

DETERMINANTS OF UNCONTROLLED HYPERTENSION IN AN AFRICAN-AMERICAN POPULATION

Objectives: The purpose of this study was to assess blood pressure control and the determinants of uncontrolled blood pressure among African-American hypertensive patients.

Design: Baseline clinical data were collected as part of a nationwide hypertension quality improvement initiative. An analysis of determinants of uncontrolled blood pressure was conducted using logistic regression for the following variables: angina, congestive heart failure, coronary artery disease, diabetes, family history of cardiovascular disease or stroke, hyperlipidemia, left ventricular hypertrophy, and tobacco use.

Setting: 10 managed care/advanced physician organizations.

Patients: Pharmacy and medical claims covering 1,965,000 lives were reviewed and 292,996 members with a hypertension-related claim were identified between June 1, 1998 and July 1, 2001. A random sample ($N=5,935$) was selected for chart review. The present analysis was conducted on the subset of African-American patients ($N=440$) included in this sample.

Results: Approximately 66% of the African-American patients were female, the mean age was 60.4 years, 47.8% had dyslipidemia, and 31.4% had diabetes. Approximately 64% had uncontrolled hypertension. Patients with diabetes were 3 times more likely to have uncontrolled blood pressure as were patients without diabetes ($OR=2.92$; $P<.0001$).

Conclusions: Blood pressure control in the African-American population is lower than the *Healthy People 2010* goal of 50%. African Americans with hypertension and diabetes are at an increased risk for uncontrolled blood pressure. Treating this high-risk population more aggressively may reduce long-term complications and decrease mortality. (*Ethn Dis.* 2002;12[suppl3]:S3-53-S3-57)

Key Words: African American, Diabetes, Hypertension, ACE Inhibitors

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INTRODUCTION

African Americans are at higher risk than the general population for the negative consequences of hypertension. The prevalence of hypertension in African Americans—approximately 37% among both men and women—is among the highest in the world.¹ An earlier onset of hypertension in African Americans, compared with White Americans, is associated with a higher rate of fatal and nonfatal stroke, end stage kidney disease, and death from heart disease. In addition, African Americans have a high prevalence of other risk factors for adverse cardiac events, including obesity, dyslipidemia, renal disease, and diabetes.¹ Patients with both diabetes and hypertension are at substantially higher risk for adverse cardiac events and diabetic complications, including stroke, coronary artery disease (CAD), peripheral vascular disease, retinopathy, and nephropathy.² Pharmacologic treatment of hypertension has been shown to decrease the risk of cardiovascular disease complications including stroke, coronary events, heart failure, progression of renal disease, and all cause mortality.³⁻⁶ For all of these reasons, effective control of hypertension in the African-American population is vital to prevent disabling and costly adverse outcomes.

The current study was an analysis of data from a large national cross-section-

al, pre-test and post-test evaluation of the clinical and economic impact of initiatives designed to improve blood pressure control. The study's objectives were to evaluate the degree of blood pressure control in African Americans, and to describe the demographic, medical, or treatment factors that may be determinants of hypertension control in this population.

METHODS

Study Design

The present study of an African-American population was conducted as part of an ongoing national hypertension quality improvement initiative conducted at 10 managed care/advanced physician organizations, comprising more than 1.9 million enrolled individuals and a hypertensive population of 292,996 individuals. This project was designed to evaluate the degree of blood pressure control and to analyze the impact of related demographic, medical, or treatment factors on blood pressure control in a large population of Americans being treated for hypertension in health plans throughout the United States. These baseline data have been collected and analyzed as the initial phase of a 3-part program designed to improve the quality of hypertension control for the total population, and for African Americans, who represent a significant proportion of the populations enrolled in these practice settings.⁷ During the second phase of the program, these data are being used to design and implement educational initiatives to improve hypertension control among patients with high blood pressure. Phase III of this

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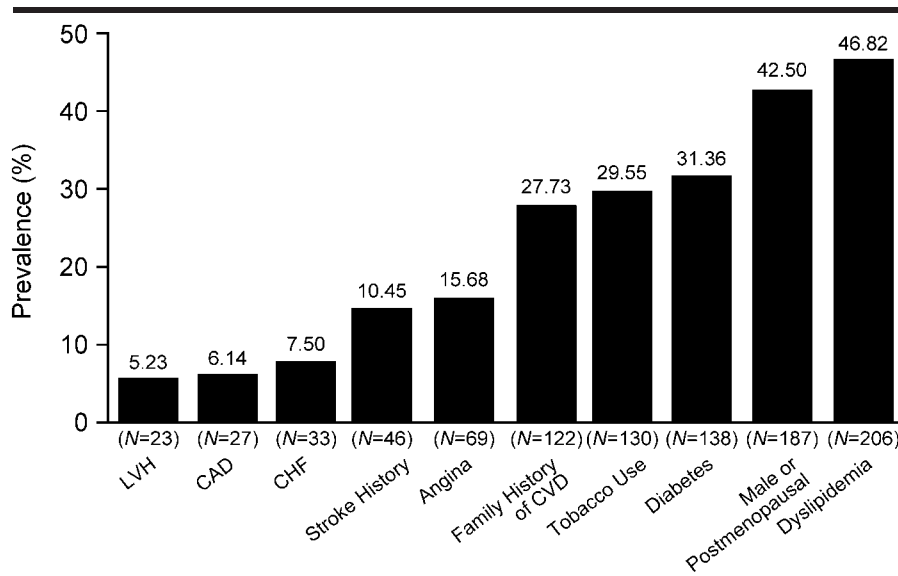


Fig 1. Prevalence of risk factors in the total population (N=440). CHF, congestive heart failure; LVH, left ventricular hypertrophy; CAD, coronary artery disease; CVD, cardiovascular disease

program will collect similar data in order to analyze how effective these interventions have been in terms of improving hypertension control after approximately one year.

Risk factors for uncontrolled hypertension were identified by a review of the literature and the following risk factors were abstracted from medical charts: male gender or postmenopausal status, diabetes, dyslipidemia, congestive heart failure (CHF), history of stroke, angina, CAD, tobacco use, family history of cardiovascular disease (CVD), and left ventricular hypertrophy (LVH) and treatment intensity. Pharmacy claims data and chart reviews were also used to analyze prescribing patterns for antihypertensive medications for the total and the diabetic population.

Blood pressure control was defined according to recommendations of the sixth report of the Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure (JNC VI). This report recommends a goal blood pressure of <140/90 mm Hg for the general population and a goal blood pressure of <130/85 mm Hg for patients with diabetes.³

Population

Eligible patients were identified by reviewing medical and pharmacy claims data from 10 managed care/advanced physician organizations. In a population of more than 1.9 million enrollees, a total of 292,996 hypertensive individuals were identified. A random sample of the hypertensive population was selected for chart review (N=5,935). Chart reviews were conducted to validate the hypertension diagnosis and to obtain baseline demographic and clinical data. African Americans (N=440, 7.5% of the population) included in the chart review population are the subjects in the present analysis.

Exclusion Criteria

Participants ≤18 years of age and those with end stage renal disease were excluded. *International Classification of Disease, 9th Revision* (ICD-9) codes were assessed in order to exclude non-hypertensive patients who had ischemic heart disease, history of myocardial infarction, CHF, arrhythmia, migraine, benign prostatic hypertrophy, and anxiety-panic disorder. These patients were excluded because they may have been prescribed

antihypertensives for conditions other than hypertension.

Statistical Analysis

Categorical variables were assessed by descriptive statistics. Determinants of uncontrolled blood pressure were identified using logistic regression. The odds ratios (ORs) for the presence of factors relative to blood pressure control were estimated.

RESULTS

Demographic and Clinical Variables

Among the 440 patients included in this analysis, the mean age was 60.41 (± 10.93) years. The youngest patient was 31 years of age and the oldest was 96 years of age. Within the study group, 66.4% (N=292) were women and 33.6% (N=148) were men. Of the total sample, 46.8% (N=206) had dyslipidemia, 31.4% (N=138) of the patients had diabetes, and 29.6% (N=130) used tobacco. The prevalence rates of these and other clinical variables within this population are reported in Figure 1.

Blood Pressure Control

JNC-VI goals were the standard used for evaluating this patient population. The percentage of patients with controlled blood pressure was consistently less than 50%; control was highest in the nondiabetic population (43%) and lowest in the diabetic population (20.3%) (Figure 2). When applying a blood pressure goal of <140/90 mm Hg for the total population (N=440), 40.5% of patients were controlled. When applying the JNC-VI blood pressure goals of <140/90 mm Hg for the nondiabetic population and <130/85 mm Hg for the diabetic population, 35.9% of patients were controlled.

Determinants of Blood Pressure Control

Table 1 summarizes the calculated odds ratio (OR) for blood pressure con-

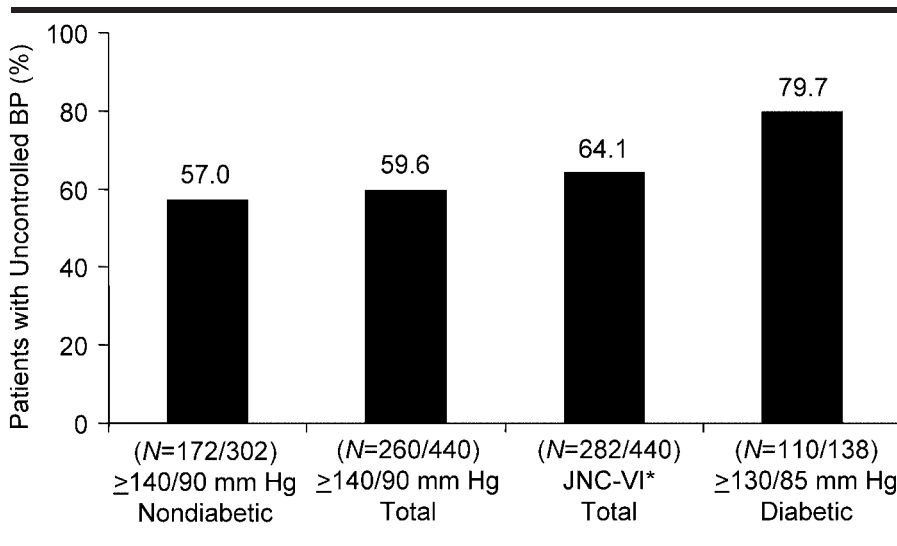


Fig 2. Rates of uncontrolled blood pressure, according to population and definition of control. Bar 1 represents the nondiabetic population above the goal blood pressure control level of $<140/90$ mm Hg. Bar 2 represents the total population above the control level of $<140/90$ mm Hg. Bar 3 represents the total population not meeting JNC VI recommendations for blood pressure control.* Bar 4 represents the diabetic population not meeting a control level of $<130/85$ mm Hg. *BP $<140/90$ mm Hg for nondiabetics and $<130/85$ mm Hg for diabetics

control for each of the variables assessed, after controlling for age and treatment intensity (the number of antihypertensive medications prescribed). Diabetes was the only clinical variable that was significantly associated with an increased OR for uncontrolled blood pressure (OR=2.92, $P<0.0001$). Age, dyslipidemia, LVH, angina, and CAD were not significant predictors of hyperten-

sion control, while patients with CHF and those with a family history of CVD had an increased likelihood of blood pressure control (OR for uncontrolled blood pressure, CHF=0.442, [$P=.0453$]; family history of CVD=0.567, [$P=.0143$]).

Table 2 shows prescribing patterns for the total and diabetic populations. For the total population, the most fre-

quently prescribed medications were diuretics and calcium channel blockers, followed by angiotensin-converting enzyme (ACE) inhibitors and beta blockers. For the diabetic population, the most frequently prescribed medications were ACE inhibitors, followed by diuretics and CCBs. In the total and the diabetic populations, 11.7% and 12.6% of patients, respectively, received no prescriptions for an antihypertensive medication during the data collection phase of this study. Alpha adrenergic blockers, ARBs, and combination products including 2 antihypertensive medications, each represented small percentages of total prescriptions.

DISCUSSION

Blood pressure control is poor in the general and diabetic populations in the United States.¹ This analysis was conducted using data from a large initiative designed to improve blood pressure control in patients enrolled in managed care/advanced physician organizations. The pool of patients with hypertension in this study was greater than 292,000 and contained a large proportion of patients with diabetes, ranging from 14% to 23%.⁷

Overall blood pressure control to JNC-VI goals in this cohort exceeded the level of control reported from National Health and Nutrition Examination Survey (NHANES) data.³ However, blood pressure control in this cohort remains lower than the *Healthy People 2010* goal of blood pressure control for 50% of hypertensive patients.⁸

It is reasonable to assume that treating hypertension in African Americans can result in comparable levels of blood pressure control achieved in White Americans. In an analysis of NHANES data comprising more than 16,000 adults, only 23% of hypertensive individuals taking medications had blood pressure values $<140/90$ mm Hg. African Americans were more likely than

Table 1. Odds ratios for determinants of hypertension control

Parameter	Odds Ratio	P Value*
Age	1.005	NS
Diabetes mellitus	2.921	$<.0001$ †
Dyslipidemia	1.004	NS
CHF	0.442	.0453‡
LVH	0.994	NS
Angina	1.131	NS
CAD	1.458	NS
Familial history of CVD	0.567	.0143‡
Male sex or postmenopausal status	1.036	NS
Stroke history	0.580	NS
Tobacco use	0.680	NS

Odds ratios controlled by treatment intensity. NS = not significant; CHF = congestive heart failure; LVH = left ventricular hypertrophy; CAD = coronary artery disease; CVD = cardiovascular disease.

* Significance threshold, $P<.05$.

† Positive predictor of uncontrolled hypertension.

‡ Negative predictor of uncontrolled hypertension.

Table 2. Most common prescriptions for antihypertensive medications among African Americans with high blood pressure

Drug Class/Combination	% of Prescriptions, Total Population*	% of Prescriptions, Patients with Diabetes†
Diuretics (all types)	20.9	19.5
CCBs (all types)	20.0	19.1
ACE inhibitors	16.6	22.1
Beta Blockers	13.8	11.1
Alpha adrenergic blockers	3.8	3.8
ACE inhibitor/diuretic combination	3.2	3.4
ARBs	3.0	2.3
Beta blocker/diuretic combination	1.4	1.2
ACE inhibitor/CCB combination	1.3	0.8
ARB/diuretic combination	1.2	1.5
Other	3.1	2.7
None‡	11.7	12.6

CCB = calcium channel blocker; ACE = angiotensin-converting enzyme; ARB = angiotensin II receptor blocker.

* Based on a total of 770 prescriptions for the total population (N = 440)

† Based on a total of 262 prescriptions for the diabetic population (N = 138).

‡ Hypertensive patients treated with therapeutic lifestyle change interventions only.

other groups to be unaware of having hypertension, however those African Americans who were taking medications had similar rates of blood pressure control as other groups.⁹ A community-based study also found that race does not lead to a disparity in the incidence of uncontrolled blood pressure; in this study, African-American and White adults who lived in the same community had similar access to health care.¹⁰

The 20% blood pressure control rate for African-American patients with diabetes is particularly troubling. In this cohort, having diabetes conferred an OR of 2.9 for the risk of uncontrolled blood pressure. The reasons for this discrepancy are uncertain; however, it is likely that physicians have yet to implement appropriate management strategies to lower blood pressure to the appropriate target (<130/85 mm Hg) in diabetic patients in general. Nearly 13% of the diabetic cohort was not receiving any prescription for an antihypertensive agent at the time of data collection.

Lack of adherence to therapy remains a possible reason for poor blood pressure control in the total population. Nonetheless, problems related to clinical management are also likely to play a significant role in uncontrolled hyperten-

sion. For example, Cushman and colleagues¹¹ identified different responses among African Americans and Caucasian Americans to different classes of antihypertensive medications. In particular, it has been observed that ACE inhibitors have less blood pressure lowering efficacy in African-American patients, compared with White patients.¹¹⁻¹² Weir and colleagues¹³ found that increased doses were needed to achieve the same degree of BP reduction in African-American patients as in White patients. Because there is a general perception that ACE inhibitors will not lower blood pressure sufficiently in African Americans, physicians may be reluctant to use them in this population, despite the fact that there is abundant data regarding their benefits, for certain patient groups, eg, patients with diabetes, heart failure, and those who are post-myocardial infarction.³ It is encouraging that the most frequently prescribed medication class for the African-American patients with diabetes included in this study was ACE inhibitors; however, there is room for improvement as only 28% of all antihypertensive prescriptions for diabetic patients included an ACE inhibitor.

Evaluating the treatment of hyper-

tension in the African-American community is critical. Adequate treatment intensity and the selection of appropriate antihypertensive medications are vital management strategies for achieving appropriate blood pressure goals and reducing serious complications related to hypertension. Because of the prevalence of diabetes and kidney disease among African Americans, medication selection may be of particular importance in this group. Current evidence that indicates increased information about the renoprotective and cardioprotective effects of ACE inhibitors in general^{3,14-16} and the benefits in African Americans, in particular,¹⁷ should be considered. It appears that primary care physicians may not be sufficiently aggressive in their management of high blood pressure. Research has indicated that physicians may frequently be willing to accept elevated systolic blood pressure, particularly in older patients.¹⁸ Monotherapy will bring only a small portion of patients with high blood pressure to target levels. Large, randomized clinical trials have demonstrated that 2 or more antihypertensive agents are required to achieve blood pressure goals in adults with uncomplicated hypertension.¹⁹⁻²⁰ Patients with diabetes generally require 3 or more medications to achieve a blood pressure goal of <130/80 mm Hg.²¹ Yet, the overall use of combination antihypertensive medications was very low in this study.

Educational initiatives designed for both patients and physicians are components of the second phase of this hypertensive care improvement program. Patient-oriented interventions will be designed to encourage therapy adherence, as well as reinforce lifestyle modifications. Physician-oriented education interventions will include reinforcing physicians' awareness and adherence to JNC-VI blood pressure goals and recommendations.

CONCLUSIONS

The findings from this study indicate that there is inadequate blood pres-

sure control in hypertensive African-American patients seen in primary healthcare settings. African Americans with hypertension and diabetes are at an increased risk for the complications of hypertension, as well as for poor hypertension control. Patterns of medication use and blood pressure control indicate that many uncontrolled hypertensive African Americans may benefit from more aggressive medical treatment using 2 or more antihypertensive medications at effective doses.

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