

Physician-Related Barriers to the Effective Management of Uncontrolled Hypertension

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Background: Primary care physicians may not be aggressive enough with the management of hypertension. The purpose of this study was to identify barriers to primary care physicians' willingness to increase the intensity of treatment among patients with uncontrolled hypertension.

Methods: Descriptive survey study. We sampled patient visits in a large midwestern health system to identify patients with uncontrolled hypertension. The treating primary care physicians were asked to complete a survey about the patient visit with a copy of the office notes attached to the survey (patient visits, n=270; response rate, 86%).

Results: Pharmacologic therapy was initiated or changed at only 38% of visits, despite documented hypertension for at least 6 months before the patients' most recent visit. The most frequently cited reason for no initiation or change in therapy was related to the primary care physicians being satisfied with the blood pressure (BP) value (satisfactory

BP response, 30%; satisfactory diastolic BP response, 16%; only borderline hypertension, 10%). At 93% of these visits, systolic BP values were 140 mm Hg or higher, which is above the cut point recommended by Sixth Report of the Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure guidelines, and 35% were 150 mm Hg or higher. On average, physicians reported that 150 mm Hg was the lowest systolic BP at which they would recommend pharmacologic treatment to patients, compared with 91 mm Hg for diastolic BP.

Conclusions: Our findings suggest that an important reason why physicians do not treat hypertension more aggressively is that they are willing to accept an elevated systolic BP in their patients. This has an important impact on public health because of the positive association between systolic BP and cardiovascular disease.

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IMPROVING THE QUALITY of hypertension care is a priority. Studies have shown that most patients with hypertension have inadequate blood pressure (BP) control,¹⁻⁷ resulting in excess cases of coronary artery disease, congestive heart failure, renal insufficiency, peripheral vascular disease, and stroke.^{2,8-11} Safe and effective therapies for hypertension are readily available, and the importance of obtaining optimal BP control through the use of these therapies is increasingly recognized. Efforts to understand poor BP control have usually focused on patient adherence with therapy and patient characteristics associated with nonadherence. Recently, it has been shown that clinician practices are very important and that physicians may not be aggressive enough in their management of hypertension.^{2,5,12-18} Further, despite the demonstrated positive association between systolic BP and cardiovascular disease, there is uncertainty among physicians about the importance of systolic BP.^{19,20} These re-

sults suggest the need for studies on patient-clinician interaction and that better define how clinicians make decisions about therapy for the hypertensive patient.

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Investigators have suggested that barriers to the effective management of patients with uncontrolled hypertension include patient management time constraints, physician practice patterns, drug adverse effects, and the complexity of prescribing and/or monitoring existing drug regimens.^{2,15,16,21-27} There are also patient-specific factors that affect the successful management of hypertension. These include lack of adherence to therapy, limited access to care, financial barriers related to the cost of medications, and lack of knowledge about the seriousness of uncontrolled hypertension.^{2,21,22,25-38} The quality of the interaction between the patient and physician may also be important in pre-

METHODS

We conducted a descriptive survey study to identify physician-related barriers to the treatment of uncontrolled hypertension in a primary care setting. We sampled patient visits during a specified 3-week period (October 4, 1999, through October 22, 1999) to identify patients with uncontrolled hypertension and then queried the treating physicians about barriers related to physicians' willingness to increase the intensity of treatment. We also conducted patient interviews to obtain information on patient characteristics that may be related to hypertension management, including patient satisfaction with the BP treatment plan.

STUDY SITE

This study was conducted at the Henry Ford Medical Group, which is part of the Henry Ford Health System in Detroit, Mich. The Henry Ford Medical Group (a system-affiliated, multispecialty, salaried physician group) provides most of the care for the Henry Ford Health System and consists of 27 sites. To ensure a high level of participation, we identified 1 geographic site within the Henry Ford Health System where primary care physicians are willing to participate and have had experience conducting quality of care research. We limited our study to an insured patient population with a regular source of care and a recent physician visit in the prior year because these factors have been identified as correlates of controlled hypertension.^{30,32,46-49}

The Henry Ford Health System contains automated medical databases for all inpatient and outpatient encounters. Information on outpatient encounters includes the date of visit, diagnoses, physician delivering care,

procedures delivered, clinic where the care was delivered, and charges compiled. Medical records are maintained in both a traditional paper format and a computerized system. The electronic medical record includes information on inpatient interim and final diagnoses, discharge summaries, inpatient pharmacy, laboratory data, appointments, outpatient visit diagnoses, physiologic measures (including BP), and clinic office notes. The system is updated continuously and almost immediately from the paper format to the electronic medical record.

ASCERTAINMENT OF PATIENTS WITH UNCONTROLLED HYPERTENSION

We identified all patients from the site of interest with an *International Classification of Diseases, Ninth Revision* (ICD-9) diagnosis code of hypertension (401.0-401.9) during the prior 6 months who had at least 1 prior visit to a physician at the Henry Ford Health System during the prior year. We then determined whether these patients had a recent office visit (defined as the index visit) with an elevated BP (systolic BP ≥ 140 mm Hg and/or a diastolic BP ≥ 90 mm Hg) during a specified 3-week interval using computerized outpatient visit data. Blood pressure readings were abstracted for these patients from the computerized medical record. A patient was classified as having uncontrolled hypertension if the average BP reading for up to 6 visits during the 6 months prior to the index visit was elevated.

PHYSICIAN QUESTIONNAIRE

For patients identified and defined as having uncontrolled hypertension, we identified the primary care physician who

dicting the adequate delivery of medical care.^{12,22,39} Some studies suggest that physicians do not conform to practice guidelines for treating hypertension, although the reasons for this have not been adequately studied.^{2,40-45}

The purpose of the present study was to identify, in a primary care setting, barriers to physicians' willingness to increase the intensity of treatment among patients with uncontrolled hypertension as suggested by consensus guidelines. We assessed familiarity and agreement with the Sixth Report of the Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure (JNC VI)² hypertension treatment guidelines, including the importance of systolic BP. These results will provide important information to improve the quality of care in patients with hypertension.

RESULTS

We initially identified 5145 patients with an ICD-9 diagnosis code of hypertension during the prior 6 months who had at least 1 visit during the prior year. None of the patients identified by our algorithm had an ICD-9 code 401.0 (malignant hypertension). Of these 5145 patients, 314 patients had an office visit during the 3-week period of sampling and were classified as having uncontrolled hypertension. At the study site, 21 (81%) of 26

physicians responded to the physician questionnaire and provided information on 270 patient visits for a response rate of 86%. Physicians may have completed surveys on multiple patients, and each physician completed an average of 13 surveys. The time between the index visit and the physician's completion of the survey ranged from 10 to 90 days (median, 55 days). Patient telephone interviews were attempted on the 314 patients; 15 patients were excluded during the interview process because they did not speak English, were too sick to complete the interview, or were deceased. In total, 231 of 299 patients completed the telephone interview for a response rate of 77%. The time between the index visit and patient telephone interview ranged from 24 to 107 days (median, 61 days).

Characteristics of the patients who completed the interview are presented in **Table 1**. The median age of patients was 69 years (range, 25-96 years). The patient population was composed of approximately 50% whites, 30% blacks, and 12% other races or ethnicities. The patients' average BP value during the prior 6 months was 152 mm Hg for systolic and 84 mm Hg for diastolic, with 94% of the patients currently taking hypertension medication. The median age of the physicians was 42 years, and all physicians were board certified in internal medicine. The median number of years since completing residency was 9.5, and approximately one third of the phy-

treated the patient at the index visit. The physician was then asked to complete a self-administered survey about the patient visit, and a copy of the office notes for that visit was attached to the survey. We developed this survey instrument based on work done by Cabana et al⁵⁰ with the goal of identifying barriers to effective treatment of patients with uncontrolled hypertension. The survey was administered to the physician for each patient visit of interest. The survey included questions about any changes in hypertension medication at the index visit and barriers related to this change in medication. Items used to assess barriers included closed- and open-ended questions. The questionnaire was pilot tested on a sample of 15 physicians who were not part of the final study. We used pilot testing and informal focus group settings to further obtain a list of barriers to treatment modification. A second one-time survey that included questions about familiarity and agreement with JNC VI² guidelines, target BP treatment goals, and physician demographics and practice characteristics was also given to the physician.

PATIENT TELEPHONE INTERVIEWS

Patient telephone interviews were conducted to obtain information on patient characteristics that may be related to hypertension management, including patient satisfaction and adherence with BP treatment plan, age, race/ethnicity, and educational level. The questionnaire was pilot tested and standardized using trained interviewers at the Henry Ford Health System. Patients who were identified as having uncontrolled hypertension were mailed an introductory letter inviting them to participate in the study and stating that they would be contacted by telephone to

give consent and participate in a brief telephone interview of approximately 10 minutes.

AUTOMATED DATA COLLECTION

Information was obtained from the computerized databases for each patient on the duration of hypertension, number of physician visits and hypertension-related visits during the prior year, and comorbidities. Electronic medical record review was conducted by trained chart abstractors to collect detailed information on the reason for the index visit, physician diagnosis of hypertension at the index visit, current hypertension medications, family history of cardiovascular disease, length of time under care of physician, and physician recommendation to increase the intensity of BP therapy in the prior 6 months.

DATA ANALYSIS

We calculated descriptive statistics to characterize the distribution of the study results at both the physician and patient level. Logistic regression modeling was then used to identify predictors of the likelihood of physicians to change medication or increase the intensity of treatment. Odds ratios, confidence intervals, and *P* values (2-tailed) were calculated for each variable in the model to quantify the association between the factor of interest and the likelihood of the physician increasing the intensity of treatment while controlling for other variables in the model. Statistical analyses were performed using SAS statistical software (SAS Institute Inc, Cary, NC).

sicians were women. Characteristics of the patient visits are presented in **Table 2**. Of the patient visits, 51% were for hypertension as indicated by the associated ICD-9 code.

Physician familiarity and agreement with hypertension guidelines is presented in **Table 3**. All physicians were either very familiar or somewhat familiar with the JNC VI guidelines for treating hypertension, and most agreed with these recommendations. About 62% of physicians reported that they “usually” follow JNC VI guidelines when treating hypertensive patients, while 14% reported that they “always” follow the guidelines. To assess physician awareness of uncontrolled hypertension, we asked the respondents to estimate the percentage of treated hypertensive patients who have their BP under control. Most physicians reported that they believe that 50% to 60% of patients treated with hypertension medication have controlled BP. Physicians were asked to estimate the risk associated with specific examples of elevated diastolic and systolic BP and the lowest BP at which they would recommend pharmacologic treatment. We did not account for any recommended lifestyle changes but simply wanted to find out the thresholds for pharmacologic treatment. On average, physicians reported that 150 mm Hg was the lowest systolic BP at which they would recommend pharmacologic treatment to patients, compared with 91 mm Hg for diastolic BP.

We asked physicians to report treatment strategies for specific patient visits (**Table 4**). Lifestyle modification was recommended at 47% of the visits, while prescription medication for hypertension was initiated or changed at only 38% of the visits, despite documented hypertension for at least 6 months before the index visit. Of the visits at which medication was initiated or changed (38%), more than 97% of the physicians reported initiating drug treatment, increasing the dosage of current medication, or adding a new drug to the existing regimen (Table 4).

Physician-related barriers to changing hypertension medication are presented in **Table 5**. Of the 61% of patients with no initiation or change in pharmacologic therapy, the most frequently cited reason was related to the physician being satisfied with the BP value (satisfactory BP response, 30%; satisfactory diastolic reading, 16%; only borderline hypertension, 10%). Other reasons cited as barriers to initiating or changing hypertension medication was that the focus of the visit was not BP control and/or competing medical problems (29%) and that there was a need to continue monitoring patient before changing drug regimen (35%). We further assessed those patient visits at which there was no change in pharmacologic therapy and the physician reported being satisfied. The distributions of the systolic and diastolic BP measurements at the index visit are presented in the

Table 1. Characteristics of 231 Patients With Uncontrolled Hypertension*

Age group, y†	
≤39	10 (4)
40-49	20 (9)
50-59	39 (17)
60-69	50 (22)
70-79	81 (35)
≥80	31 (13)
Female sex	156 (68)
Race/ethnicity†	
Black	67 (29)
White	122 (53)
Other	28 (12)
Education†	
Less than high school	63 (27)
High school/GED diploma	70 (30)
Some college	54 (23)
College graduate	34 (15)
Employment status†	
Full-time	55 (24)
Homemaker	47 (20)
Retired	94 (41)
Other	24 (10)
Family history of cardiovascular disease§	
Yes	90 (39)
Comorbidities#††‡	
Yes	90 (39)
Currently taking HTN medication (prior 6 mo)§	
Yes	217 (94)
BP at index visit, mm Hg‡§	
SBP	153.6 ± 14.3
DBP	84.1 ± 11.3
Average BP§, mm Hg	
SBP	152.6 ± 10.7
DBP	84.4 ± 9.4
Duration of HTN, y #	6.4 ± 3.8
No. of physician visits for HTN during prior year***	3.5 ± 2.4
No. of physician visits during prior year††	13.4 ± 11.1

*Data are number (percentage) of patients or mean ± SD of specified value. GED indicates general educational development; HTN, hypertension; BP, blood pressure; SBP, systolic blood pressure; and DBP, diastolic blood pressure. Some categories may not total 100% owing to missing responses.

†Data obtained from patient telephone interviews.

‡Median SBP, 150 mm Hg; median DBP, 85 mm Hg.

§Data obtained from electronic medical record review.

||Average of index BP reading and up to 6 other readings during prior 6 months. Median SBP, 151 mm Hg; median DBP, 84.7 mm Hg.

||Median, 6 years.

#Data obtained from automated medical databases.

***Median, 3 years. Includes outpatient visits only.

††Median, 11 years. Includes outpatient visits only.

‡‡Diabetes, hyperlipidemia or dyslipidemia, heart disease, cerebrovascular disease, peripheral vascular disease, chronic renal failure, nephropathy, or retinopathy.

Figure. At 93% of these visits, systolic BP values were 140 mm Hg or higher, which is above the cut point recommended by JNC VI guidelines, and 35% were 150 mm Hg or higher. Diastolic BP values were 90 mm Hg or higher at 22% of the visits. For patient visits at which the physician cited the need to continue monitoring the patient before changing the drug regimen (n=58), we explored the distribution of BP measurements available during the prior 6 months. Only 20 (34%) had evidence of at least 1 measure indicating BP control.

We explored potential predictors of the physician increasing the intensity of hypertension treatment, including physician characteristics, physician familiarity and agreement with JNC VI guidelines, patient demo-

Table 2. Characteristics of 231 Patient Visits*

Reason for visit HTN related	118 (51)
Physician diagnosis of HTN at visit	201 (87)
Physician recommendation to increase BP therapy during the 6 mo prior to index visit	95 (41)
Mean ± SD length of time patient under the care of treating physician, y†	2.8 ± 2.7

*Data are number (percentage) of patient visits unless otherwise specified. Data obtained from electronic medical record review.

HTN indicates hypertension; BP, blood pressure. Some categories may not total 100% owing to missing responses.

†Median, 1.54 years.

Table 3. Physician Agreement and Familiarity With Awareness of Hypertension Guidelines*

Familiar with JNC VI guidelines?	
Yes, very familiar	11 (52)
Yes, somewhat familiar	10 (48)
No	0
Agree with JNC VI treatment recommendations?	
Yes	16 (76)
No	3 (14)
Follow JNC VI guidelines when treating patients?	
Always	3 (14)
Usually	13 (62)
Sometimes	4 (19)
Rarely/never	0
Who is at higher risk for myocardial infarction or stroke, a patient with a BP of	
150/80 mm Hg	8 (38)
135/95 mm Hg	10 (48)
Who is at higher risk for myocardial infarction or stroke, a patient with a BP of	
130/100 mm Hg	11 (52)
160/85 mm Hg	8 (38)
Lowest DBP at which you would recommend pharmacologic treatment to a patient†	
Without comorbidities, mm Hg	91.1 ± 3.4
With comorbidities, mm Hg	87.0 ± 2.8
Lowest SBP at which you would recommend pharmacologic treatment to a patient‡	
Without comorbidities, mm Hg	150.4 ± 12.9
With comorbidities, mm Hg	142.5 ± 12.4
% of treated hypertensive patients in the general population who have "controlled" hypertension based on§	
SBP reading	57.4 ± 17.0
DBP reading	61.3 ± 18.7

*Data are number (percentage) of physicians or mean ± SD of specified value. Data obtained from physician survey completed by 21 physicians.

JNC IV indicates Sixth Report of the Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure²; BP, blood pressure; DBP, diastolic blood pressure; and SBP, systolic blood pressure.

Some categories may not total 100% owing to missing responses.

†Without comorbidities: median, 90 mm Hg; with comorbidities: median, 86 mm Hg.

‡Without comorbidities: median, 147.5 mm Hg; with comorbidities: median, 140 mm Hg.

§Median SBP, 50%; median DBP, 60%.

graphics, comorbidities, reason for visit, physician diagnosis of hypertension at visit, length of time under care of physician, patient satisfaction, level of BP control, previous recommendation to increase BP therapy, and number of current hypertension medications being taken. Logistic regression modeling identified level of BP control and previous recommendation to increase the intensity of BP therapy as predictors of the physician initiating or

changing therapy. The variable for number of current hypertension medications did not reach statistical significance in the model, but it was associated with an increased likelihood of the physician initiating or changing therapy (**Table 6**).

Not only did physicians not describe adherence to therapy as a barrier to control, but patients also reported a high level of compliance with therapy. Additionally, patients were very satisfied with care even though their BP was not controlled.

COMMENT

Uncontrolled hypertension is a significant public health problem with only about 25% of patients having adequate BP control. This has the potential to make a significant impact on the morbidity and mortality associated with cardiovascular disease and stroke. Understanding the ways in

which physicians manage hypertension and the process of care is important, especially their willingness to be more aggressive with hypertension therapy.

We conducted this descriptive survey in primary care physicians and their patients with uncontrolled hypertension to identify barriers to physicians' willingness to increase the intensity of hypertension treatment. Pharmacologic therapy was initiated or changed at only 38% of patient visits, despite the fact that hypertension was recorded as uncontrolled for at least 6 months before the index visit. Our study demonstrated that the most frequently cited barrier to changing hypertension medication was the physician was satisfied with the existing BP value. Consistent with our study, Berlowitz et al⁵ have suggested that physicians are not aggressive with the management of hypertension and have shown that patients with hypertension have inadequate control of their BP. Failure of physicians to increase or change therapy and

Table 4. Physician Treatment Strategies for Patients With Uncontrolled Hypertension*

Lifestyle modification recommended to the patient to help reduce blood pressure?†	
Yes	128 (47)
No	140 (52)
Prescription medicine for hypertension initiated or changed at visit?	
Yes	103 (38)
No	164 (61)
If yes, what occurred at visit‡	
Initiated drug treatment	10 (10)
Increased dosage of current medication	42 (41)
Added new drug(s) to existing regimen of medications	48 (47)
Decreased dosage of current medications and/or reduced No. of drugs	3 (3)
Discontinued all therapy	0

*All data are number (percentage) of patient visits. Data obtained from physician survey completed by 21 physicians contributing information on 270 patient visits. Some categories may not total 100% owing to missing responses.

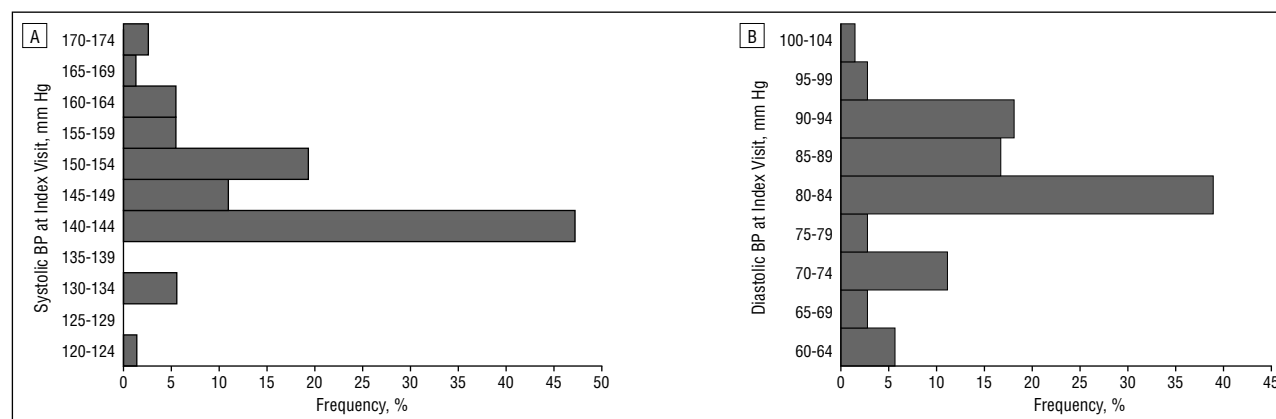
†Change diet, quit smoking, increase physical activity, lose weight, reduce alcohol intake, or reduce stress.

‡Multiple-answer question (n = 103).

Table 5. Reason(s) for No Initiation or Change of Hypertension Medication*

Need to continue monitoring patient before changing drug regimen	58 (35)
Satisfactory blood pressure response	50 (30)
Focus of visit not blood pressure control or competing medical problems	48 (29)
Diastolic reading was satisfactory	26 (16)
Only borderline hypertension	17 (10)
Poor patient acceptance	15 (9)
Priority was on improving compliance	15 (9)
Intensifying therapy would have created too many adverse effects	8 (5)
Other	5 (3)
Not enough time with patient	2 (1)
Intensifying therapy was unlikely to lower blood pressure much more	2 (1)
Forgot	0
Intensifying therapy would have made medical regimen too complex	0

*All data are number (percentage) of patient visits. Data obtained by physician survey completed by 21 physicians contributing information on 270 patient visits. Multiple-answer question (of 164 patients who had no initiation or change of hypertension medication).



A, Systolic blood pressure (BP) for 72 patients with no initiation or change of hypertension medication. B, Diastolic BP for 72 patients with no initiation or change of hypertension medication. Reasons given for no initiation or change in hypertension included satisfactory BP response, diastolic BP reading was satisfactory, or only borderline hypertension.

Table 6. Multivariate Logistic Regression Analysis of Factors Associated With Physician Increasing Intensity of Treatment*

Factor†	Odds Ratio‡ (95% CI)	P Value
Current No. of HTN medications	1.69 (0.83-3.49)	.15
Patient age	0.73 (0.27-2.01)	.53
Patient sex	0.73 (0.35-1.52)	.40
Patient education	1.12 (0.55-2.30)	.75
Patient race/ethnicity	1.35 (0.65-2.83)	.42
Physician recommendation to increase BP therapy during the 6 mo prior to index visit	2.88 (1.42-5.96)	.004
Level of HTN control	2.96 (1.53-5.83)	.001

*Increasing intensity of treatment at index visit (no [referent] vs yes [increased dosage of current medication and/or added new drug(s) to existing regimen of medications]). A total of 199 patient visits available for analysis. HTN indicates hypertension; CI, confidence interval; BP, blood pressure; and GED, general educational development.

†Current number of HTN medications (0 or 1 medication [referent] vs 2 or more medications); patient age (≤ 50 y [referent] vs > 50 y); patient sex (male [referent] vs female); patient education (some grade school/grade school/some high school/high school diploma or GED diploma/technical school/vocational school [referent] vs some college/college graduate/graduate school/professional degree); race/ethnicity (Asian/Hispanic/white/American Indian/other [referent] vs black); increased BP therapy in the 6 months prior to index visit (no [referent] vs yes); level of HTN control (moderately controlled [referent] vs poorly controlled [index systolic BP ≥ 160 mm Hg or index diastolic BP ≥ 95 mm Hg]).

‡Adjusted for all other variables in a logistic regression model.

the administration of low dosages of antihypertensive medication have also been cited in JNC V¹ and JNC VI² reports as reasons for poor BP control. Our study findings suggest that the level of BP control, a previous recommendation to increase BP therapy, and number of current hypertension medications are predictors of a physician initiating or changing therapy, which is consistent with the findings of Berlowitz et al.⁵

Our findings, based on the survey responses and medical record review, suggest that physicians place more importance on the diastolic BP reading than the systolic BP reading. At patient visits for which there was no change or initiation in hypertension therapy, systolic BP values were above the 140 mm Hg cut point recommended by the JNC VI guidelines. Typically, physicians stated that they were satisfied with the level of BP control at the index visit despite the elevated systolic BP. This is supported by the finding that physicians reported that, on average, 150 mm Hg was the lowest systolic BP at which they would recommend pharmacologic treatment to the patient, compared with 91 mm Hg for diastolic BP. In addition, when asked to estimate the risk associated with specific examples of elevated diastolic and systolic BP, physicians attributed a higher risk to elevated diastolic BP. Physicians reported being familiar and in agreement with the JNC VI guidelines, with more than 75% of physicians reporting that they “always” or “usually” follow JNC VI guidelines when treating hypertensive patients. Physicians may not understand the risk associated with an elevated systolic BP and are thus focusing on the diastolic reading, or they may be knowledgeable about the risk but do not incorporate this into their practice patterns. This highlights the difficulties in implementing clinical

guidelines.^{41,50} Further, most physicians reported that they believe that 50% to 60% of patients treated with hypertension medication have controlled BP. Based on the Third National Health and Nutrition Examination Survey data, 45% of treated hypertension patients had BP control, and only 34% of all patients with hypertension were at or below the systolic BP goal of 140 mm Hg.^{4,51}

Few studies have examined physician-related barriers to the management of uncontrolled hypertension. A physician survey (N=3740) conducted by the National Heart, Lung, and Blood Institute⁵² assessed barriers to the effective control of BP. Physicians from general and family practice, cardiology, and internal medicine specialties reported on both patient- and physician-related factors, although the list of possible factors was not comprehensive. The most frequently cited impediments to BP control were lifestyle changes (67%), failure to take medications as instructed (42%), patient lack of understanding of the problem (39%), physician fees (23%), costs of drugs (39%), and drug adverse effects (34%). In a large survey conducted in Europe of more than 11 000 cardiovascular patients receiving hypertension treatment, 84% of the patients had an unchanged treatment even though target BP goals were not achieved.¹⁷ However, these same physicians reported that they would be willing to change medications by increasing the dosage, adding a new drug, or switching drugs.^{14,15,17} These studies and ours emphasize that both physician and patient factors are important in the control of BP.

Patient adherence has been identified as one of the main reasons that BP therapy fails.^{1,2,22} The complexity of the regimen including multiple drugs and dosages is likely to be related to compliance.^{22,24,37,53} We hypothesized that significant barriers to the management of uncontrolled hypertension would include patient compliance, patient acceptance, and complexity of the drug regimen. However, physicians did not report these factors as important barriers to changing or initiating hypertension medication therapy. Patients who have more aggressive therapy may be less satisfied with their medical care. We had the opportunity to ask patients questions related to compliance and satisfaction. Almost all patients reported that they followed their physicians' recommendations concerning BP medication and were satisfied with their treatment and medications.

Drug adverse effects have also been identified as a factor related to physician prescribing patterns of hypertensive medications. In a study by Ekpo et al,⁵⁴ the reason most often mentioned for not using drug therapy to treat isolated systolic hypertension was reduced quality of life due to adverse effects. Lip and Beevers²⁵ surveyed primary care physicians (n=178) and their patients (n=948). Of all switches in antihypertensive drug therapy, 42% occurred because patients experience adverse effects. In another survey of 500 adults with hypertension, 11% reported stopping hypertension medication because of adverse effects, and 47% of the patients reported adverse effects as the most important attribute of medication.²⁷ In our study, adverse effects were not reported as an important barrier to pharmacologic treatment changes.

No other study to our knowledge has looked at barriers to physicians' willingness to change hypertension

medications and the intensity of treatment. We had the ability to conduct semistructured surveys about specific patient visits to elicit a range of barriers to understand the obstacles to effective treatment of hypertension. We believe our approach provides more detailed and specific information directly related to patients with uncontrolled hypertension compared with a simple checklist approach.

There are several limitations to this study. The selection of a single site within the Henry Ford Health System to conduct this study may limit the generalizability of these findings to populations with limited access to care and to other physicians. However, based on the complexity of this study design, we used the resources available to obtain specific and detailed information from physicians, patients, and medical records. We focused our efforts on obtaining participation from both physicians and patients, which is evident from the high response rates obtained for this survey study.

The physicians at the Henry Ford Health System are similar to private practice physicians in that they have few constraints related to providing care to their patients. There is no formal continuing medical education program, and physicians obtain additional education on their own.

The algorithm we used to screen and identify patients with hypertension may have missed some patients with uncontrolled hypertension. However, our goal was not to assess the prevalence of uncontrolled hypertension, but to sample patient visits and describe barriers to effective management of uncontrolled hypertension. We believe the approach we used to identify and define patients with uncontrolled hypertension using claims data and medical records is valid based on work done by others.^{6,55,56}

There is no standardized instrument available to assess physician-related barriers to hypertension treatment. To minimize bias, questions were asked in the context of the medical management of the patient, and physicians were informed that the overall goal of the study was to identify physician-related barriers to the effective treatment of uncontrolled hypertension. These results suggest the need for studies on the patient-clinician interaction and for studies that better define how clinicians make decisions about therapy for the hypertensive patient. The median time between the index visit and physician completion of the survey was 55 days. There may be inherent limitations with this approach if the physician had difficulty recalling details of the patient visit; therefore, we attached a copy of the office notes for the index visit to the physician questionnaire. Likewise, the median time between the index visit and patient telephone interview was 61 days with the potential for recall bias. However, information on such factors as age, sex, and race/ethnicity that was obtained from the patient interview is unlikely to be biased.

To achieve the ultimate goal of improving health by controlling hypertension, it is important to fully understand the obstacles that physicians encounter while providing care. Our findings suggest that an important reason why physicians do not treat hypertension more aggressively is that they are willing to accept an elevated

systolic BP in their patients. Our findings seem to suggest that physicians are familiar with the guidelines for treating hypertension but do not implement this knowledge into their everyday practice. This has an important public health impact because of the positive association between systolic BP and cardiovascular disease. The findings of this study provide useful information for designing effective physician interventions for the management of patients with uncontrolled hypertension.

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