

HYPERTENSION KNOWLEDGE AMONG PATIENTS FROM AN URBAN CLINIC

Objective: To determine levels and correlates of hypertension knowledge.

Design: Cross-sectional telephone survey.

Setting: Urban, public hospital clinic.

Participants: 296 adults with hypertension.

Main Outcome Measure: Hypertension knowledge was assessed through a 10-item test; respondents received one point for each correct answer.

Results: Eighty-nine percent of respondents were Black, 79% were female, 75% had a monthly income <\$1000, and 62% had completed high school. Items with the lowest percentage of correct responses included knowing that hypertension does not cause cancer (41.9% correct), a blood pressure of 130/80 mm Hg is normal (59.8% correct), hypertension lasts a lifetime (60.5% correct), and renal failure is a complication of hypertension (76.4% correct). Overall, 39% answered 9 or 10 questions correctly. Low hypertension knowledge (≤ 7 questions correct) was associated with age ≥ 60 years, having less than a high school education, and reporting a first hypertension diagnosis within 9 years before being surveyed.

Conclusions: Hypertension knowledge deficits in specific content areas and among certain subgroups were present in this urban population. Educational programs focusing on newly diagnosed hypertensive patients and aimed at filling targeted knowledge deficits may be a cost-effective approach to increase hypertension knowledge in similar populations. (*Ethn Dis.* 2008;18:42–47)

Key Words: Hypertension, Knowledge, Minority, Urban, End-stage Renal Disease

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INTRODUCTION

Hypertension is common among US adults, with a prevalence of 28.7%.¹ Despite effective treatments, approximately two thirds of all patients with hypertension in the United States have uncontrolled blood pressure.¹ Racial disparities are also evident; Blacks have lower rates of controlled hypertension than do other ethnic groups.^{1,2} In addition, Blacks have an increased risk of hypertension complications, including cardiovascular disease, end-stage renal disease, and stroke.^{3–9}

The causes of uncontrolled hypertension are multifactorial.¹⁰ Patient factors associated with hypertension control include demographics, socioeconomic, health beliefs, and the presence of other chronic diseases.¹⁰ An additional potential cause for the high rates of uncontrolled blood pressure and its long-term complications in the urban setting is insufficient hypertension knowledge.¹¹ However, data supporting this hypothesis are limited.^{12,13} We report the results of a study assessing hypertension knowledge and correlates of low hypertension knowledge in an urban setting.

METHODS

Target Population

In September 2004, we identified patients from the rosters of four inter-

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nists practicing at the Medical Center of Louisiana in New Orleans, a public hospital-based, faculty-run continuity clinic. The population served in this clinic was largely composed of uninsured or underinsured adult, female patients from the greater New Orleans metropolitan area.

All patients with established hypertension, ≥ 18 years of age, were considered eligible for participation. We defined established hypertension as two outpatient diagnoses of hypertension (International Classification of Diseases, Ninth Revision, Clinical Modification code 401.0–401.9), recorded in the clinic's administrative database during the preceding 12 months. Of the 1017 eligible candidates identified, 696 were not surveyed because 1) they had inactive or incorrect telephone numbers listed in the database ($n=122$); 2) they denied a diagnosis of hypertension ($n=7$); 3) they were unreachable despite a working phone number and multiple attempts ($n=519$); or 4) they were not called because the study was interrupted by Hurricane Katrina ($n=48$). Input error led to one survey without documented data. Of the eligible participants eventually contacted, 24 (7%) refused participation. We analyzed data from the 296 participants who completed the survey.

Survey Administration

The telephone survey was conducted between October 2004 and August 2005. A single trained interviewer administered the survey using a standardized script. Multiple attempts, at varying times of the day and evening and on weekdays and weekends were made to contact patients. Once potential participants were reached and the study introduced, their voluntary participation in completion of the survey was requested.

Survey Instrument Description

Of relevance to the current analysis, the survey instrument included domains of sociodemographics, health-related behaviors, medical history, healthcare experiences, and hypertension knowledge. Sociodemographic information included age, sex, race, income, education level, and current employment and habitation status. Behavioral questions included cigarette smoking and alcohol consumption. The medical history portion of the survey included a self-reported history of diabetes, high cholesterol, and duration of hypertension. Healthcare experiences included questions on the patients' perceived accessibility to and relationship with their physician.

Hypertension knowledge was ascertained by using a test adapted from a previously published knowledge questionnaire.¹⁴ This tool was developed to assess hypertension knowledge in low literacy patient populations and applied in a population that included a high percentage of Blacks and Latinos.¹⁴ The current survey included multiple aims beyond the assessment of hypertension knowledge. Therefore, to reduce respondent burden, the hypertension knowledge instrument was shortened to 10 questions. The shortened hypertension knowledge test assessed respondents' knowledge in defining hypertension, lifestyle and behaviors that may affect blood pressure levels, and the long-term consequences of hypertension. Responses were coded as correct or incorrect, with one point assigned for each correct response and zero points assigned for incorrect responses or responses of "don't know." Points were summed to generate a total score, with a possible range of 0 to 10; higher scores reflected better hypertension knowledge. Because the distribution of hypertension knowledge scores was skewed, participants were classified into tertiles of hypertension knowledge. Participants who incorrectly answered three or more questions (ie, scores ≤ 7) were classified as having low hypertension knowledge.

Those who answered 8 questions correctly were classified as having medium hypertension knowledge, and those who answered 9 or 10 questions correctly were classified as having high hypertension knowledge.

The institutional review boards at Tulane University Health Sciences Center and Louisiana State University Health Sciences Center approved all aspects of the study. We obtained verbal informed consent from each participant before beginning the interviews.

Statistical Methods

Data entry occurred at the time of interview into the back-end application of a web-based survey software tool (Key Survey, Braintree, Mass). Data were stored in an ASCII file and imported to SAS 9.1 statistical software (SAS Institute, Cary, NC) for analysis.

We determined the proportion of participants that answered each question correctly. Next, the prevalence of low hypertension knowledge was determined by demographic and socioeconomic characteristics, cigarette smoking, medical history, and healthcare experiences of the study participants and compared across strata using the chi-square test. A *P* value of $<.05$ was considered statistically significant. We calculated the adjusted odds ratios of low hypertension knowledge using a logistic regression model, with high hypertension knowledge as the comparative group. Covariates in the model included age, sex, monthly income, education, smoking, history of diabetes, history of myocardial infarction or stroke, family history of hypertension, hypertension duration, and whether they were comfortable asking their doctor questions.

RESULTS

Characteristics of participants included in the current analysis are shown in Table 1. Eighty-nine percent of participants were black, 79% were

female, and 75% reported an income less than \$1000 per month and 62% had graduated high school. A family history of hypertension was reported by 92% and 53% reported receiving their first diagnosis of hypertension within the previous five years. Overall, 23% and 3% reported they were sometimes or never comfortable asking their doctor questions, respectively.

The distribution of correct responses is shown for each item in Table 2. More than one third of participants did not recognize a blood pressure reading of 130/80 mm Hg as normal and failed to understand that hypertension lasted a lifetime. Also, more than half of participants were unaware that hypertension did not cause cancer. Approximately one in four participants failed to associate hypertension with the development of kidney disease. At least 80% of participants answered each of the remaining questions correctly.

The distribution of overall hypertension knowledge scores is presented in Figure 1. The median hypertension knowledge score was 8 (25th percentile=7 and 75th percentile=9). The prevalence of low hypertension knowledge scores was more common among participants aged ≥ 60 years than among those aged <50 years (Table 1). Also, higher percentages of participants with less than a high school education, more recently diagnosed with hypertension, and who were less comfortable asking their physician questions had low hypertension knowledge.

After multivariate adjustment, participants with less than a high school education and a more recent diagnosis of hypertension had increased odds of low hypertension knowledge (Table 3). Also, although not statistically significant, the multivariate-adjusted odds ratio of low hypertension knowledge was increased for those ≥ 60 versus <50 years of age, those with a concurrent diagnosis of diabetes, and those who were less comfortable asking their physician questions.

Table 1. Characteristics and percentage of survey respondents (n=296) with low hypertension knowledge*

Characteristic	%	% with low hypertension knowledge	P value
Overall		35.1	
Age			
<50 years	27.4	29.6	
50-59 years	34.1	26.7	
≥60 years	38.5	46.5	.009
Black	88.9	36.1	
Non-Black	11.2	27.3	.32
Female	79.4	35.3	
Male	20.6	34.4	.90
Monthly income			
<\$500	22.3	37.9	
\$500-\$1000	52.7	33.3	
≥\$1000	25.0	36.5	.89
Formal education			
Less than high school	38.5	43.9	
High school or more	61.5	29.7	.01
Cigarette smoking			
Current	18.6	36.4	
Former	34.5	33.3	.70
Never	47.0	36.0	.96
History of diabetes			
Yes	34.8	39.8	
No	65.2	32.6	.22
History of heart attack/stroke			
Yes	14.5	41.9	
No	85.5	34.0	.32
Family history of hypertension			
Yes	92.2	34.1	
No	7.8	47.8	.19
Hypertension duration			
<1 year	9.1	55.6	
1-4 years	43.6	37.2	
5-9 years	18.2	38.9	
≥10 years	29.1	23.3	.004
Comfortable asking physician questions			
Always	73.3	32.3	
Sometimes	23.3	42.0	.14
Never	3.4	50.0	.25

* Hypertension knowledge scores can range from 0 to 10 with higher scores indicating greater hypertension knowledge. Low hypertension knowledge defined as a score <8.

P values reflect differences in the prevalence of low hypertension knowledge across subgroups.

DISCUSSION

We found that 65% of patients queried from this urban, indigent clinic correctly answered ≥8 of the 10 hypertension knowledge questions. There were, however, knowledge deficits identified, including the definition of a normal blood pressure, that

hypertension has a lifelong duration, and that hypertension can cause kidney problems.

This study confirms the results of previous research on hypertension knowledge in vulnerable populations.^{13,15-17} Some subgroups were more likely to have low hypertension knowledge scores. Older adults had lower hypertension knowl-

edge scores compared to their younger counterparts. In a previous study, adults >70 years of age had lower hypertension knowledge,¹⁸ supporting the findings from the current study. We also found that those with less formal education had lower hypertension knowledge scores, which is consistent with prior research.¹⁹

In our population, participants reporting a more recent initial diagnosis of hypertension were more likely to have low hypertension knowledge scores. Previous research suggests that this may not be true for all populations.¹⁷ Specifically, in a racially mixed population, despite a median hypertension duration of 14 years, patients were reported to lack a comprehensive understanding of hypertension.¹⁷ However, that study did not use a standardized instrument to assess hypertension knowledge, and the main focus of that study was to examine patients' level of systolic blood pressure knowledge.

Participants with a diagnosis of diabetes were more likely to have low hypertension knowledge compared to their counterparts without diabetes. Diabetes patients with inadequate health literacy had lower hypertension knowledge scores than did those with better health literacy.¹⁴ Furthermore, our public hospital system has extensive opportunities for diabetes education that may compete with the patients' need for hypertension education. This finding is significant given the high prevalence of a co-morbid diagnosis of diabetes and hypertension in low-income populations.²⁰

In the current study, only 76.4% of participants knew hypertension causes kidney problems. Given that the study sample was 89% Black, this finding is especially relevant. Hypertension is a leading cause of end-stage renal disease, and the prevalence of kidney disease is high among Blacks.^{21,22} Prior surveys have also demonstrated that Black populations are less likely to perceive themselves as susceptible to end-stage

Table 2. Hypertension knowledge items and percentage of participants with correct responses

Item	Hypertension Knowledge Item	Response options*	% Correct
1	If someone's blood pressure is 130/80, it is...	high, low, normal , don't know	59.8
2	If someone's blood pressure is 160/100 it is...	high , low, normal, don't know	88.5
3	Once someone has high blood pressure, it usually lasts for ...	a few years, 5–10 years, the rest of their life , don't know	60.5
4	People with high blood pressure should take their medicine...	everyday , at least a few times a week, only when they feel sick	99.7
5	Losing weight usually makes blood pressure...	go up, go down , stay the same	81.1
6	Eating less salt usually makes blood pressure...	go up, go down , stay the same	86.2
7	High blood pressure can cause heart attacks.	yes , no, don't know	94.9
8	High blood pressure can cause cancer.	yes, no , don't know	41.9
9	High blood pressure can cause kidney problems.	yes , no, don't know	76.4
10	High blood pressure can cause strokes.	yes , no, don't know	98.0

* Correct responses are given in **boldface**.

renal disease.²³ Results from a previous study indicated knowledge of this association was higher in Blacks than Whites (64.2% versus 46.3%, $P < .001$). Nonetheless, results from the current study indicate a large percentage of patients with hypertension may not be aware of their risk for kidney disease.

In the current study, 59.8% of participants reported that a blood pressure of 130/80 mm Hg was normal. This was the correct response in the original study questionnaire published in the 1990s. However, current guidelines from the National Heart Lung and

Blood Institute define a blood pressure of 130/80 mm Hg as prehypertension.¹¹ In these guidelines, only blood pressures $< 120/80$ mm Hg are considered normal. Therefore, we repeated the analyses included in Tables 2 and 3 without this question (ie, using a nine-item test), and the same factors remained associated with low hypertension knowledge (data not shown). Future studies that use this hypertension knowledge test should consider changing the blood pressure levels for this question to lower values (eg, 115/75 mm Hg).

Although not statistically significant, respondents who expressed less comfort asking their primary care physician questions during the clinical encounter were more likely to have low hypertension knowledge. Patient understanding of the management of a chronic disease is critical given the importance of self-management to long-term disease control. Racial disparities in disease control for patients with chronic disease may relate, in part, to differences in doctor-patient communication.²⁴ Gordon et al. reported limited, directly observed, information exchange between black patients and their physicians both because black patients were more passive in the interaction and were less likely to prompt doctors for information and doctors in turn provided less information to these patients.²¹

Some hypertension knowledge deficits in the population under study are worth noting. Many participants did not correctly respond that a diagnosis of hypertension lasts a lifetime. This misperception may have negative consequences. Hypertension is a significant and often asymptomatic chronic medical condition requiring persistent adherence to medication regimens. A lack of understanding of the persistent nature of hypertension may affect long-term compliance with antihypertensive medication. Balazovjeh et al reported patients had a willingness to comply with treatment when they were aware that life expectancy was reduced by

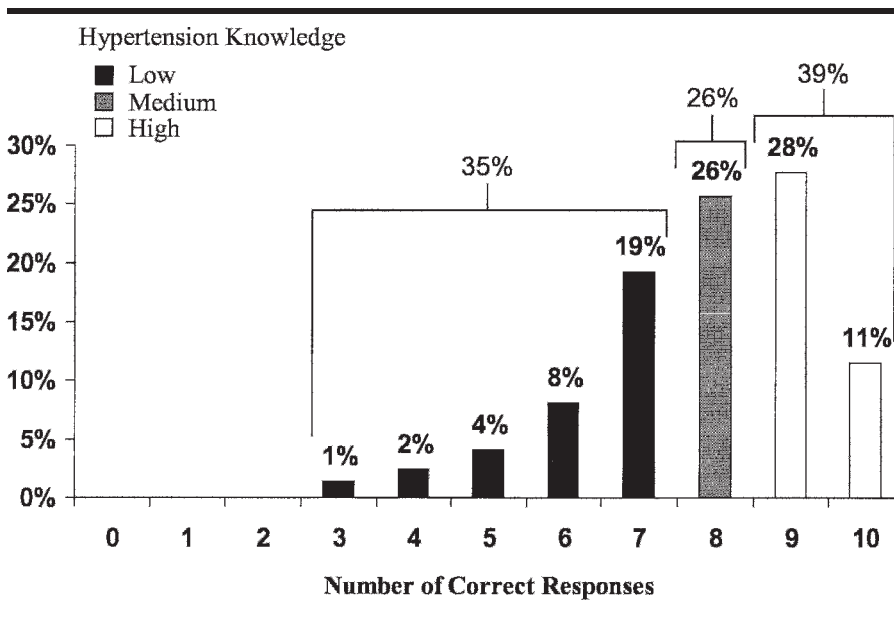


Fig 1. Distribution of correct responses on a 10-item hypertension knowledge questionnaire and categorization of respondents into low, medium and high knowledge categories

Table 3. Multivariate-adjusted odds ratios of low hypertension knowledge

	OR* (95% CI)
Age	
<50 years	Referent
50–59 years	.82 (.37–1.79)
≥60 years	1.91 (.86–4.26)
Black ethnicity	1.70 (.63–4.57)
Male	.97 (.43–2.21)
Monthly income	
<\$500	Referent
\$500–\$1000	.88 (.41–1.88)
≥\$1000	.93 (.38–2.23)
Education less than high school	2.20 (1.14–4.21)
Cigarette smoking	
Current	.91 (.40–2.04)
Former	.88 (.44–1.76)
Never	Referent
History of diabetes	1.62 (.86–3.07)
History of heart attack/stroke	.89 (.40–1.97)
Family history of hypertension	.54 (.16–1.86)
Hypertension duration	
<1 year	5.35 (1.68–17.0)
1–4 years	2.89 (1.36–6.16)
5–9 years	2.37 (.98–5.74)
≥10 years	Referent
Comfortable asking physician questions	
Always	Referent
Sometimes	1.82 (.88–3.75)
Never	1.91 (.37–9.89)

OR=odds ratio; CI=confidence interval.

* Compares the odds of having low hypertension knowledge with having high hypertension knowledge.

increased levels of blood pressure.²⁵ However, a previous analysis of the same population included in the current study did not find an association between hypertension knowledge and medication adherence.²⁶ Nonetheless, making patients aware of the perils of uncontrolled hypertension may result in

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improved antihypertensive medication compliance.

Improving hypertension knowledge may require a multidimensional approach aimed at meeting the needs of patients. While patients must be educated about the consequences of uncontrolled hypertension, targeted programs may be useful to improve participants' understanding of hypertension.¹⁷ Hypertension education programs that target Black patients may help increase blood pressure control. In one study, a health education program specifically designed for Black hypertensive patients demonstrated a 27% increase in controlled hypertension.²⁷

Limitations of the current study should be considered when interpreting the results. First, although the participation rate was high (91%) among patients contacted, for reasons previous-

ly noted, a substantial number of individuals were not reached. Therefore, the sample included in the analysis may not be fully representative of the urban clinic population under study. We surveyed patients from a single, urban clinic site serving primarily uninsured/underinsured Black women, which may limit the generalizability of our results to other patient populations. Data collected during the survey were self-reported and subject to patient recall. Also, because data collection was limited to a telephone survey and medical records were not accessed, we were unable to assess whether lower hypertension knowledge is associated with uncontrolled blood pressure and target organ damage.

Despite these limitations, the current study maintains several strengths. We report on the hypertension knowledge of a large sample of urban, primarily (89% Black) minority, low-income individuals – those at highest risk for poor hypertension control and adverse outcomes. To estimate knowledge levels, we used a modified version of a tool developed in a population likely to be similar to the current participants.¹⁴ The introductory script read to potential participants was targeted to a 7th grade reading level to enhance the understanding of the purpose of the questionnaire administered in the study. Also, in order to strengthen the reliability of the data, a single, trained interviewer administered the questionnaire using a standardized script.

Hypertension knowledge as measured by a standardized instrument was good in this urban, low-income clinic population. A set of patient attributes including older age, less formal education, a shorter time since initially being diagnosed with hypertension, having diabetes, and not being comfortable asking their physician questions were associated with “low” hypertension knowledge. We observed important knowledge content deficiencies that could be used to streamline

educational programs for such populations.

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