentage of CKD occurrence is in the hypertension population ages 65 years old or older summarized in the NHANES 2005–2010 report, and until more evidence is obtained, we side with the KDIGO BP goal of ≤140/90 mmHg in patients with urinary albumin <30 mg/24 h and ≤130/≤80 mmHg in those with urinary albumin >30 mg/24 h.

**Recommendation 6**
The sixth recommendation, which received a moderately strong B grade, advises that the nonblack population without CKD, including those with diabetes, receive antihypertensive treatment with thiazide-type diuretics, CCBs, ACEIs, or ARBs. This straightforward recommendation is similar to the recommendations of other national and international guidelines.

**Recommendation 7**
This recommendation applies to the general black population without CKD, including those who have diabetes; it received a moderate grade B for the general black population and a grade C for black individuals with diabetes. It advises the use of thiazide-type diuretics or CCBs as a first-line therapy. This recommendation is mainly on the basis of the results of the Antihypertensive and Lipid-Lowering Treatment to Prevent Heart Attack Trial (ALLHAT) trial that showed that thiazide diuretics were more effective than ACEIs in improving cerebrovascular, heart failure, and all combined CV outcomes. Although the ALLHAT trial also showed that the use of CCBs was less effective than diuretics in preventing heart failure in the black subgroup, it found no differences in other outcomes (cerebrovascular, coronary heart disease, combined CV and kidney outcomes, or overall mortality) between the two medication types.

**Recommendation 8**
The eighth recommendation, which the panel approved with a moderate grade B, deals with the general population ages ≥18 years old with CKD, regardless of race or diabetes mellitus status. It recommends starting treatment with ACEIs or ARBs to improve kidney outcomes. In the discussion, the panel specifically addresses the black population with CKD and without proteinuria, recommending the therapeutic choices of thiazide-type diuretics, CCBs, ACEIs, or ARBs. It also recommends the optional use of CCBs or thiazide diuretics in subjects of any race older than 75 years. This recommendation does not differ from other national or international guidelines.

**Recommendation 9**
The ninth and final recommendation fills the gaps not covered by the previous eight recommendations and was approved with a weak expert opinion (grade E). For patients for whom the goal BP is not reached within 1 month of treatment, the panel advises either increasing the dose of the initial medication or adding a second drug from the thiazide-type diuretic, CCB, ACEI, or ARB class. If the second drug is not effective, a third drug can be added, but the panel does not recommend the combined use of ACEIs and ARBs. It advises adding any other antihypertensive approach if the initial use of three drugs does not help the patient reach the BP goal. It also recommends consulting with a hypertension specialist if the BP is not controlled or for "the management of complicated patients for whom additional clinical consultation is needed"; however, the panel falls short of defining the hypertension specialist qualifications. We agree with this recommendation.

**CONCLUDING COMMENTS**

The 2014 Guidelines were developed by a highly qualified group of experts on the basis of a very strict evidence quality rating review system. The panel assessed studies of individuals ages 18 years or older that addressed these three questions.

1. In adults with hypertension, does initiating antihypertensive pharmacologic therapy at specific BP thresholds improve health outcomes?

2. In adults with hypertension, does treatment with antihypertensive pharmacologic therapy to a specified BP goal lead to improvements in health outcomes?
(3) In adults with hypertension, do various antihypertensive drugs or drug classes differ in comparative benefits and harms on specific health outcomes?

The 2014 Guidelines include nine recommendations summarized in the executive report and described in detail in the 2014 Guidelines supplement published online. The panel screened 6146 articles, but only 126 of those publications were abstracted and used to write the nine recommendations; the remaining articles failed to attain a qualifying rating according to the evidence review system used by the panel. Only five of the recommendations were approved and graded using that systemic evidence review: one recommendation received a strong A rating, with a corollary addendum based on expert opinion and graded E, a weak rating; one recommendation earned a split grade A and E; two recommendations were given moderate B grades; and one recommendation received a split grade B and C. Four recommendations were approved by expert opinion only and graded E.

The 2014 Guidelines support the lifestyle approach of the recommendations from the 2013 Lifestyle Work Group of the American College of Cardiology/American Heart Association Task Force. Although that set of guidelines was also on the basis of an evidence quality rating system, the grading process included as well “the review of randomized trials, meta-analysis and observational studies evaluated for quality to reach a very clear clinical consensus that a particular test or therapy is useful.”

We, therefore, question the effectiveness of the 2014 Guidelines evidence quality review system, which used such strict criteria that only 2.05% of the studies screened were reviewed and as a result, could be used to inform the recommendations. In fact, four of nine recommendations were accepted by expert opinion only. In addition, the 2014 Guidelines support the lifestyle approach recommended by the 2013 ACC/AHA Lifestyle Work Group, which was on the basis of a less strict evidence review approach.

We are concerned that increasing the SBP level requiring treatment in those ≥60 years old to ≥150/≥90 mmHg (information included in the first recommendation) may adversely affect renal function. The NHANES 2005–2010 report indicated that the occurrence of eGFR<60 ml/min per 1.73 m² was prevalent in subjects with hypertension ≥140/≥90 mmHg. In addition, Kidney Early Evaluation Program data have shown that subjects with a mean age of 69 years have a hazard ratio for ESRD of 1.72 (95% CI, 1.21–2.45) when SBP is ≥140 mmHg and that the hazard ratio increased to 3.30 with an SBP=150 mmHg (95% CI, 2.51–4.49). The KEEP data also found a higher ESRD risk for subjects with DBP>90 mmHg compared with a DBP=60–74 mmHg (hazard ratio, 1.81; 95% CI, 1.33–2.43).

We believe that recommendation 5, which advises initiating pharmacologic treatment for those ≥18 years old with diabetes when their SBP/DBP is ≥140/≥90 mmHg with the goal of reducing levels to <140/<90 mmHg, may also have adverse health effects. The 2014 Guidelines made this recommendation considering that no high-quality evidence-based prospective studies support the KDIGO, American Diabetes Association, and ESH/ESC guidelines that advise decreasing BP to lower levels of ≤140/90 mmHg for subjects with albuminuria<30 mg/24 h and ≤130/80 mmHg for those with higher proteinuria. However, KEEP studies have shown higher hazard ratios and more risk for ESRD for those with SBP>130 mmHg and DBP>90 mmHg, which was previously mentioned.

We agree with all of the other recommendations proposed by 2014 Guidelines.

The 2014 Guidelines missed an opportunity to prioritize areas in need of research and update some of the following important issues: definition of BP, clinical diagnosis of hypertension, including ambulatory BP and home BP monitoring, white coat and masked hypertension, and the use and value of the ankle-brachial index, pulse wave velocity, and echocardiogram versus electrocardiogram. It also failed to discuss treatment in special populations, such as the obese, patients with metabolic syndrome, women, Hispanics, and patients with obstructive sleep apnea.

We recognize the effort of the 2014 Guidelines panel and believe that the strict evidence quality rating system developed by the National Institutes of Health should inspire more careful designs for future studies that will allow future panelists to reach important answers for the treatment of hypertension and the evaluation of CV and renal complications.

In lieu of NHLBI endorsement of future guidelines, we hope that, in the future, a national coalition of federal agencies and professional organizations focusing on hypertension and cardiorenal complications will be able to publish public guidelines every 3–4 years to address the very important ongoing changes in treatments and approaches in hypertension—a disease that remains a major cause of morbidity and mortality.

ACKNOWLEDGMENTS

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DISCLOSURES

None.

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2. Wright JT Jr., Fine LJ, Lackland DT, Ogedegbe G, Dennison Himmelfarb CR: Evidence supporting a systolic blood pressure goal of less than 150 mm Hg in patients aged 60 years or


