Self-reported Hypertension Treatment Practices Among Primary Care Physicians

Blood Pressure Thresholds, Drug Choices, and the Role of Guidelines and Evidence-Based Medicine

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Background: Primary care physician treatment practices affect the rate of hypertension control to the goal of 140/90 mm Hg. Awareness of and agreement with national hypertension management guidelines, and grounding in evidence-based medicine principles, may be important determinants of practice.

Methods: A 26-item mail questionnaire was sent to a national sample of 1200 primary care physicians. The questionnaire elicited (1) the blood pressure (BP) criteria physicians use to initiate and intensify hypertension treatment, (2) first-line drug treatment choices, (3) familiarity with the Joint National Committee on Detection, Evaluation, and Treatment of High Blood Pressure (JNC) hypertension treatment guidelines, and (4) familiarity with research methods used to develop evidence-based medicine guidelines. The analysis focused on (1) determining the percentage of physicians who reported treatment practices consistent with JNC recommendations and (2) the relation between familiarity with JNC guidelines, evidence-based medicine methods, and reported treatment practices.

Results: The overall response rate was 34%, with no important differences in demographic or professional training variables between respondents and nonrespondents. For middle-aged patients with uncomplicated hypertension, 33% of physicians would not start drug therapy unless the diastolic BP was greater than 95 mm Hg, and 43% would not start unless the systolic BP was greater than 160 mm Hg. In patients without complications who were receiving drug treatment, 25% of physicians would not intensify therapy for a persistent diastolic BP of 94 mm Hg, and 33% would not intensify therapy for a systolic BP of 158 mm Hg. Physicians were generally less aggressive in older patients. Angiotensin-converting enzyme inhibitors were the most common first-line drug choice. Forty-one percent of physicians had not heard of or were not familiar with the JNC guidelines. In multiple logistic regression models, familiarity with the JNC guidelines was associated with lower treatment thresholds, and increased familiarity with research methods was associated with greater use of diuretics or β-blockers as first-line agents.

Conclusions: Many physicians have higher BP thresholds for the diagnosis and treatment of hypertension than the 140/90 mm Hg criterion recommended by the JNC. Therefore, further improvements in population hypertension control will require physician behavior change. Physician practice is associated with awareness of practice guidelines and familiarity with evidence-based medicine methods, but the precise nature and extent of this relation requires further study.

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Hypertension is the number one diagnosis for office visits to primary care physicians in the United States. The definition of hypertension control in national health surveys since 1980 has been a systolic blood pressure (SBP) of less than 140 mm Hg and a diastolic blood pressure (DBP) of less than 90 mm Hg. In 1988, the Joint National Committee on Detection, Evaluation, and Treatment of High Blood Pressure (JNC) added an SBP of less than 140 mm Hg and a DBP of less than 90 mm Hg as the recommended treatment goal. How physicians treat hypertension affects rates of hypertension control in the population and health care costs. After decades of steady improvement in hypertension control in the general population, it appears that after 1990 this trend has leveled off, and may have declined slightly by the early 1990s. At the peak of control recorded in the first phase of the third National Health and Nutrition Examination Survey (1988-1991), 73% of patients with hypertension were aware of having hypertension; in 29%, the hypertension was controlled.

Findings from surveys in the late 1970s and early 1980s indicated that most physicians did not treat persistent DBPs

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SUBJECTS AND METHODS

The survey sample consisted of 1200 physicians who listed their specialty as internal medicine, family medicine, or general practice, drawn randomly from the American Medical Association’s master file.

A 26-item questionnaire was developed to elicit the following information: (1) DBP at which drug therapy is initiated in younger (age 40-60 years) and older (age >70 years) patients and the impact of diabetes as a cardiovascular risk factor on the treatment threshold level; (2) SBP that would warrant drug treatment in younger and older patients, assuming a “satisfactory” DBP level; (3) whether the physician would intensify drug therapy in the face of persistent mild elevations in SBP or DBP above the JNC recommended treatment goals; (4) usual choice of first-line agent for patients in different age and ethnicity categories; (5) familiarity and agreement with JNC guidelines (JNC-V guidelines were the most current at the time of the survey); and (6) familiarity with and perceived usefulness of different types of study designs, including case-control studies, meta-analyses, randomized clinical trials, and case series, for providing evidence to guide treatment choices. Questions related to calcium channel blockers and the perceived influence of managed care on the treatment of hypertension were included in the survey, but are not the focus of this report.

The questionnaire items and format were pilot tested for clarity and face validity. The initial survey mailing was made in November 1996. Three follow-up mailings were made to nonrespondents, and postal card and telephone reminders were used to encourage a high response rate. The cover letter stressed the importance of hypertension treatment to the nation’s public health, but no financial incentives were offered to respondents. The project was carried out with institutional review board approval.

The χ² test was used for bivariate comparisons between categorical variables, and an analysis of variance was used for continuous variables. Differences in reported treatment choices within physicians (eg, BP level for the initiation of treatment in older vs younger patients) were analyzed with the McNemar test for dependent samples. Familiarity with results of evidence from different types of clinical studies such as the issue of the role of calcium channel blockers and the validity of JNC drug recommendations, are rooted in questions of the quality of evidence from case-control studies, meta-analyses, and randomized trials.12-14

We conducted a mail survey to obtain estimates of physicians’ approaches to the treatment of hypertension and to investigate how JNC guidelines and perceptions of evidence from different types of clinical studies influenced them.

RESULTS

Of the total sample of 1200 physicians, 85 did not have current addresses and could not be traced, 9 were retired, and 4 were deceased, leaving an effective sample size of 1102. A total of 379 (34%) completed surveys were received. Of these physicians, 63 indicated that they did not treat patients with hypertension, and they were eliminated from further analysis. The final sample used in the analysis was 316. As shown in Table 1, there were no significant differences in age, sex, board certification status, or specialty (internal medicine vs family practice or general practice) between nonrespondents and those included in the analysis.

The physicians’ BP thresholds for initiating drug treatment in younger and older patients with hypertension with and without diabetes are shown in Figure 1 and Figure 2. More than one third of physicians would not start drug therapy in middle-aged or older adults without diabetes unless the DBP was consistently 95 mm Hg or higher. Fifty-two percent of physicians would not start treatment for middle-aged adults with an SBP between 140 and 160 mm Hg, and only 24% would begin treatment for those aged 70 years or older who had an SBP of less than 160 mm Hg. Physicians did report being substantially more aggressive in treating patients with dia-

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Table 1. Characteristics of Respondents and Nonrespondents*

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Nonrespondents (n = 723)</th>
<th>Respondents (n = 379)</th>
<th>P</th>
<th>Met the Inclusion Criteria for Analysis (n = 316)</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age, mean, y</td>
<td>48.0</td>
<td>48.2</td>
<td>.31</td>
<td>47.5</td>
<td>.30</td>
</tr>
<tr>
<td>Female sex</td>
<td>17</td>
<td>16</td>
<td>.58</td>
<td>16</td>
<td>.30</td>
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<tr>
<td>Board certified</td>
<td>67</td>
<td>72</td>
<td>.08</td>
<td>73</td>
<td>.08</td>
</tr>
<tr>
<td>Primary care specialty†</td>
<td>Internal medicine 60</td>
<td>61</td>
<td>.39</td>
<td>60</td>
<td>.39</td>
</tr>
<tr>
<td>Family practice</td>
<td>39</td>
<td>40</td>
<td></td>
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<td></td>
</tr>
</tbody>
</table>

* Data are given as percentage of subjects unless otherwise indicated. Respondents who stated they did not treat patients with hypertension were excluded. †Percentages may not total 100 because of rounding.

Figure 1. Diastolic blood pressure (BP) ranges at which physicians would start drug treatment in patients with uncomplicated hypertension and in patients with hypertension who also had diabetes mellitus (DM).

Figure 2. Systolic blood pressure (BP) ranges at which physicians would start drug treatment in patients with uncomplicated hypertension.

Figure 3. Proportion of respondents who would intensify drug treatment for a systolic blood pressure (SBP) between 140 and 160 mm Hg or a diastolic blood pressure (DBP) between 90 and 95 mm Hg by patient age category. The result of the McNemar $\chi^2$ test was less than 0.05 for all 2 x 2 contrasts comparing actions in younger vs older patients and in those with an elevated SBP vs those with an elevated DBP.

Table 2. Most Common First-Line Drug for Monotherapy in Selected Patients*

<table>
<thead>
<tr>
<th>Rank</th>
<th>Whites Using</th>
<th>African Americans Using</th>
<th>Hispanics Using</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Drug</td>
<td>Drug</td>
<td>Drug</td>
</tr>
<tr>
<td></td>
<td>Whiting</td>
<td>African</td>
<td>Hispanics</td>
</tr>
<tr>
<td>1</td>
<td>ACE inhibitor</td>
<td>Diuretic</td>
<td>ACE inhibitor</td>
</tr>
<tr>
<td>2</td>
<td>β-blocker</td>
<td>CA blocker</td>
<td>β-blocker</td>
</tr>
<tr>
<td>3</td>
<td>Diuretic</td>
<td>ACE inhibitor</td>
<td>CA blocker</td>
</tr>
<tr>
<td>4</td>
<td>Cα blocker</td>
<td>β-blocker</td>
<td>Others</td>
</tr>
<tr>
<td>5</td>
<td>Others</td>
<td>Others</td>
<td>Others</td>
</tr>
</tbody>
</table>

* The selected patients were all aged 40 to 60 years. ACE indicates angiotensin-converting enzyme; Cα, calcium channel.

70 years, 48% would not take action for an elevated DBP and 67% would not act in the face of an elevated SBP to 158 mm Hg ($P<.001$).

Physicians were asked to name the drug they used most frequently as a first-line single agent in 40- to 60-year-old whites, African Americans, and Hispanics, and their responses are summarized in Table 2. Angiotensin-converting enzyme inhibitors were mentioned most frequently as the first choice in whites and in Hispanics. Diuretics were the first choice of respondents in African Americans.

betes, with only 15% using a DBP greater than 94 mm Hg as a threshold to initiate treatment. Systolic thresholds for treatment initiation in the presence of diabetes were not assessed.

For thresholds for treatment intensification, the survey presented physicians with 2 scenarios: (1) a persistent BP of 158/88 mm Hg while receiving treatment and (2) a BP of 138/94 mm Hg in middle-aged and elderly patients. As reported in Figure 3, 25% of respondents would take no action in the face of a persistent DBP elevation to 94 mm Hg in those aged 40 to 60 years, while 33% would take no action in the face of a persistent SBP elevation to 158 mm Hg ($P = .049$). In patients older than
Using a scale of 1 (not at all familiar) to 5 (very familiar), respondents indicated their greatest familiarity with randomized controlled trials (3.84±1.10), followed by case-control studies (3.41±1.23), meta-analyses (3.26±1.33), and case series (3.13±1.23). Using a similar scale, randomized clinical trials were rated as most useful. Meta-analyses and case-control studies received similar average usefulness ratings (3.25±0.94 and 3.20±0.88, respectively), and case series received the lowest usefulness ratings. (All data are given as mean±SD.) There was no relation between ratings of familiarity and usefulness of various designs.

Forty-one percent of respondents who treated hypertension had either not heard of the JNC-V guidelines or had heard of the report but were not familiar with the contents. Of the remainder, about half had actually read the report, and the other half had read or heard about the guidelines in journal articles or continuing education conferences. Irrespective of physicians’ familiarity with the report, they were asked to rate on a scale from 1 to 10 their extent of agreement with the report’s suggestion that diuretics and \( \beta \)-blockers be used as first-line agents. The answers were evenly distributed along the response scale, with 45% scoring in the disagreement range, 13% choosing the neutral point, and 42% choosing a score in the agreement range.

We explored the relation between reported hypertension treatment choices and physicians’ age, sex, specialty (internal medicine vs family practice or general practice), board certification status, general familiarity with research methods, familiarity with the JNC-V guidelines, and agreement with the guidelines using logistic regression modeling and whether the physician saw managed care patients. Table 3 reports the relation between reported treatment practices and EBM orientation (operationalized as general familiarity with research designs) and between reported treatment practices and familiarity with the JNC guidelines. Board certification was significantly associated with initiating treatment for a DBP of less than 95 mm Hg in those aged 40 to 60 years and with intensification of treatment for a DBP between 90 and 94 mm Hg in younger and older patients, and the models in Table 3 are adjusted for this variable. Other potential covariates measured in the survey, including age, sex, specialty, participation in managed care, or perceived usefulness of different types of studies, did not reach significance and were omitted from the final models. There was no evidence of an interaction between general familiarity with research methods and familiarity with the guidelines in explaining the variance in reported treatment practices.

Familiarity with research methods was independently predictive of a lower SBP threshold for initiating drug treatment and for choosing a \( \beta \)-blocker or diuretic as a first-line agent. It was also modestly related to intensification of treatment for a mildly elevated SBP, but the direction of the association was inverse (the higher the familiarity score, the less likely the physician was to change drugs or increase the dosage for a mildly elevated SBP in a 70-year-old patient). Familiarity with the JNC-V guidelines was consistently associated with having more aggressive BP goals, with odds ratios that reached statistical significance in predicting the SBP threshold to initiate drug treatment in older patients, intensification of treatment for a mildly elevated SBP in younger patients and older patients, and intensification of treatment for a mildly elevated DBP in younger patients. However, familiarity with JNC-V guidelines was not predictive of choice of a \( \beta \)-blocker or a diuretic as a first-line agent.

This survey was intended to document the BP thresholds physicians use to initiate and intensify BP treatment and to elicit attitudes regarding treatment guidelines, choice of drug therapy, and clinical research methods. The results indicated that a significant proportion of primary care physicians do not seek the treatment goal of an SBP of less than 140 mm Hg and a DBP of less than 90 mm Hg recommended by the JNC guidelines. Furthermore, the response patterns to the clinical scenarios provided indicated that physicians are more likely to intensify treatment for a mildly elevated DBP than for a mildly elevated SBP and that higher BPs were tolerated in older patients.

Forty percent of the respondents reported limited familiarity with the consensus guidelines in effect at the time (JNC-V). Physicians who reported familiarity with the JNC guidelines were consistently more likely to report lower BP thresholds for treatment. This was true even for isolated mild SBPs in elderly patients, a case in which the guidelines offer flexibility for the treatment goal. Most

### Table 3. Association Between Treatment Choices, Familiarity With Research Methods, and Familiarity With JNC-V Guidelines

<table>
<thead>
<tr>
<th>Dependent Variables</th>
<th>Familiarity With Research Design</th>
<th>Familiarity With JNC-V Guidelines</th>
</tr>
</thead>
<tbody>
<tr>
<td>SBP threshold &lt;150 mm Hg to start drug therapy</td>
<td>1.10 (1.00-1.21)</td>
<td>1.54 (0.77-3.10)</td>
</tr>
<tr>
<td>Patients aged 40-60 y</td>
<td>1.15 (0.99-1.21)</td>
<td>2.04 (0.80-6.96)</td>
</tr>
<tr>
<td>Patients aged ≥70 y</td>
<td>1.03 (0.96-1.10)</td>
<td>1.37 (0.82-2.20)</td>
</tr>
<tr>
<td>DBP threshold &lt;95 mm Hg to start drug therapy</td>
<td>1.00 (0.94-1.07)</td>
<td>1.69 (1.02-2.80)</td>
</tr>
<tr>
<td>40-60 y</td>
<td>0.94 (0.99-1.01)</td>
<td>1.87 (1.09-3.19)</td>
</tr>
<tr>
<td>≥70 y</td>
<td>0.93 (0.86-0.99)</td>
<td>2.36 (1.34-4.14)</td>
</tr>
<tr>
<td>Intensify treatment for a SBP between 140 and 160 mm Hg</td>
<td>1.00 (0.93-1.09)</td>
<td>2.28 (1.26-4.14)</td>
</tr>
<tr>
<td>40-60 y</td>
<td>1.02 (0.95-1.09)</td>
<td>1.21 (0.72-2.01)</td>
</tr>
<tr>
<td>≥70 y</td>
<td>1.10 (1.02-1.18)</td>
<td>1.34 (0.79-2.28)</td>
</tr>
</tbody>
</table>

*All models were adjusted for age, sex, and specialty training. JNC-V indicates the fifth report of the Joint National Committee on Detection, Evaluation, and Treatment of High Blood Pressure; SBP, systolic blood pressure; and DBP, diastolic blood pressure.
†Data are given as odds ratios (95% confidence intervals). Odds ratios represent the independent association with each treatment choice in models that included all 3 predictors (board certification, general familiarity with research design, and familiarity with JNC-V guidelines).
physicians used first-line agents that were inconsistent with the national guideline recommendations, regardless of their familiarity with the guidelines.

Modest positive associations were found between our measure of EBM orientation and some of the treatment practices defined in the analysis, in particular, the choice of β-blockers and diuretics as first-line agents. Since this recommendation of the JNC is explicitly EBM, the hypothesis that EBM guidelines are more likely to be observed if physicians are familiar with the methods of EBM deserves further investigation. The study of EBM’s impact on physician treatment practices is in its infancy, and there are no well-established tools to measure the construct. As research in this area progresses, other investigators may develop alternative ways to operationalize EBM background and orientation among physicians.

As is common in most mail surveys, the results are subject to potential bias from several sources. The response rate of 34% in this study is below the average of 54% calculated by Asch et al20 for physician respondents in their analysis of mail survey response rates. However, it is well within the range of the 10% to 45% found in published surveys in major journals27–29 and, as noted by Asch et al, there is no necessary relation between the response rate to a survey and bias in the results obtained. The demographic characteristics of respondents were quite similar to the nonrespondents in demographic information, but these variables may not capture differences in the response patterns of those who returned the survey compared with those who did not. Since it is possible that late responders are more similar to nonresponders, as recommended by Fowler,21 we compared the answers of early with late responders. This analysis yielded only 1 statistically significant difference of more than 25 comparisons, a finding that is consistent with chance variation alone (data available on request).

The results presented herein are self-reported behaviors and, thus, are likely to overestimate attitudes and clinical behaviors viewed as desirable.22 For example, in a study23 of physicians’ cholesterol treatment practice, self-reported treatment patterns were significantly more aggressive than those reflected in the physicians’ medical records. It is also possible that the associations between familiarity with research designs and JNC guidelines and self-reported behaviors merely reflect an awareness of what the “correct” answer should be. However, the items inquiring about drug choices were open ended and were presented before the questions about guidelines and evidence and, thus, physicians were not alerted to the issue of guideline adherence before answering.

Hypertension is a highly prevalent chronic disease that serves as a barometer of the effectiveness of public health education, professional education, and health care system effectiveness in this country. Some 50 million Americans have hypertension, and more than 25 million are receiving drug treatment.4 It is one of the most common reasons for visits to internists. This survey documents the reported diagnosis and treatment thresholds of a national sample of primary care physicians in a period that coincides approximately with the latest national health survey findings regarding hypertension awareness, treatment, and control rates.4,5 The results of our physician survey, along with those of another recent study24 of physicians’ hypertension treatment practices in the Veterans Affairs Health System, document that most physicians do not pursue control to an SBP of less than 140 mm Hg and that many do not pursue a DBP of less than 90 mm Hg. Since these are the criteria used to define hypertension awareness and control in the population, it is clear that physician behavior makes a significant contribution to the poor rates of hypertension control documented in the third National Health and Nutrition Examination Survey.

The National Committee for Quality Assurance has modified its influential Health Employer Data Information Set25 to include the percentage of hypertensive patients with an SBP of less than 140 mm Hg and a DBP of less than 90 mm Hg as one of its quality indicators beginning in the year 2000. This policy change is likely to make hypertension treatment one of the most important topics in ambulatory medicine during the coming years.20 Understanding physicians’ thresholds for action and factors that influence their treatment decisions will be critical to achieving national hypertension control goals at the population level and for meeting quality standards in health care delivery settings. In view of the growing momentum of the EBM movement as the basis for developing treatment guidelines and medical decision algorithms, the extent to which physicians’ practices vary based on their familiarity with EBM principles requires further study.

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