

Uncontrolled Blood Pressure in a Treated, High-risk Managed Care Population

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Abstract

The prevalence of hypertension in the United States is increasing, and the estimated cost of care is more than \$55 billion annually, including direct and indirect expenditures. The most recent National Health and Nutrition Examination Survey data show an improvement in awareness, treatment, and control of hypertension compared with previous surveys. Nonetheless, fewer than one third of adults with hypertension are achieving blood pressure control. The *Seventh Report of the Joint National Committee on the Prevention, Detection, Evaluation, and Treatment of High Blood Pressure* (JNC 7) states that most patients will require more than 1 drug to achieve goal blood pressure (<140/90 mm Hg, or <130/80 mm Hg for those with diabetes or chronic kidney disease). Hypertension is common in patients with diabetes, and aggressive blood pressure control has been shown to reduce the risk of these complications. In a study conducted from 2002 to 2005, the medical charts of 9492 adults with hypertension and diabetes from physician practices across the United States were reviewed. Only 27.5% of this high risk study population achieved the blood pressure goal of <130/80 mm Hg. Ninety-eight percent of patients were receiving antihypertensive therapy; 37.1% were using 1 agent, 34.4% were using 2, and 26.2% were using 3 or more agents. Angiotensin-converting enzyme inhibitors and angiotensin receptor blockers were the most frequently used antihypertensive agents in this study population, but they were underutilized, being used by 55.4% and 32.3%, respectively. These findings, which are consistent with other studies, suggest a need for improvement in management of hypertension in patients with diabetes and other high-risk groups.

(*Am J Manag Care. 2005;11:S215-S219*)

Cardiovascular disease (CVD) affects 70.1 million individuals in the United States. Hypertension is the most common form of CVD, affecting 65 million Americans.¹ Hypertension predisposes to other CVDs, including coronary artery disease, stroke, cardiac failure, and peripheral

artery disease. The age-adjusted risk ratio for each of these CVDs is increased by 2- to 4-fold in men and women with hypertension compared with sex-matched normotensive individuals.²

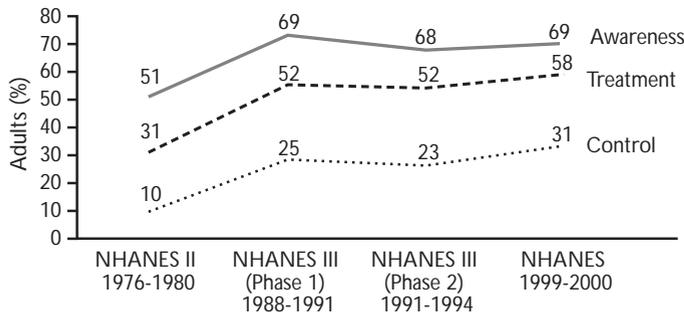
In a meta-analysis of 61 clinical trials by Lewington and colleagues, ischemic heart disease mortality increased linearly at all ages, starting at systolic blood pressure >115 mm Hg and diastolic blood pressure >75 mm Hg.³ For patients 40 to 89 years of age, ischemic heart disease mortality doubled with every 20-mm Hg increase in systolic blood pressure and every 10-mm Hg increase in diastolic blood pressure.³

Hypertension prevalence is increasing in the United States. In the most recent National Health and Nutrition Examination Survey (NHANES), conducted in 1999 to 2000, the prevalence of hypertension was 28.7%, an increase of 3.7% from 1988 to 1991.⁴ Hypertension prevalence was highest in non-Hispanic blacks (33.5%), increased with age (65.4% among those aged 60 years), and tended to be higher in women (30.1%).⁴ NHANES 1999-2000 showed an improvement over previous NHANES in the awareness, treatment, and control of hypertension, yet control of hypertension remained low at 31% (**Figure 1**).⁴ Furthermore, approximately 47% of treated hypertensive patients do not have their blood pressure controlled.⁴

Most individuals will develop hypertension if they live long enough. Persons older than 60 years are the fastest growing segment of the US population.⁵ From 1980 to 2000, the number of Americans 65 years old increased from 24.2 million to 32.6 million.⁶ The lifetime risk of developing hypertension is 90% in normotensive individuals between 55 and 65 years of age.⁵ A changing pattern of blood pressure occurs with

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Figure 1. US Trends in Awareness, Treatment, and Control of Hypertension



NHANES indicates National Health and Nutrition Examination Survey.
Source: Hajjar I, Kotchen TA.⁴

Table 1. JNC 7: Compelling Indications for Individual Drug Classes

Compelling indication	Initial therapy options
Heart failure	Thiazide, BB, ACEI, ARB* ALDO antagonist
Postmyocardial infarction	BB, ACEI, ALDO antagonist
High CAD risk	Thiazide, BB, ACEI, CCB
Diabetes	Thiazide, BB, ACEI, ARB*, CCB
Chronic kidney disease	ACEI, ARB*
Recurrent stroke prevention	Thiazide, ACEI

*Based on clinical trials using losartan potassium, irbesartan, or valsartan. JNC 7 indicates *Seventh Report of the Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure*; BB, beta blocker; ACEI, angiotensin-converting enzyme inhibitor; ARB, angiotensin receptor blocker; ALDO, aldosterone; CAD, coronary artery disease; CCB, calcium channel blocker.
Source: JNC 7. *JAMA*. 2003;289:2560-2572.

increasing age. Typically, diastolic blood pressure increases until about age 50, at which time it is maintained at the same level or even declines, whereas systolic blood pressure continues to rise with age.⁷ In individuals older than 50 years, systolic blood pressure >140 mm Hg is a stronger risk factor for CVD than is diastolic blood pressure.⁸ Clinical trials have demonstrated that control of isolated systolic hypertension reduces total mortality, cardiovascular mortality, stroke, and heart failure events.⁹

Greater emphasis, therefore, must be placed on the management of systolic hypertension.

JNC 7 Guidelines

The *Seventh Report of the Joint National Committee on the Prevention, Detection, Evaluation, and Treatment of High Blood Pressure* (JNC 7) recognized hypertension as a major risk factor for CVD.⁴ JNC 7 contained several concepts not included in previous JNC reports. It reinforced the importance of systolic blood pressure as the leading risk factor for CVD. JNC 7 also supported the “lifetime risk concept,” which means as already stated that individuals who are normotensive between 55 and 65 years of age have a 90% lifetime risk for developing hypertension. JNC 7 simplified the blood pressure classification system, eliminating stage 3 hypertension and introducing a “prehypertension” category of systolic blood pressure of 120 to 139 mm Hg and/or diastolic blood pressure of 80 to 89 mm Hg. An integrated treatment algorithm in JNC 7 incorporated comorbid conditions in selecting therapy. Finally, use of combination therapies was addressed as a means of getting patients to blood pressure goals.

Lifestyle modification is recommended for all blood pressure classifications in JNC 7, including prehypertension. For most patients with stage 1 hypertension (systolic blood pressure of 140-159 mm Hg or diastolic blood pressure of 90-99 mm Hg), a thiazide diuretic is recommended as initial therapy either alone or in combination with another agent. Compelling indications (ie, heart failure, diabetes, chronic kidney disease [CKD], recurrent stroke prevention) for which specific drug classes may be beneficial are listed in **Table 1**. Consideration can also be given to angiotensin-converting enzyme (ACE) inhibitors, angiotensin receptor blockers (ARBs), beta blockers, or calcium antagonists, or a combination, as initial therapy.

Many patients will require 2 or more drugs to achieve a blood pressure goal <140/90 mm Hg, or <130/80 mm Hg for patients with diabetes or CKD. In the Antihypertensive and Lipid-Lowering Treatment to Prevent Heart Attack Trial

(ALLHAT), an average of 2 or more drugs was required to achieve blood pressure goal (blood pressure <140/90 mm Hg).⁸ In the African American Study of Kidney Disease and Hypertension (AASK), patients required almost 4 drugs to achieve a goal mean arterial pressure of <92 mm Hg.⁹

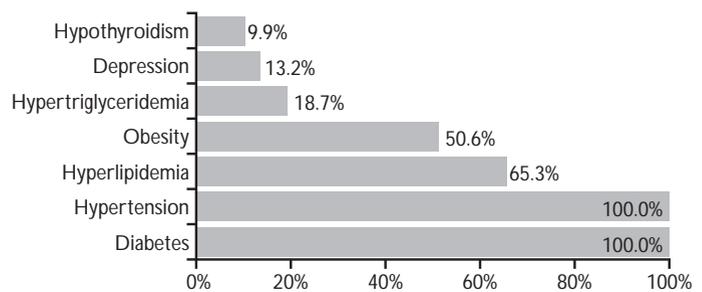
A 2-drug combination is recommended for patients who are >20 mm Hg above their systolic blood pressure goal or >10 mm Hg above their diastolic blood pressure goal.⁶ In stage 2 hypertension (systolic blood pressure 160 mm Hg or diastolic blood pressure 100 mm Hg), a 2-drug combination is recommended for most patients to achieve goal blood pressure.⁶ A majority of patients with diabetes will also require 2 or more drugs to achieve blood pressure control.⁶

Benefits of Blood Pressure Control

The National Committee for Quality Assurance (NCQA) provides an overall assessment of the performance of the healthcare system. In its State of Health Care Quality 2004 Results, NCQA reported that approximately 62% of patients achieved a blood pressure 140/90 mm Hg (blood pressure goal for controlling high blood pressure measure).¹⁰ The report also noted that a significant treatment gap exists between the national average blood pressure control rate (62%) and the blood pressure control rate achieved among patients being treated for hypertension by the top 10% of health plans (71%).¹⁰ A number of issues may help explain this treatment gap. One is that patient adherence to treatment may be better in the top health plans, possibly because their physicians make sure that patients are educated about the disease state. Another factor may be that patients in the top health plans are closely monitored and their drug therapy adjusted if necessary to achieve goal blood pressure. The current blood pressure control rate as reported by NHANES is 31%, which is far below the Healthy People 2010 goal of 50%.⁴ Furthermore, 30% of NHANES participants were unaware that they had hypertension.

The cost of hypertension in 2004 was \$55.5 billion, which included \$41.5 billion in direct medical expenditures and \$14 billion in indirect expenditures, such as absenteeism

Figure 2. Comorbidities* in Study Population (N = 9492)



*Patients may have more than 1 comorbid condition; therefore, percentages do not add to 100.

Table 2. Number of Comorbidities in Study Population (N = 9492)

Number	n	%
0	0	0
1	0	0
2	1868	19.7
3	3498	36.9
4	2243	23.6
5	1029	10.8
6	854	9

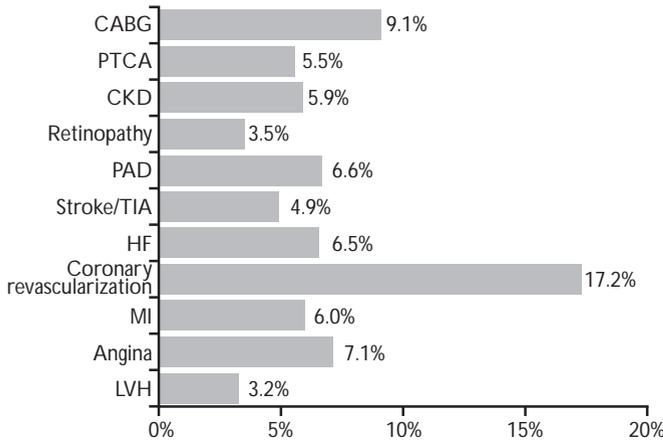
and lost work productivity.¹⁰ The total cost of managing hypertension is actually less than the total cost from hypertension-associated heart disease, stroke, and renal failure. More than 10 million sick days could be avoided each year if blood pressure was controlled at rates in the top 10% of health plans (71% blood pressure control rate).¹⁰

In addition to its financial benefits, controlling hypertension reduces morbidity and mortality. A reduction in systolic blood pressure by 5 mm Hg can reduce stroke mortality by 14%, coronary heart disease mortality by 9%, and total mortality by 7%.¹⁰ Antihypertensive therapy has also been associated with a 35% to 40% mean reduction in stroke incidence, a 20% to 25% reduction in myocardial infarction, and a greater than 50% reduction in heart failure.¹⁰

Hypertension Research Initiative

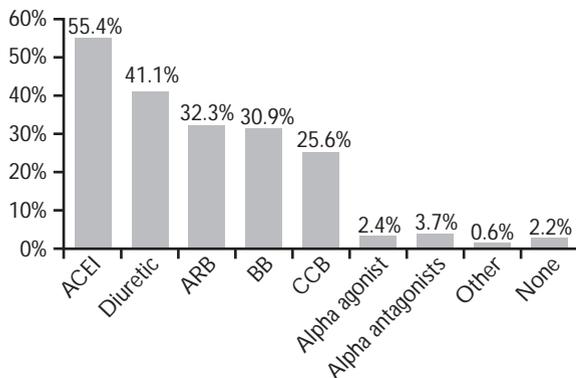
Hypertension is common in patients with diabetes and is a major risk factor for

Figure 3. Target-organ Damage* in Study Population (N = 9492)



*Defined by *Seventh Report of the Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure* guidelines. CABG indicates coronary artery bypass grafting; PTCA, percutaneous transluminal coronary angioplasty; CKD, chronic kidney disease; PAD, peripheral arterial disease; TIA, transient ischemic attack; HF, heart failure; MI, myocardial infarction; LVH, left ventricular hypertrophy.

Figure 4. Antihypertensive Utilization* in Study Population (N = 9492)



*Patients may have more than 1 antihypertensive medication or may have been taking a combination drug product, therefore percentages do not add to 100%. If a combination drug product was taken (eg, captopril/hydrochlorothiazide) the drug was counted in both the angiotensin-converting enzyme and diuretic classes.

ACEI indicates angiotensin-converting enzyme inhibitor; ARB, angiotensin receptor blocker; BB, beta blocker; CCB, calcium channel blocker.

microvascular and macrovascular complications.¹¹ The United Kingdom Prospective Diabetes Study¹² and other large clinical trials have demonstrated that aggressive control of blood pressure can reduce the risk of these complications. A recent research ini-

tiative was designed to assess blood pressure management nationally in insured patients with concomitant hypertension and diabetes (VA, unpublished data, 2005). Medical chart reviews were conducted in physician practices across the United States from 2002 to 2005 for 9492 adult patients with both hypertension and diabetes.

The average age of the study population was 63 years (46% were 65 years old); the average weight was 210 pounds; 74% were white, and men and women were represented in equal proportions. Other than hypertension and diabetes, the 2 most common comorbid conditions were hyperlipidemia and obesity, each present in more than half of the study population (Figure 2). The most common number of comorbidities was 3 (Table 2). Thirty-seven percent of the patients had evidence of target-organ damage as defined by JNC 7, coronary revascularization being the most common (Figure 3).

The blood pressure goal of <130/80 mm Hg was achieved in 27.5% of the study population. When stratified by age, 26.8% of subjects <65 years and 28.2% 65 years attained goal blood pressure.

Ninety-eight percent of patients were using antihypertensive drug therapy. Approximately 37.1% of patients were using only 1 agent, 34.4% were using 2 agents, and 26.2% were using 3 or more agents. Patients were most often treated with an ACE inhibitor (55.4%) followed by a diuretic (41.1%), ARB (32.3%), beta blocker (30.9%), and calcium antagonist (25.6%) (Figure 4).

Conclusion

Persons with diabetes and hypertension are at high risk for CVD as well as microvascular complications. Treating systolic blood pressure and diastolic blood pressure to targets of <130/80 mm Hg in patients with diabetes and hypertension is associated with a decrease in CVD, yet less than one third of patients in this study had controlled blood pressure. Most individuals with hypertension will require 2 or more antihypertensive agents from different drug classes to reach goal.⁶ In the study population, however, more than one third of patients were taking only 1 antihypertensive drug. According to JNC 7, diabetes is a compelling indication for treat-

ment with an ACE inhibitor or an ARB. These drugs were underutilized in this study population, with only slightly more than half receiving an ACE inhibitor and less than one third receiving an ARB. Other studies support these findings of inadequate treatment of patients with diabetes, showing poor control of blood pressure and underutilization of preferred antihypertensive agents.¹³⁻¹⁵ These findings suggest that there is much need for improvement in the management of hypertension, especially among high-risk patients, such as those with diabetes. Better control of hypertension could not only reduce morbidity and mortality but also the costs associated with caring for hypertension and its related cardiovascular and renal complications.

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