Factors Associated With Hypertension Awareness, Treatment, and Control in Dallas County, Texas

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Background: Hypertension (HTN) control rates in the United States remain lower in black than white persons, particularly before 65 years of age. Potential sociocultural factors have not been sufficiently addressed.

Methods: We analyzed data from structured interviews and blood pressure measurements in a population-based sample of 1514 hypertensive (1194 non-Hispanic black and 320 non-Hispanic white) subjects aged 18 to 64 years in Dallas County, Texas, from 2000 to 2002 to identify sociocultural factors associated with low rates of HTN control. We calculated adjusted odds ratios (aORs) and 95% confidence intervals (CIs) using multivariate logistic regression.

Results: Awareness, treatment, and control of HTN were negatively associated with a common perception of good health, with aORs (95% CIs) of 0.37 (0.27-0.50) for awareness, 0.47 (0.36-0.62) for treatment, and 0.66 (0.51-0.86) for control. They were positively associated with having a regular physician, with aORs (95% CIs) of 3.81 (2.86-5.07) for awareness, 8.36 (5.95-11.74) for treatment, and 5.23 (3.30-8.29) for control. Among untreated hypertensive subjects, lack of perceived need for a regular physician was associated with perceived good health (aOR [95% CI], 2.2 [1.2-4.0]), male gender (aOR [95% CI], 2.4 [1.4-4.1]), and black race/ethnicity (aOR [95% CI], 2.1 [1.0-4.4]). The HTN outcomes were unrelated to perceived racism or lay beliefs about the causes, consequences, and treatment of HTN.

Conclusions: Among young to middle-aged hypertensive subjects, a perception of good health and the lack of perceived need for a regular physician remain major factors associated with untreated and uncontrolled HTN at the community level—particularly among black men. These factors merit greater emphasis in professional education and public health programs on HTN.

Arch Intern Med. 2008;168(12):1285-1293

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Hypertension (HTN) is more prevalent and more severe and causes proportionally more disability and death among non-Hispanic black persons than among all other racial/ethnic groups in the United States, particularly before 65 years of age. Despite some evidence of recent improvement, HTN control rates remain lower in black than white persons, with recommended blood pressure (BP) treatment goals being achieved in less than one-third of the approximately 15 million US black persons with HTN. Multi-faceted health promotion programs targeting HTN in urban minorities have improved BP control in selected cohorts, but improvement has been difficult to sustain. Despite providing unencumbered access to health care, outreach programs have shown inconsistent improvement in HTN control at the community level. Thus, identifying and removing physician- and patient-related barriers that disproportionately affect HTN control in the US black population remain an unsolved public health problem. The recent literature on HTN control has emphasized physician nonadherence with evidence-based practice guidelines and patient nonadherence with prescription medication regimens and appointment keeping. Provider alerts via electronic medical records and patient education and self-monitoring via nurse telemedicine are new countermeasures undergoing evaluation. However, such technology-based approaches and HTN practice guidelines assume that the physician-patient relationship is already established. They do not address more upstream sociocultural factors such as beliefs about health and health care that could dissuade hypertensive individuals—even those with health insurance—from seeking primary care physicians, who diagnose and treat most HTN. The identification of such upstream factors cannot be gleaned from provider network databases and necessitates community-based research.

The Dallas Heart Study constitutes a population-based health survey that was designed, among other reasons, to explore factors associated with deficiencies and disparities in HTN awareness, treatment, and control in a contemporary multiethnic urban community.
to test for associations between HTN outcomes and the following 3 categories of sociocultural factors that have been hypothesized to disproportionately delay HTN detection and treatment in inner-city black populations: (1) perceived need for regular medical checkups in the absence of symptoms, (2) perceived racial discrimination when getting medical care, and (3) lay beliefs about HTN that differ from the medical understanding of the condition.8,15-19

STATISTICAL ANALYSES

Descriptive statistics at the population level required special methods to account for the stratified sampling design.14 The SAS Surveymeans procedure (SAS Institute Inc, Cary, North Carolina) was used to account for finite population size, stratified sampling design, and restriction of population inferences to hypertensive non-Hispanic black or hypertensive non-Hispanic white subjects aged 18 to 64 years. Before conducting statistical analyses, we excluded those 65 years or older to avoid the potential influence of transition to Medicare. The results of purely descriptive analyses are presented without P values and are expressed as percentages unless otherwise noted.

Three separate logistic regression models were developed to predict an individual sample member’s probability of HTN awareness, treatment, or control, conditional on sets of covariates. In these models we weighted the subjects equally. Following recommended guidelines,27-29 we minimized the risk of false discovery using a number of steps.

First, candidate predictors were selected from those available on the basis of the existing literature. Dichotomous coding of candidate predictors removed the possibility of false linearity assumptions. Second, interactions between candidate predictors that had significant influence on the outcomes were ruled out using exploratory recursive partitioning.30 Third, best subset model selection based on the complete candidate pool of covariates produced a series of best models of increasing size. Fourth, we applied 10-fold cross-validation to this series of best models to identify which had the least cross-validated misclassification error. Using cross-validation addresses bias arising when a model is validated on the same data from which it was estimated.31 In short, the original sample was split randomly into 10 subsets of equal size. The outcomes in each subset were predicted using the model fit to the other 9, and this process was performed for each model in the series of best models of increasing size. The final model selected was the one with the lowest overall misclassification rate between predicted and actual outcomes.

The optimal logistic regression models identified this way were augmented with covariates not selected but of interest owing to their absence or implication in previous studies. None of the additionally included covariates significantly affected the fit of those optimally selected. Finally, we verified that our data included a sufficient number of events (or nonevents, whichever were rarer) per selected variable, including the added covariates. Specifically, our data included 43 aware hypertensive subjects per selected variable, 59 treated hypertensive subjects per selected variable, and 30 subjects with uncontrolled HTN per selected variable. The general rule is that there should be at least 10 events per selected variable.27-29

Stepwise logistic regression was used to explore factors associated with no perceived need for a regular physician among respondents lacking one and to explore factors associated with a perception of poor health. A significance level of .05 was required for both selection and retention of a variable.

All analyses except for recursive partitioning were performed using SAS/STAT statistical software (version 9.13; SAS Institute Inc). Recursive partitioning was performed using the rpart package of R, version 2.6.1.32 Throughout the text and tables, results of multivariate logistic models are presented as adjusted odds ratios (aORs).
RESULTS

In this relatively young adult population, overall HTN prevalence was 24.5%; among the hypertensive subjects, overall rates of HTN awareness, treatment, and control were 64.4%, 50.6%, and 26.9%, respectively (Table 1). All subsequent results pertain only to those with HTN.

Among the 4 gender × race groups of hypertensive individuals, mean age ranged from 45.2 to 49.2 years and mean body mass index (calculated as weight in kilograms divided by height in meters squared) ranged from 29.7 to 33.3 (stage 1 obesity). A wide spectrum of socioeconomic indicators was represented; for example, 42.2% to 64.9% of the hypertensive subjects had education beyond high school (Table 2). Most (74.4%-85.5%) had some form of health insurance.

Most hypertensive subjects (69.2%-80.2%) rated their overall health as good to excellent (Table 3).

Rates of perceived personal experience of racism in everyday life were higher among black men than white men (50.0% vs 13.8%) and among black women than white women (47.7% vs 10.5%). Rates of perceived racial discrimination when getting medical care also were higher among black

<table>
<thead>
<tr>
<th>Demographic Groups</th>
<th>HTN Prevalence, % (SE)</th>
<th>Unweighted Hypertensive Sample Size</th>
<th>Subjects With HTN, % (SE)</th>
<th>Control Among Treated Subjects</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total</td>
<td>24.5 (1.0)</td>
<td>1514</td>
<td></td>
<td></td>
</tr>
<tr>
<td>18-39 y</td>
<td>11.5 (1.2)</td>
<td>305</td>
<td>64.4 (2.3)</td>
<td>50.6 (2.3)</td>
</tr>
<tr>
<td>40-59 y</td>
<td>34.9 (1.7)</td>
<td>1012</td>
<td>49.6 (5.3)</td>
<td>32.3 (4.8)</td>
</tr>
<tr>
<td>60-64 y</td>
<td>52.0 (5.2)</td>
<td>197</td>
<td>66.8 (2.8)</td>
<td>53.0 (2.8)</td>
</tr>
<tr>
<td>Total</td>
<td>24.5 (1.6)</td>
<td>18-39 y</td>
<td>66.7 (2.3)</td>
<td>53.6 (2.5)</td>
</tr>
<tr>
<td>Men</td>
<td></td>
<td>12.9 (1.9)</td>
<td>37.0 (7.1)</td>
<td>20.3 (5.7)</td>
</tr>
<tr>
<td>40-59 y</td>
<td>33.1 (2.4)</td>
<td>448</td>
<td>68.3 (3.9)</td>
<td>49.0 (4.3)</td>
</tr>
<tr>
<td>60-64 y</td>
<td>60.6 (7.9)</td>
<td>85</td>
<td>77.3 (8.7)</td>
<td>66.9 (9.6)</td>
</tr>
<tr>
<td>Total</td>
<td>24.6 (1.4)</td>
<td>40-59 y</td>
<td>66.2 (6.3)</td>
<td>48.1 (7.0)</td>
</tr>
<tr>
<td>Women</td>
<td></td>
<td>10.1 (1.4)</td>
<td>67.2 (3.9)</td>
<td>56.4 (3.8)</td>
</tr>
<tr>
<td>60-64 y</td>
<td>45.0 (6.4)</td>
<td>112</td>
<td>81.1 (5.4)</td>
<td>77.0 (5.8)</td>
</tr>
<tr>
<td>Total</td>
<td>31.1 (1.4)</td>
<td>18-39 y</td>
<td>66.7 (2.3)</td>
<td>53.6 (2.5)</td>
</tr>
<tr>
<td>Black</td>
<td></td>
<td>13.8 (1.4)</td>
<td>51.8 (5.4)</td>
<td>37.5 (5.6)</td>
</tr>
<tr>
<td>40-59 y</td>
<td>52.9 (2.3)</td>
<td>793</td>
<td>71.3 (2.8)</td>
<td>57.8 (3.1)</td>
</tr>
<tr>
<td>60-64 y</td>
<td>75.7 (3.9)</td>
<td>152</td>
<td>76.1 (5.8)</td>
<td>68.7 (6.0)</td>
</tr>
<tr>
<td>White</td>
<td>Total</td>
<td>21.6 (1.3)</td>
<td>18-39 y</td>
<td>47.8 (8.3)</td>
</tr>
<tr>
<td>Total</td>
<td>21.6 (1.3)</td>
<td>320</td>
<td>62.9 (3.4)</td>
<td>48.7 (3.4)</td>
</tr>
<tr>
<td>Black men</td>
<td>Total</td>
<td>30.6 (1.9)</td>
<td>18-39 y</td>
<td>28.1 (5.8)</td>
</tr>
<tr>
<td>White men</td>
<td>Total</td>
<td>31.5 (1.9)</td>
<td>18-39 y</td>
<td>73.1 (7.9)</td>
</tr>
<tr>
<td>Black women</td>
<td>Total</td>
<td>31.5 (1.9)</td>
<td>18-39 y</td>
<td>73.1 (7.9)</td>
</tr>
<tr>
<td>White women</td>
<td>Total</td>
<td>31.5 (1.9)</td>
<td>18-39 y</td>
<td>73.1 (7.9)</td>
</tr>
</tbody>
</table>

a Data are weighted to the residential population of Dallas County, Texas, aged 18 to 64 years.

b Subjects are grouped by years of age, gender, and race.

(REPRINTED) ARCH INTERN MED/VOL 168 (NO. 12), JUNE 23, 2008 WWW.ARCHINTERNMED.COM

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men than white men (11.5% vs 4.0%) and higher among black women than white women (14.7% vs 1.1%) (Table 3).

All 4 gender/race groups were quite similar in their beliefs about HTN. Most hypertensive subjects held several beliefs about HTN that are concordant with the current medical understanding of the condition, but they also held other discordant beliefs (Table 3). For example, 98.6% to 99.7% believed that prescription medication is an effective treatment for HTN. However, 77.9% to 89.8% of hypertensive subjects also believed that garlic, herbs, or vitamins are effective treatments. In contrast to the medical model of HTN as an asymptomatic “silent killer,” 88.5% to 90.4% of all hypertensive subjects believed HTN usually causes symptoms.

FACTORS ASSOCIATED WITH HTN

Awareness, Treatment, and Control

In 3 logistic regression models, having a regular physician was the strongest predictor of HTN awareness, treatment, and control, which is consistent with previous data.33,34 Also consistent with previous data,35 having diabetes mellitus (a comorbid condition that brings patients to medical attention) was associated with a greater likelihood of HTN awareness and treatment but not control (Table 4).

Hypertensive adults who rated their overall health as good to excellent were much less likely than those who rated their health as fair to poor to be aware of their HTN, to have it medically treated, or to have it controlled (Table 4). Consistent with a low level of risk perception, those who were unaware of any parental history of HTN were less likely to be aware of their own HTN or to have it treated. Furthermore, younger hypertensive adults (aged <45 years) were less likely than older ones (aged 45-64 years) to be aware of HTN or to have it treated and controlled. All 3 indicators (self-rated good-to-excellent health, no known parental HTN history, and young age) remained significant when the awareness and treatment models were rerun on a subset of hypertensive subjects (n=827) with 2 additional sets of BP measurements (data not shown).

Table 2. Biological, Socioeconomic, and Medical Characteristics of the Hypertensive Subjects

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Black Men (n=545)</th>
<th>Black Women (n=649)</th>
<th>White Men (n=153)</th>
<th>White Women (n=167)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age, y</td>
<td>45.2 (0.7)</td>
<td>46.3 (0.7)</td>
<td>47.3 (1.1)</td>
<td>49.2 (0.9)</td>
</tr>
<tr>
<td>BMI</td>
<td>29.7 (0.4)</td>
<td>33.3 (0.8)</td>
<td>30.1 (0.5)</td>
<td>31.6 (0.8)</td>
</tr>
<tr>
<td>Systolic BP, mm Hg</td>
<td>149.3 (1.2)</td>
<td>145.3 (1.3)</td>
<td>142.8 (1.4)</td>
<td>140.6 (1.5)</td>
</tr>
<tr>
<td>Diastolic BP, mm Hg</td>
<td>89.5 (0.8)</td>
<td>87.8 (0.8)</td>
<td>88.6 (0.8)</td>
<td>85.2 (0.8)</td>
</tr>
<tr>
<td>Education beyond high school</td>
<td>50.0 (3.5)</td>
<td>42.2 (3.6)</td>
<td>64.9 (4.9)</td>
<td>56.2 (4.5)</td>
</tr>
<tr>
<td>Annual household income &lt;$16 000</td>
<td>24.0 (3.3)</td>
<td>27.4 (2.8)</td>
<td>10.6 (2.9)</td>
<td>8.1 (2.0)</td>
</tr>
<tr>
<td>Married or living with partner</td>
<td>57.9 (3.3)</td>
<td>47.4 (3.7)</td>
<td>72.8 (3.8)</td>
<td>68.9 (3.9)</td>
</tr>
<tr>
<td>Weekly religious service attendance</td>
<td>35.0 (3.2)</td>
<td>57.4 (3.6)</td>
<td>24.3 (4.7)</td>
<td>36.0 (4.4)</td>
</tr>
<tr>
<td>Has smoked ≥ 100 cigarettes in his/her lifetime</td>
<td>39.8 (3.6)</td>
<td>29.0 (3.3)</td>
<td>25.9 (4.3)</td>
<td>23.9 (3.8)</td>
</tr>
<tr>
<td>Has drunk an alcoholic beverage</td>
<td>87.8 (2.2)</td>
<td>81.1 (2.7)</td>
<td>99.5 (0.4)</td>
<td>90.7 (2.9)</td>
</tr>
<tr>
<td>Diabetes mellitus</td>
<td>14.2 (2.4)</td>
<td>17.5 (2.6)</td>
<td>13.8 (3.9)</td>
<td>11.5 (2.8)</td>
</tr>
<tr>
<td>Heart attack</td>
<td>5.9 (1.6)</td>
<td>6.6 (2.2)</td>
<td>7.1 (2.5)</td>
<td>0.3 (0.3)</td>
</tr>
<tr>
<td>Stroke</td>
<td>4.5 (1.3)</td>
<td>6.0 (1.9)</td>
<td>3.1 (1.5)</td>
<td>2.2 (1.2)</td>
</tr>
<tr>
<td>Kidney failure</td>
<td>0.6 (0.3)</td>
<td>1.1 (0.6)</td>
<td>0.0 (0.0)</td>
<td>0.0 (0.0)</td>
</tr>
</tbody>
</table>

Abbreviations: BMI, body mass index (calculated as weight in kilograms divided by height in meters squared); BP, blood pressure; ED, emergency department; HMO, health maintenance organization; HTN, hypertension; VA, Veterans Administration.

*Numbers of subjects are unweighted sample size. Data are expressed as percentages (SE), unless otherwise noted, and weighted to the residential population of Dallas County, Texas, aged 18 to 64 years.
None of the prevalent lay beliefs about HTN was significantly associated with HTN awareness, treatment, or control (Table 4). Likewise, neither perceived racism (in everyday life or when getting health care) nor other negative perceptions about medical care was associated with the 3 HTN outcomes.

After adjusting for all of these factors, the models indicate that black hypertensive subjects were no more or less likely than white hypertensive subjects to be aware of their HTN or to have it controlled. However, hypertensive men were less likely than hypertensive women to be aware or to have HTN treated and controlled.

Reasons Cited for Not Having a Regular Physician

Because a regular physician is so important for controlling HTN, we asked respondents without a physician to indicate the primary reason for not having one. Whereas finance was the reason most frequently cited by hypertensive white (2%) and black (9%) women, the reason most frequently cited by hypertensive white (8%) and black men (23%) was that they “have not needed a doctor” (Figure). Average home BP was higher in subjects who did not perceive a need for a physician than in those under the care of a regular physician (149/91 vs 143/86 mm Hg) (P <.001 for both systolic and diastolic BP). In stepwise logistic regression, the strongest predictors of the perception of not needing a physician were self-rated overall health as good to excellent (aOR [95% confidence interval (CI)], 2.2 [1.2-4.0]) and male gender (aOR [95% CI], 2.4 [1.4-4.1]). Self-identification as black or African American (aOR [95% CI], 2.1 [1.0-4.4]) entered the model only after the additional effects of alcohol consumption (aOR [95% CI], 0.34 [0.16-0.76]), insurance provided by the Department of Veterans Affairs (aOR [95% CI], 0.08 [0.01-0.72]), emergency department visits in the past year (aOR [95% CI], 0.45 [0.23-0.87]), and an annual household income of less than $16 000 (aOR [95% CI], 0.54 [0.32-0.91]). The good-to-excellent self-rating of health remained significant when the model was rerun on the subset of hypertensive subjects with 3 sets of BP measurements. Finally, when the self-rating of fair-to-poor health was modeled using stepwise logistic regression, the only strong association was with self-reported diabetes mellitus (aOR [95% CI], 2.8 [2.1-3.7]).
That perceived good health, younger age, and lack of a known parental history of HTN were associated with a lower likelihood of HTN awareness, treatment, or control among hypertensive young and middle-aged adults, regardless of race, perceived their health to be good. In our study, the only factor strongly associated with perceived poor health was self-reported diabetes mellitus, a comorbid condition that, when symptomatic, brings patients to medical attention. Thus, further research is needed to better understand the psychological factors influencing overall health perception and health care-seeking behavior among hypertensive individuals lacking such comorbidity.

As indicated by our data and many previous data sets, having a regular physician constitutes a health care–seeking behavior of pivotal importance in every step of the process leading to HTN control. Repeated documentation of elevated BP on multiple occasions is necessary to confirm the medical diagnosis of HTN, and continuity of care is essential for effective titration of antihypertensive medication.

Figure. Reasons cited for not having a regular physician by Dallas County residents with hypertension. This question was asked only of subjects without a regular physician (38% of hypertensive black men, 20% of hypertensive black women, 21% of hypertensive white men, and 8% of hypertensive white women). The bar graph reflects percentages of the total hypertensive population (subjects with and without a regular physician).

Table 4. Adjusted Odds Ratios (aORs) for HTN Awareness, Treatment, and Control

<table>
<thead>
<tr>
<th>Reason and Hypertensive Population (aORa (95% CI))</th>
<th>Awareness aORa (95% CI)</th>
<th>Treatment aORa (95% CI)</th>
<th>Control aORa (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Has a regular physician</td>
<td>3.81 (2.86-5.07)</td>
<td>8.36 (5.95-11.74)</td>
<td>5.23 (3.30-8.29)</td>
</tr>
<tr>
<td>Has diagnosed diabetes mellitus</td>
<td>2.02 (1.35-3.01)</td>
<td>2.13 (1.50-3.03)</td>
<td>1.12 (0.81-1.54)</td>
</tr>
<tr>
<td>Perceives own health as good to excellent</td>
<td>0.37 (0.27-0.50)</td>
<td>0.47 (0.36-0.62)</td>
<td>0.66 (0.51-0.86)</td>
</tr>
<tr>
<td>Unaware of parental history of high BP</td>
<td>0.43 (0.33-0.56)</td>
<td>0.55 (0.42-0.71)</td>
<td>0.77 (0.58-1.02)</td>
</tr>
<tr>
<td>Younger than 45 y</td>
<td>0.41 (0.32-0.53)</td>
<td>0.38 (0.29-0.49)</td>
<td>0.60 (0.45-0.81)</td>
</tr>
<tr>
<td>Believes high BP or HTN usually causes symptomsb</td>
<td>0.86 (0.57-1.29)</td>
<td>0.73 (0.48-1.09)</td>
<td>1.08 (0.70-1.66)</td>
</tr>
<tr>
<td>Believes high BP or HTN is caused by eating too much pork</td>
<td>0.80 (0.56-1.13)</td>
<td>0.83 (0.59-1.16)</td>
<td>0.90 (0.64-1.28)</td>
</tr>
<tr>
<td>Believes HTN is effectively treated by garlic, herbs, and vitamins</td>
<td>1.46 (1.00-2.13)</td>
<td>1.12 (0.77-1.63)</td>
<td>1.23 (0.82-1.83)</td>
</tr>
<tr>
<td>Believes high BP or HTN is effectively treated by bittersc</td>
<td>1.25 (0.95-1.65)</td>
<td>1.13 (0.86-1.49)</td>
<td>1.18 (0.89-1.56)</td>
</tr>
<tr>
<td>Has experienced racial discrimination when getting medical care</td>
<td>3.68 (2.46-1.00)</td>
<td>0.84 (0.57-1.24)</td>
<td>0.82 (0.54-1.24)</td>
</tr>
<tr>
<td>Self-assigned non-Hispanic black race/ethnicity</td>
<td>1.18 (0.84-1.60)</td>
<td>1.45 (1.05-1.99)</td>
<td>0.77 (0.55-1.07)</td>
</tr>
<tr>
<td>Male gender</td>
<td>0.76 (0.59-0.97)</td>
<td>0.73 (0.57-0.93)</td>
<td>0.61 (0.47-0.79)</td>
</tr>
</tbody>
</table>

Abbreviations: BP, blood pressure; CI, confidence interval; HTN, hypertension.

a Adjusted for all other variables in a logistic regression model.
b Symptoms include headaches, dizziness, or rapid heart beat.
c Include vinegar, mustard, and other bitter liquids.
to masculinity should be taken into account when developing health promotion messages that resonate with men.

In contrast to what has been hypothesized,8,15-18,39 we found no evidence that disparities in HTN awareness, treatment, or control were associated with perceived racial discrimination or lay beliefs about HTN. In this regard, our rates of perceived racial discrimination—in everyday life and when getting medical care—fall within the range of those reported by other major epidemiologic studies.23,40-43

Our data confirm previous qualitative research16,18,19,39,44 by showing that most hypertensive individuals hold beliefs about HTN—its causes, consequences, and treatment—that are both concordant and discordant with the medical understanding of this condition. Furthermore, our data extend the previous body of work by (1) highlighting the similarity between black and white hypertensive subjects in their beliefs about HTN and (2) showing that prevalent lay beliefs about HTN—whether concordant or discordant with the medical model—were not associated with HTN awareness, treatment, or control. Previous studies were not designed to study HTN beliefs across racial groups or to test for associations with HTN outcomes.

The strengths of the present study include the probability-based population sample and the careful measurement of BP. The large number of black hypertensive subjects surveyed in 1 county approaches or exceeds the total sample size of hypertensive black participants in national surveys.1,2 Despite some differences in methods, age-specific HTN prevalence estimates are similar to current US population estimates.1,2 Awareness, treatment, and control rates appear somewhat lower in Dallas County, although misclassification from alerting (“white coat”) reactions should have been minimized by repeated BP measurements in the participants’ homes by racially congruent surveyors.

The study also has potential limitations. There is an inherent potential for finding spurious associations when large numbers of variables and responses are analyzed. Our method adheres to published criteria for minimizing this potential by ensuring sufficient numbers of outcome events for each explanatory variable selected in the final multivariate models, testing for interactions, and using holdout data to validate the proposed models.27-29

The cross-sectional design cannot establish causal attribution between health perception and health behavior. Merely being told one has HTN can trigger anxiety, and HTN labeling has been associated with lower self-rated health status.45 However, getting one’s HTN treated and controlled generally leads to improved self-rated health,46,47 which cannot explain the directionally opposite associations we observed.

Most of our analyses are based on a single set of BP measurements, which can overestimate HTN prevalence and underestimate HTN awareness, treatment, and control. However, our major conclusions were the same regardless of whether individual HTN status was defined by 1 set of BP measurements or 3 separate sets on different days.

Physician behavior and adherence to a medication regimen, 2 important determinants of HTN control, were beyond the scope of this population survey. Although physicians can be too slow to initiate and intensify BP medication therapy, recent studies suggest improvement and no differential treatment of black and white hypertensive subjects.9,38 Our data by no means contradict other data suggesting that adherence may be enhanced when patients have a detailed understanding of their individualized treatment goals.49

Our conclusions are based on a single urban community in the southwestern United States and need independent confirmation before being applied to other urban centers or rural communities. Because of the intentionally restricted age range of this sample, our findings may not apply to Medicare beneficiaries 65 years or older.36,50 However, black men are underrepresented in the Medicare population, with a mean life expectancy of 68 years, owing in part to cardiovascular complications of uncontrolled HTN.51,52

CONCLUSIONS

Our study draws attention to a persistent disparity in HTN control disproportionately affecting non-Hispanic black men and informs the development and evaluation of new public health programs designed to reduce this disparity. Previous programs have used popular secular sites such as barbershops and sporting events to convey preventive cardiology messages to large segments of the at-risk male population who have not engaged the health care system.53-56 Despite their widespread appeal and recent feasibility data,54 these programs have never been formally evaluated. Adequately powered randomized, controlled community intervention trials are needed,57 with the primary outcome metric being the change in HTN control rates in well-defined community samples. For example, a prospective group-randomized trial is under way in 16 black-owned barbershops to test whether HTN control rates (the percentage of regular hypertensive male customers achieving recommended BP levels) will increase more in 8 shops randomized to an enhanced HTN detection, referral, and follow-up program administered by barbers than in 8 other shops randomized to standard HTN screening and health education (ClinicalTrials.gov number, NCT00325533). Based on the findings of the present report, the enhanced intervention does not focus on changing HTN beliefs per se but rather is designed to increase health care–seeking behavior by personalizing the health risk posed by elevated BP, emphasizing the need for a regular physician for effective risk reduction, and making risk reduction socially desirable.

Accepted for Publication: December 28, 2007.

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Author Contributions: Study concept and design: Victor, Vaeth, Freeman, and Haley. Acquisition of data: Victor and

Financial Disclosure: None reported.

Funding/Support: This study was supported by grants from the Donald W. Reynolds Foundation and the American Heart Association Patient Care and Outcomes Research Program and by grant HL080582 from the National Heart Lung and Blood Institute (Dr Victor). Dr Hess was supported by a fellowship grant from the Doris Duke Foundation; Dr Jones, by National Institutes of Health training grant HL-07360; and Dr Ravenell, by a career development award from the American Heart Association Pharmaceutical Roundtable Program.

Role of the Sponsors: The funding organizations had no role in the design and conduct of the study; the collection, management, analysis, and interpretation of the data; and the preparation, review, or approval of the manuscript.

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