Original Paper

Health Care Services Provided During Physician Office Visits for Hypertension: Differences by Specialty

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The changing health care system has reduced patients' access to specialty care. Often, patients with hypertension visit noncardiologists. The objective of this study is to compare differences by physician specialty in the provision of health care services during office visits for hypertension. The authors examined office visits for US physicians by using data from the National Ambulatory Medical Care Survey for 2003 to 2005. Of more than 274 million hypertension visits, 35.5%, 43.9%, 8.5%, and 12.1% visits were made to general practitioners/family physicians, internists, cardiologists, and other specialties, respectively. Visitors to cardiologists were more likely to have coronary heart disease and heart failure than visitors to other physicians. While prescriptions for antihypertensive drugs overall were similar by specialty, cardiologists were more likely to prescribe lipid-lowering drugs (odds ratio [OR], 1.60; 95% confidence interval [CI], 1.14–2.24) and aspirin (OR, 2.76; 95% CI, 1.81–4.20), calcium channel blockers (OR, 1.48; 95% CI, 1.12–1.96), β-blockers (OR, 1.83; 95% CI, 1.35–2.48), and α-blockers (OR, 2.10; 95% CI, 1.46–2.95) than general practitioners/family physicians after adjusting for relevant risk factors. There was no difference by specialty in providing/making a referral for nutrition/exercise counseling among physicians. Among hypertension office visits in the United States, cardiologists were more likely to provide lipid-lowering drugs, aspirin, calcium channel blocker, β-blockers, and α-blockers than other physicians. J Clin Hypertens (Greenwich). *2010;12:89–95.* ©*2009 Wiley Periodicals, Inc.*

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Hypertension, which affects nearly one third of the adult population of the United States,[1] is associated with higher risk for coronary artery disease, cerebrovascular disease, and kidney disease.[2–4] Physician's offices are the major source for providing health care for patients with hypertension. Indeed, hypertension is the most frequently recorded principal diagnosis for ambulatory visits to physician offices in the United States.[5] Although numerous expert guidelines have been developed to assist physicians in determining appropriate levels of blood pressure (BP) based on individual risk,[6,7] the widespread adoption of these guidelines is suboptimal.[8] While primary care physicians provide the most ambulatory care for patients with hypertension, patients with high BP visit a variety of physicians, including general and family practitioners, general internists, and cardiologists and other specialists. In recent years, however,

changes in the US health care system have decreased patient's access to all specialists, including cardiologists.[9,10] Little is known about the differences in practice patterns between general practice and family physicians, internists, cardiologists, and other specialists when they provide care during hypertension-related office visits. We analyzed National Ambulatory Medical Care Survey (NAMCS) data from 2003 to 2005 to assess the patterns of physician practice by specialty during hypertension-related office visits in the United States and determine the associations between the health care provided and physician specialty.

METHODS

Data

We used data from NAMCS for 2003 to 2005. The NAMCS, which is conducted by the National Center for Health Statistics (NCHS) Centers for Disease Control and Prevention (CDC)[11] is an ongoing annual survey of selected practicing physicians from lists maintained by the American Medical Association and the American Osteopathic Association. We aggregated the 3 years of NAMCS data to yield sufficient samples for a cross-sectional analysis of the office visits for hypertension.

Response rates to the survey from physician offices were 66%, 65%, and 62% in 2003, 2004, and 2005, respectively. The survey used a multistage probability sampling design to sample defined geographic areas, physician practices within those areas, and patient visits within those practices. This sampling procedure was designed to select respondents representative of those providing office-based services in various regions, practice settings, and populations throughout the United States.

The following measurements were included in this report: age, sex, race/ethnicity (non-Hispanic white, non-Hispanic black, Hispanic and other), major source of payment for this visit (private insurance, government insurance, other, no insurance), and whether the office was located in a standard metropolitan statistical area. Clinical characteristics included the measurement of BP during the visit, whether the physician was the patient's primary care physician, the number of minutes the physician spent with the patient, up to 3 physicians' diagnosis codes, as well as up to 3 codes of patients' reasons for the visit. NAMCS also obtained information about whether a physical examination was performed, laboratory tests ordered, and counseling/education therapy (for diet/nutrition or exercise counseling) provided or recommended through referral during the visit. Two laboratory tests (blood cholesterol and blood glucose) and electrocardiography (ECG) were also included in the survey. NAMCS allows up to 8 medications to be listed on the data record form, including both prescription drugs and over-the-counter medicines. The prescription drugs include both the medications prescribed during the current visit and those prescribed during the previous visits if the current physician told the patients to continue taking them. The survey lists medications by the individual drug name. The NCHS team categorized the drugs (generic and brand) by the National Drug Code (NDC).[12] The NDC has 5 classifications for antihypertensives, including diuretics (0507), calcium channel blockers (0510), β-blockers (0512), α-blockers (0513), and angiotensin-converting enzyme (ACE) inhibitors (0514). In addition, there is a general classification of antihypertensives (0506). Angiotensin receptor blocker is not categorized in the NDC; therefore, it is included in the general antihypertensive class code. We estimated the percentage of visits at which medications within the specific classes of antihypertensive medications were prescribed (which includes direct provision, as well as continuing a drug prescribed earlier). In addition, all drugs within the medications of interest classes, including lipid-lowering drugs and aspirin, were included.

All hypertension-related visits were identified by the *International Classification of Diseases, 9th Revision, Clinical Modification* (*ICD-9-CM*) code for hypertension (401–405) from the 3 physician diagnoses or by a listing of "hypertension" under "reason for visits." Among visits for hypertension, patients with comorbid diagnoses of diabetes (*ICD-9-CM* 250), coronary heart disease (*ICD-9-CM* 410-414), and hyperlipidemia (*ICD-9-CM* 272) were identified by their *ICD* codes. Smoking status was identified by a check "current tobacco use" or "smoking problems" under "reason for visit." Physician's specialty was categorized as general practice and family physicians, internal medicine, cardiology, and others, which included surgery and all others not mentioned above, such as neurology.

Statistics Analysis

We estimated the national total of hypertension-related visits to physician offices and examined the distribution of physician specialties for these visits. In addition, we estimated the prevalence of the patients' demographic and clinical characteristics by physician specialty. The chi-square test and Student's *t*-test were used to determine significant differences in patient characteristics by physician specialty.

Table I. Characteristics Among Hypertension Visits to Physicians by Physician Specialty, NAMCS 2003–2005

	GP/Family	Internist	Cardiologist	Others	*P* Value
Sociodemographic					
Age, y	60.6 (0.55)	63.4 (0.59)	66.5 (0.51)	62.7 (1.01)	<.001
Age ≥65 y	40.6 (1.8)	49.6 (1.7)	58.9 (1.8)	51.7 (2.9)	<.001
White race	73.3 (2.4)	69.4 (3.2)	74.8 (3.0)	67.6 (3.5)	.367
Male	44.6 (1.4)	42.6 (2.0)	44.7 (1.6)	38.3 (2.6)	.162
Insurance					
Private	48.9 (2.1)	43.3 (2.1)	36.8 (1.9)	39.7 (2.9)	<.001
Medicare/Medicaid	39.2 (2.3)	49.1 (2.0)	57.1 (1.8)	56.0 (2.8)	
No insurance	4.5 (0.8)	2.3 (0.5)	1.4 (0.4)	1.7 (0.6)	
Others	7.4 (1.2)	5.3 (0.8)	4.6 (0.8)	2.6 (0.6)	
Office visits					
Office in MSA	81.1 (5.4)	85.0 (4.4)	91.4 (3.7)	88.3 (5.3)	.327
PCP	97.0 (0.5)	94.9 (1.7)	25.6 (4.2)	39.9 (5.0)	<.001
Minutes with patients	19.0 (0.4)	20.2 (0.7)	21.3 (0.8)	21.4 (1.3)	.159
Clinical					
Hyperlipidemia	21.2 (1.2)	23.6 (2.3)	23.0 (2.1)	10.6 (1.9)	.001
Smoke	30.6 (2.2)	30.2 (3.5)	26.3 (2.7)	24.3 (3.3)	.476
Diabetes	19.3 (1.2)	19.7 (1.7)	9.9 (1.3)	17.4 (1.9)	.006
Systolic BP, mm Hg	140 (0.76)	137 (0.89)	138 (0.64)	141 (1.23)	<.001
Diastolic BP, mm Hg	82 (0.45)	80 (0.49)	78 (0.41)	80 (0.95)	<.001
Heart failure	0.91 (0.2)	1.1 (0.3)	4.3 (0.7)	1.7 (0.5)	<.001
CHD	3.1 (0.4)	5.7 (0.9)	29.4 (2.9)	3.0 (0.8)	<.001
BP <140/90 mm Hg	43.5 (1.5)	53.0 (1.9)	48.8 (1.9)	41.8 (2.9)	<.001

Abbreviations: BP, blood pressure; CHD, coronary heart disease; GP, general practice; MSA, metropolitan statistical area; NAMCS, National Ambulatory Medical Care Survey; PCP, primary care physician. Values are expressed as percentage (standard error).

The frequencies with which the services were provided by physicians during the office-based visits was shown by the percentages of visits in which the diagnostic tests were provided (blood cholesterol and glucose tests, ECG), different medications (antihypertensive in general and individual antihypertensive drugs, lipid-lowering drugs, aspirin) were prescribed, as well as lifestyle counseling/education (diet/nutrition and exercise) was provided or referred by physician specialty. However, since unadjusted differences by physician specialty could be influenced by patient characteristics, a multivariate logistic regression model was developed to account for these potentially confounding characteristics. The predictor variable was physician specialty, adjusted by patient age, sex, race/ethnicity, whether the office was located in a standard metropolitan statistical area, insurance status, hyperlipidemia, diabetes, coronary heart disease, heart failure, and systolic BP.

Sampling weights were applied to achieve nationally representative estimates. To comply with NCHS standards for reliability, all the estimates were based on at least 30 sample records and had a relative standard error (standard error divided by the estimate) of <30%. To account for the complex sample design of the NAMCS, all analyses were performed using SPSS Complex Samples (SPSS, Chicago, IL), with Strata and Cluster variables specified. The reported *P* value and standard errors reflect this adjustment for the effect of sampling design.

RESULTS

From 2003 to 2005, an estimated 2780 million office-based visits (95% CI, 2549–3012 million) took place in the United States. Of these, 274 million (odds ratio [OR], 9.8%; 95% confidence interval [CI], 9.2%–10.5%) were related to hypertension. Among hypertension-related visits, 35.5% were made to general practitioners or family physicians, 43.9% to internists, 8.5% to cardiologists, and 12.1% to other specialists.

Hypertension visits made to general practitioners or family physicians involved, on average, patients who were younger than those going to other physicians and those who were more likely to have private insurance (Table I). In almost all cases, the

Table II. Medical Care Provided Among Hypertension Visits by Physicians' Specialty, NAMCS 2003–2005

	GP/Family	Internist	Cardiologist	Others	*P* Value
Test ordered, %					
Cholesterol	25.0 (1.4)	27.0 (2.0)	17.9 (2.1)	12.8 (2.4)	<.001
Glucose	15.6 (1.2)	19.1 (2.0)	7.2 (1.4)	12.0 (2.5)	.002
ECG	5.9 (0.8)	7.4 (1.0)	27.8 (3.8)	3.7 (1.3)	<.001
Medications, %					
Antihypertensive	72.3 (2.1)	69.9 (2.7)	78.2 (4.1)	65.0 (3.9)	.165
Antilipidemic	23.7 (1.4)	28.7 (2.2)	38.3 (2.8)	25.1 (2.4)	.001
Aspirin	11.1 (1.2)	16.1 (2.1)	32.1 (3.2)	16.4 (2.7)	<.001
Diuretics	18.9 (1.5)	19.5 (1.9)	24.9 (2.0)	19.1 (2.5)	.317
CCBs	18.5 (1.2)	21.1 (1.5)	26.5 (2.2)	21.9 (2.4)	.041
β-Blockers	18.2 (1.3)	22.5 (1.6)	36.2 (2.6)	19.7 (2.7)	<.001
α-Blockers	7.7 (0.8)	6.9 (0.9)	15.5 (1.3)	13.0 (2.0)	<.001
ACE inhibitors	26.7 (1.5)	24.4 (1.6)	31.5 (2.4)	19.4 (2.4)	.014
Counseling, %					
Diet/nutrition	33.4 (2.1)	29.7 (2.5)	31.1 (3.9)	29.1 (4.8)	.648
Exercise	23.7 (1.9)	21.3 (2.5)	23.0 (3.6)	14.3 (2.7)	.121

Abbreviations: ACE, angiotensin-converting enzyme; CCBs, calcium channel blockers; ECG, electrocardiography; GP, general practice; NAMCS, National Ambulatory Medical Care Survey. Values are expressed as percentage (standard error).

visits in this group were to the patient's primary care physician. Visits to cardiologists involved, on average, patients who were older, and these patients were more likely to have Medicare as insurance and to have coronary heart disease and heart failure.

Among hypertension-related visits, those involving general practitioners/family physicians and those to internists were more likely to include tests of cholesterol and glucose concentrations, and visits to cardiologists were more likely to involve an ECG (Table II). No differences were seen by specialty in overall prescription of antihypertensives or in diuretics in particular. In contrast, cardiologists were more likely than other physicians to prescribe lipid-lowering drugs, aspirin, calcium channel blockers, β-blockers, α-blockers, and ACE inhibitors. There was no difference by specialty in ordering (or referring) counseling on diet/nutrition and exercise.

In the logistic regression models, using general practitioners/family physicians as the referent, cardiologists were less likely to order cholesterol and glucose tests and more likely to order ECG (Table - III). There was no difference between the two groups in prescribing antihypertensives in general or in counseling, but cardiologists were more likely to prescribe lipid-lowering drugs (OR, 1.60; 95% CI, 1.14–2.24) and aspirin (OR, 2.76; 95% CI, 1.81–4.20), calcium channel blockers (OR, 1.48; 95% CI, 1.12–1.96), β-blockers (OR, 1.83; 95% CI, 1.35–2.48), and α-blockers (OR, 2.10; 95% CI, 1.46–2.95).

DISCUSSION

This nationally based study of physician office practice indicates, perhaps surprisingly, that cardiologists do not differ from family physicians/general practitioners or general internists in prescribing antihypertensives in general or in providing (or recommending) counseling on diet/nutrition or exercise. On the other hand, cardiologists appear to be more likely than general/family physicians to prescribe certain antihypertensives (calcium channel blockers, β-blockers, and α-blockers) as well as lipid-lowering drugs and aspirin.

An earlier report based on 1995 NAMCS data indicated that for office visits in general, cardiologists were more likely to provide cardiovascular prevention services (eg, measuring BP, counseling the patient to exercise) than were noncardiologists.[9] However, because that report was not specific to cardiovascular disease, its findings could be biased by the fact that a higher percentage of patients with cardiovascular diseases would visit cardiologists. Therefore, cardiologists would be expected to order more cardiovascular-related diagnostic and treatment services than noncardiologists. Similarly, in the present study, among visits that involved hypertension, those made to cardiologists were more likely to involve patients with coronary heart disease or heart failure. Therefore, it was not surprising to see that cardiologists were more likely to order ECG and to prescribe lipid-lowering drugs and aspirin than were general practitioners/family physicians. A high percentage of coronary heart

Table III. Odds Ratios (95% Confidence Interval) of Diagnostic Test Ordered or Medication Prescribed During Visits Related to Hypertension Made to Internists, Cardiologists, and Other Physicians Using GP or Family Physicians for Comparison, NAMCS 2003–2005

	GP/Family	Internist	Cardiologist	Others
Test/examination				
Cholesterol	1	1.09 (0.85–1.39)	0.68 (0.49–0.95)	0.60 (0.37–0.95)
Glucose	1	1.30 (0.93–1.83)	0.55 (0.32–0.90)	0.93 (0.54–1.61)
ECG	1	1.37 (0.92–2.06)	5.85 (3.54–9.66)	0.62 (0.26–1.46)
Medications				
Hypertension	1	0.82 (0.59–1.15)	1.33 (0.82–2.16)	0.78 (0.53–1.15)
Lipid-lowering	1	1.10 (0.84–1.45)	1.60 (1.14–2.24)	1.38 (0.98–2.24)
Aspirin	1	1.35 (0.89–2.04)	2.76 (1.81–4.20)	1.81 (1.07–3.19)
Diuretics	1	1.00 (0.75–1.32)	1.24 (0.93–1.66)	1.05 (0.71–1.55)
CCBs	1	1.11 (0.89–1.37)	1.48 (1.12–1.96)	1.21 (0.87–1.69)
β-Blockers	1	1.19 (0.92–1.55)	1.83 (1.35–2.48)	1.14 (0.78–1.66)
α-Blockers	1	0.84 (0.61–1.17)	2.10 (1.46–2.95)	1.78 (1.10–2.70)
ACE inhibitors	1	0.85 (0.68–1.07)	1.26 (0.96–1.66)	0.69 (0.47–1.01)
Counseling				
Diet/nutrition	1	0.84 (0.62–1.15)	1.03 (0.66–1.60)	1.07 (0.62–1.84)
Exercise	1	0.90 (0.64–1.28)	1.18 (0.73–1.88)	0.67 (0.41–1.08)

Abbreviations: ACE, angiotensin-converting enzyme; CCBs, calcium channel blockers; ECG, electrocardiography; GP, general practice; NAMCS, National Ambulatory Medical Care Survey. All models were adjusted for age, sex, race/ethnicity, whether the office was located at metropolitan statistical area, insurance status, hyperlipidemia, diabetes, coronary heart disease and systolic blood pressure.

disease and heart failure among those visits to cardiologists might also contribute to their more frequent prescribing of calcium channel blockers, β-blockers, and α-blockers.[13]

While there was no difference by specialty in the provision of lifestyle and behavior counseling, the overall use of counseling was relatively low, with a rate of 21.5% for exercise counseling and 31.1% for diet and nutrition counseling. With two thirds of the US adult population classified as overweight or obese in 2003–2004,[14] and in light of the protean risks attached to obesity, more attention to such counseling seems to be in order.

The overall rate for controlled BP (≤140/90 mm Hg) in this study was 47%, far below the Healthy People 2010 objective of 68%.[15] In terms of treatment, a national survey found that for 1999 to 2004, 61.4% of persons who were aware of their hypertension were treated,[16] while in the present study the rates were somewhat higher, ranging from 65% among other specialties to 78% among cardiologists. Patients visiting internists or cardiologists were more likely to have their BP controlled than those visiting general practitioners/family physicians or other physicians. With our reliance on cross-sectional data, however, we were unable to conclude that internists or cardiologists provided better hypertension care than other physicians. Earlier, a study of cardiologists, internists, and general/family practitioners found that cardiologists were more aware than general/family practitioners of the Seventh Report of the Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure (JNC 7) guidelines, and they fared better in that study in terms of knowledge of indications and contraindications for antihypertensive medications, attitudes toward the assessment of BP, and management goals.[17] Because the majority of hypertensive patients are treated by general/family practitioners or internists, it is very important for these physicians to be aware of the guidelines. And, yet, in a national survey of 316 primary care physicians, 41% were unfamiliar with current JNC guidelines and 43% would not initiate pharmacologic therapy unless the systolic BP exceeded 160 mm Hg.[18] Nevertheless, the fact that only about 20% of patients making hypertension-related visits in the United States were taking diuretics even though diuretics have been listed as the first-line drug for hypertension by JNC 7 guidelines indicated that increased implementation of guidelines for hypertension control is critically needed in the United States.

The observed higher use of lipid-lowering drugs and aspirin among cardiologists was consistent with other reports.[19,20,21] The design of the study limited our ability to determine the appropriateness of the

treatments provided or their impact on outcomes, however, and the prescribing of medications, particularly for diseases as prevalent as hypertension, is a complex practice for which evidence-based recommendations represent only one of many influencing factors. Other factors, including drug marketing, may also impact the practices.[22,23] The fact was that hypertension patients would be more likely to visit cardiologists if they had coronary heart disease or heart failure. While without outcome data here, we are unable to determine whether one was doing better than others in treating hypertension. We know, however, that previous reports based on the care of patients with acute cardiovascular conditions, including acute myocardial infarction, congestive heart failure, and unstable angina, found that cardiologists were more likely to adhere to guidelines than were noncardiologists.[24–27]

LIMITATIONS

Several limitations of the NAMCS data should be noted. While the survey is designed to produce national estimates with minimal biases, these estimates are ultimately based on visits and not on individual patients. Thus, the results may not give as clear a picture of how individual patients are treated as would a study in which patients were the unit of inquiry. Second, participation in the survey is voluntary, and in this case, one third of practitioners refused to participate. The NAMCS estimates are adjusted for nonresponse, however, and the weights used for such adjustments are designed to minimize bias from this factor. Therefore, the reported estimates are representative of US physician practices. A third concern is that patients seen by physicians on an infrequent basis might receive more services at any given visit, thus distorting the results in a study such as this one if the visits by these patients were overrepresented. The sampling procedure used in NAMCS should minimize this possibility, however. In addition, because the physicians' offices were instructed to report both new and continued medications, our analysis of medications would not be affected by the frequency of visits. Finally, because more than 90% of visits to general/family practitioners involved a visit to the patient's primary care physician, it might be argued that the findings on basic tests, such as those for cholesterol and glucose tests, could be misinterpreted. This might indeed be a consideration, as these tests would routinely be offered as part of an annual checkup by these physicians, and visits for such checkups might well have been classified as related to hypertension in the present study.

CONCLUSIONS

In this study, almost 80% of hypertension-related visits were made to general practice/family physicians or internists. These physicians were similar to cardiologists in their ordering of basic diagnostic tests, prescription of antihypertensives in general, and counseling on diet/nutrition and exercise. However, cardiologists were more aggressive than general practitioners/family physicians in prescribing lipid-lowering drugs and aspirin as well as some specific antihypertensive drugs, such as calcium channel blockers, β-blockers, and α-blockers.

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