Physician Practice Patterns in the Treatment of Isolated Systolic Hypertension in a Primary Care Setting

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The authors evaluated the treatment of isolated systolic hypertension based on medical record review of charts between 1998 and 1999 in a multispecialty physician practice group. Two agestratified random samples of ambulatory medical records were examined (393 patients aged ≥ 65 years and 251 patients aged 50–64 years). The samples corresponded to the practices of 35 primary care physicians who were surveyed about their hypertension care. Isolated systolic hypertension was defined as systolic blood pressure ≥140 mm Hg and diastolic blood pressure <90 mm Hg. Results showed that isolated systolic hypertension represented 76% and 45% of uncontrolled blood pressure in the older and middle-aged samples, respectively. Isolated systolic hypertension was often undiagnosed and untreated. Physicians reported treatment thresholds and goals that were significantly less aggressive for their patients ≥ 65 years of age. Physician awareness and treatment of isolated systolic hypertension have not yet caught up with consensus guidelines, and older patients may be affected most by this gap. (J Clin Hypertens. 2002;4:93-100) ©2002 Le Jacq Communications, Inc.

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A recent study of data from the third National Health and Nutritional Examination Survey (NHANES III) showed that isolated systolic hypertension (ISH) represented approximately 80% of all uncontrolled hypertension in individuals above age 50 in the United States.¹

However, NHANES III data collection began over a decade ago, in 1988.² At that time, major placebo-controlled trials in ISH had not been completed. Consensus guidelines did not recommend treating ISH if systolic blood pressure (SBP) was less than 160 mm Hg.³ Thus, NHANES III provided an important assessment of the epidemiology of hypertension, but it could not serve as a specific indicator of quality care of ISH. Expectations for hypertension care in 1988 were significantly different from today. Furthermore, NHANES III measured only patient attitudes and conditions. It did not measure directly the perceptions or practices of physicians.

The most recent US consensus guidelines regarding ISH were issued by the sixth report of the Joint National Committee on the Prevention, Detection, Evaluation, and Treatment of High Blood Pressure (JNC VI) in 1997. It defined ISH as SBP ≥140 mm Hg and diastolic blood pressure (DBP) <90 mm Hg.⁴ Few studies have examined the prevalence and treatment of ISH according to this definition.

We hypothesized that despite JNC VI recommendations, other guidelines, major trial results, and other studies supporting the importance of SBP, physicians tend to overlook and undertreat ISH. Our study was undertaken to provide more recent data on ISH in a typical multispecialty physician practice group, and examine how primary care providers diagnose and treat ISH.

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PATIENTS AND METHODS

Design and Setting

The study was carried out in a multispecialty group with a large primary care component located in Southern California. A retrospective cohort study of patients aged 50 years and older was conducted over an 18-month period to determine the prevalence of and treatment patterns for ISH. A survey of all primary care providers for that cohort was also performed to explore physician self-reported practices on managing systolic hypertension.

Patient Data

A list of patients 50 years of age and older who were continuously enrolled with the provider for at least 1 year prior to July 15, 1999 was obtained; 1009 charts meeting these criteria were available. Patients were stratified into two age groups, middle-aged patients (50-64 years) and elderly patients (65 years and older). To detect a significant difference between ISH treatment in elderly and middleaged patients, it was determined that a sample of 250 middle-aged patients and 400 elderly patients was needed. Random numbers were assigned to patients within each age stratum and charts were reviewed in numeric order until the required sample sizes were obtained. Patients were excluded from the cohort if they had disenrolled from the provider group after July 15, 1998 or had died, or if their medical record was not available. A total of 393 charts of patients aged ≥ 65 years and 251 charts of patients aged 50-64 years met study inclusion criteria (Figure 1).

Trained medical record technicians reviewed each study subject's medical record, retrospectively covering an 18-month period from July, 1998 to December, 1999. Hypertensive patients were defined as patients with an SBP \geq 140 mm Hg or a DBP \geq 90 mm Hg or presence of a hypertension diagnosis (by *International Classification of Disease, Ninth Revision, [ICD-9]* codes 401.1 and 409.1). Birth date,



Figure 1. Chart review flowchart

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the last recorded blood pressure (BP) measurement,⁵ and notation of a documented diagnosis of hypertension were collected for the 644 patients satisfying the above criteria. If the last recorded BP measurement met criteria for ISH (SBP \geq 140 mm Hg and DBP <90 mm Hg), the following data were collected using a standard data abstraction form:

- Demographics (age, gender)
- Comorbidities (history of myocardial infarction, diabetes, renal insufficiency, congestive heart failure, hyperlipidemia, stroke, other)
- Antihypertensive regimen as of last BP measurement
- Documented recommendations of lifestyle modification (salt-restricted diet, stress reduction, regular exercise, weight reduction, biofeedback, limit two drinks of alcohol per day)

Physician Survey

A self-administered questionnaire was sent to all 35 primary care physicians in the provider group for these patients. The questionnaire was developed after reviewing previously published ISH questionnaires.^{5,6} The instrument was designed to assess how primary care physicians treat systolic hypertension and to allow a comparison of self-reported physician practices with hypertension management guidelines. The questionnaire was pilot-tested with 10 physicians to determine clarity. It contained two demographic questions (medical specialty, years in practice), seven clinical questions (including SBP treatment thresholds and ISH treatment goals), and a clinical scenario, which included several questions regarding the appropriate approach to managing an elderly female patient with uncomplicated, sustained ISH (see Appendix).

Data Analyses

Univariate analyses were performed on patient and physician data. Chi-square was used to test for differences in categorical variables, and the Student ttest was used for continuous variables. Logistic regression was performed to determine predictors of treatment status. Survey data were analyzed with the SPSS version 10.0 software package (SPSS Inc., Chicago, IL).

RESULTS

Patient Demographics and Prevalence of ISH

Fifty-three percent of the 251 patients in the middleaged group and 58% of the 393 patients in the older group were women. Mean age was 56 (±4.3) years for the middle-aged group and 75 (±7.0) years for the older group. Elevated BP, defined as SBP \geq 140 mm Hg or DBP \geq 90 mm Hg, was more prevalent in the older group than in the middle-aged group (38% vs.

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27%; p<0.05). The prevalence of ISH was 12.3% in the middle-aged group and 28.7% in the older group (Figure 2). Demographic information for patients with ISH is presented in the Table.

Among those with uncontrolled BP, the mean BPs were SBP 143.9±12.0 mm Hg and DBP 87.7±8.1 mm Hg in the middle-aged group and SBP 148.9±11.5 mm Hg and DBP 80.6±8.9 mm Hg in the older group. In the subgroups with ISH, mean BP was SBP 144.4±5.8 mm Hg and DBP 80.7±4.2 mm Hg for the middle-aged and SBP 148.8±10.6 mm Hg and DBP 76.8±6.5 mm Hg for the elderly.

Diagnosis and Treatment Patterns in ISH

A significant proportion (45%) of middle-aged patients with elevated BP had ISH (Figure 2). A majority (58%) of these ISH patients had no documented diagnosis of hypertension by *ICD-9* codes, and only 48% received antihypertensive therapy (Figure 2). Treatment and diagnosis were related, as 92% of those with a documented *ICD-9* code for hypertension received antihypertensive therapy. All treated patients with ISH in this middle-aged group received either one or two antihypertensive medications (60% and 40%, respectively).

In the older group, ISH was the most common form of uncontrolled hypertension (76%) (Figure 3). Several of these ISH patients (37%) had no documented diagnosis of hypertension by *ICD-9* codes,



Figure 2. Prevalence of uncontrolled hypertension and isolated systolic hypertension (ISH) in a multi-specialty practice

ICD-9=International Classification of Disease, Ninth Revision

and only 63% received antihypertensive therapy. Diagnosis and treatment were related, as 90% of those with a documented *ICD-9* code for hypertension received therapy. A majority of treated patients with ISH in this older group received one or two medications (54% and 31%, respectively).

In logistic regression models, the only statistically significant predictor of treatment status was the presence of an *ICD-9* code for hypertension (p<0.0001 for models in both age groups). The models adjusted for age, gender, presence or absence of comorbidities, absolute number of comorbidities, and hypertension stage.

Table. Demographics and Clinical Characteristics of Isolated Systolic Hypertension Patients Included in the Retrospective Analysis				
Demographics	Age Groups 50–64 Years(N=31) <u>></u> 65 Years(N=113)			
Mean age (years)	56.2 <u>+</u> 3.8	75.8 <u>+</u> 6.4		
Women (%)	48.4	54.0		
Number of comorbidities (%)				
One	25.8	36.3		
Тwo	9.7	12.4		
Three	0	3.5		
Four	0	1.0		
ype of comorbidity (%)				
Hyperlipidemia	19.4	38.1		
Diabetes mellitus	25.8	20.4		
Myocardial infarction	0	4.4		
Congestive heart failure	0	3.5		
Stroke	0	3.5		
Renal insufficiency	0	2.7		

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Figure 3. Diagnosis and treatment patterns of patients with isolated systolic hypertension (ISH) *p<0.005 for elderly vs. middle-aged patients

Physician Survey

Questionnaires were sent to all 35 physicians in the multispecialty provider group of these patients. Thirty-one questionnaires (89%) were returned and included in the analysis. Half of the physicians were general practitioners (GPs) and half were general internists (GIs). The median length of time in practice for both types of physicians (GPs and GIs) was 13 years (range, 1–44 years). Ninety-three percent of the GPs and 75% of the GIs had been in practice for more than 5 years. Although physician-patient data were not explicitly linked, the 646 patients in the chart review were all part of the practices of these 35 physicians.

Physicians were asked to rate the influence of clinical experience, consensus guidelines, and other factors on their treatment decision-making. Items were rated on a scale of 1 to 5, with 1 indicating no influence at all and 5 indicating a great influence. The mean ratings were 4.4 ± 0.6 for clinical experience and 4.0 ± 0.7 for consensus guidelines. In decreasing order of importance, other factors influencing physician decisionmaking were continuing medical education, medical journals, expert opinions, textbooks, and pharmaceutical representatives.

Only 52% of physicians reported that they initiate some form of antihypertensive treatment at an SBP of 140 mm Hg in their middle-aged patients (Figure 4). Thirty-two percent reported that they initiate treatment at an SBP between 141 and 150 mm Hg. Sixteen percent reported that they initiate treatment for an SBP >150 mm Hg. Only 35% of physicians reported that they would initiate pharmacologic treatment in middle-aged patients with ISH at a sustained SBP of 140 mm Hg. In contrast, most physicians (90%) reported that they would aim to treat middleaged patients with ISH to a goal of SBP 140 mm Hg or below, once therapy was initiated.

Only 23% of physicians reported that they initiate antihypertensive treatment among older patients (≥ 65 years) with an SBP of 140 mm Hg (Figure 4). Twenty-three percent indicated that they initiate treatment at an SBP between 141 and 150 mm Hg. Forty-one percent reported that they initiate treatment for an SBP 151–160 mm Hg and 13% said that they initiate treatment only for an SBP >160 mm Hg. Furthermore, only 13% of physicians reported prescribing pharmacologic treatment for older patients with a sustained SBP of 140 mm Hg. A majority (65%) of physicians reported that they would aim to treat ISH to an SBP goal of 140 mm Hg or below in older patients (≥ 65 years). This 65% is significantly more than the 23% who said they would initiate treatment at an SBP of 140 mm Hg (p < 0.05).

More physicians indicated that they would initiate treatment for a sustained SBP of 140 mm Hg in middle-aged than in elderly patients (52% and 23% respectively; p<0.005), and more would treat middleaged patients to the goal SBP of 140 mm Hg than they would the elderly (90% and 65%; p=0.04). From the remaining survey questions, no physician offered reasons for not treating ISH (all acknowledged treating it). The majority of physicians used the fifth Korotkoff sound for measuring BP, and the lifestyle recommendations for lowering BP were evenly balanced between exercise, weight loss, stress reduction, limiting alcohol intake, and reducing salt (data not shown). Most physicians (55%) listed diuretics as their preferred choice for treating ISH.

DISCUSSION

ISH represented 76% and 45% of uncontrolled BP in the older and middle-aged samples in this study. Although the sample was relatively small, these proportions are consistent with data collected from NHANES III several years ago. In NHANES III, ISH represented over 80% of uncontrolled hypertension in individuals greater than 60 years of age and approximately 50% of uncontrolled hypertension in those 50–59.

Mean BP values were somewhat lower in our study than in NHANES III. Our older sample with ISH had a mean SBP of 148.1±9.2 (SD) mm Hg, whereas in NHANES III, individuals with ISH over 50 years of age had mean SBPs of 152.3 mm Hg (untreated) and 155.5 mm Hg (treated). Our sample size was small, so the difference could have been due to chance alone. Alternatively, it could reflect some progress in treating ISH over the past decade, or it may reflect characteristics of the site we surveyed.

Data from a 10.6-year follow-up private practice experience indicate that a higher control rate was observed in patients with diastolic/systolic hypertension than in patients with ISH; only 39% of these patients



Figure 4. Physician survey responses: blood pressure treatment thresholds and treatment goals for managing patients with isolated systolic hypertension

achieved a target BP level of less than 140 mm Hg, whereas 69% of patients age 65 years and above with systolic/diastolic hypertension achieved this target level. This experience was originally reported in 1987, prior to the availability of new agents, but was achieved in a practice devoted to the treatment of hypertension.⁷

However, in our study, ISH was still often undiagnosed and untreated. Many physicians in this study believed antihypertensive therapy for ISH should not be initiated until SBP exceeds 150 mm Hg. Their thresholds for starting therapy were more lax than their treatment goals, indicating that they were willing to tolerate mild to moderate elevations in SBP. They also indicated a greater willingness to accept elevated SBP levels in older patients.

Several studies have shown that physicians succeed more often in controlling DBP than SBP. In a large, observational study assessing medical care delivered to veterans between 1990 and 1995, a DBP of below 90 mm Hg was recorded at 67% of hypertension-related visits. However, an SBP less than 140 mm Hg was recorded at only 28% of visits. Antihypertensive therapy was increased at only 22% of visits when a DBP of less than 90 mm Hg and an SBP of 165 mm Hg or more were recorded.⁸

In a 1996 study performed in a managed care setting, patients were more likely to have DBP than

SBP treated to goal. ⁹ An international observational study covering the period 1992–1997 indicated that more effort was directed toward controlling DBP than SBP, and that adequate control of SBP was seldom achieved. ¹⁰

Our more recent study was done after release of the JNC VI guidelines. These guidelines have received considerable attention and have changed expectations for managing hypertension. More than 50 MEDLINE articles between 1988 and 1999 can be retrieved using JNC VI as a search term. The JNC VI guidelines have also been made available by other sources, including Web sites of the National Heart, Lung, and Blood Institute, the American College of Physicians, and the American Academy of Family Practice.^{11–13} The JNC VI definition of ISH is also supported by the 1999 World Health Organization Guidelines for Hypertension.¹⁴

Recent years have also seen the publication of major trials establishing the benefits of treating ISH, including the Systolic Hypertension in the Elderly Program (SHEP, 1991) and the Systolic Hypertension-Europe trial (Syst-Eur, 1997).^{15,16.} More than 200 articles in MEDLINE can be retrieved using these study names as search terms. In addition to documenting clinical benefits, these major trials showed good patient tolerability, so the safety of treating elderly patients should be of less concern than in the past.

Given this level of activity in the middle and late 1990s, our study was performed in a context of different expectations for physician behavior. Such expectations are evident in the quality of care measure implemented by the National Committee for Quality Assurance. The percent of patients controlled to 140/90 mm Hg is used as a measure of quality, it is applied equally to all age groups, and there is no different BP target for ISH than for other types of hypertension.¹⁷

Recently, a clinical advisory statement was released by the Coordinating Committee of the National High Blood Pressure Education program, to promote and clarify JNC VI recommendations emphasizing the importance of SBP as the principal clinical end point for managing hypertension in elderly patients.¹⁸ Results of our study underscore the value of such educational programs.

There are several limitations in our study. Only ISH patients with elevated SBP were identified. The absence of a specific *ICD-9* code for ISH and lack of documentation of ISH in patient charts did not permit us to identify individuals with successfully controlled ISH. We also kept our physician questionnaire brief and could not address in depth some of the reasons for lack of adherence to guidelines. We also do not have longitudinal data that could assess changes in practice patterns. Mean SBP readings for individuals with ISH in our study are lower than in NHANES III, but without additional data one cannot conclude whether this reflects improvement over time, sample size issues, or aspects of the study site. Our study serves primarily to document those challenges that remain in diagnosing and treating ISH.

We should also note that some physicians might be waiting for additional clinical trial evidence before they treat SBP more aggressively. However, our physician survey showed acceptance of SBP below 140 mm Hg as an appropriate treatment target. The difference between treatment thresholds and treatment goals in our study suggests a lax attitude toward mild elevations of SBP, rather than frank disagreement over treatment benefits.

In conclusion, physician awareness and treatment of ISH have not yet caught up with consensus guidelines, and older patients may be affected most by this gap. Further efforts are warranted to bridge this difference between guidelines and practice.

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APPENDIX: SURVEY QUESTIONNAIRE

Demographics

- 1. In which specialty do you practice?
 - (1) General/family physician
 - (2) General internist
 - (3) Internal medicine subspecialist (specifically, _____)
- 2. How long have you been practicing? _____ years

General Questions

- 3. When measuring a typical patient's blood pressure, which of the following do you usually accept as the diastolic blood pressure?
 - (1) Muffling of sound (fourth Korotkoff sound)
 - (2) Total cessation of sound (fifth Korotkoff sound)
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- 4. Which of the following nonpharmacologic treatments do you routinely recommend to your hypertensive patients? (circle as many as are appropriate)
 - (1) Salt-restricted diet
 - (2) Stress reduction
 - (3) Regular exercise
 - (4) Weight reduction
 - (5) Biofeedback
 - (6) Limit alcohol to < 2 drinks/d
 - (7) Others
- 5. In your approach to the assessment and treatment of hypertension, to what extent do the influences listed below guide your practice? (Please circle number for each influence.)

(r	10t at al	1			→ greatly)
Clinical experience	1	2	3	4	5
Consensus guidelines	1	2	3	4	5
Continuing Medical Education	1	2	3	4	5
Opinion of local experts/colleagues	1	2	3	4	5
Pharmaceutical representatives	1	2	3	4	5
Medical journals*	1	2	3	4	5
Textbooks	1	2	3	4	5
Others (please specify)					
	1	2	3	4	5
	1	2	3	4	5

6. When would you treat isolated systolic hypertension (ISH)? (Please give a specific value, not a range.)

Age:	50-64	65 +
SBP ≥		
DBP <		

7. Your treatment goals for ISH are: (Please give a specific value, not a range.)

Age:	50-64	65+
SBP <		
DBP <		

8. When do you use drug therapy for sustained systolic blood pressure above normal with diastolic pressure of less than 90 mm Hg?

\Box SBP >	I do not use drug therapy in these patients (please check).
50-64	· · · · · · · ·
65+	

If you answered "I do not use drug therapy" to both parts of this question, please go to question 9.

- 9. If you do not consider drug therapy, why not? (Please check as many reasons as are applicable.)
 - □ ISH is an inevitable consequence of aging.
 - □ ISH does not have as bad prognosis for older people as diastolic hypertension.
 - □ ISH is a compensatory mechanism to force blood through artherosclerotic arteries in older people.
 - □ Elderly patients do not comply with drug therapy.
 - **D** There is no beneficial effect in treating ISH in the elderly with drugs.
 - Drug side effects may reduce quality of life.
 - Others _____

Clinical Scenario

A 73-year-old female nonsmoker presents to your clinic for evaluation of elevated blood pressure. Assume that her blood pressure has been the same for the last three visits over the past three months. Past medical history, family history, and physical exam are otherwise unremarkable. The patient has been compliant with

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your recommendations for nonpharmacologic measures (e.g., diet, exercise) to reduce blood pressure for the past year.

- 1. Please indicate (by circling your choice) the lowest systolic blood pressure (recorded in mm Hg) at which you would recommend pharmacologic therapy: SBP <140 140-149 150-159 160-169 170-179 >180
- 2. Which medication would you advise for initial therapy? (Please specify name, dose and frequency.)
- 3. What would be the target systolic blood pressure you would endeavor to obtain in this patient? < _____ mm Hg
- 4. If your initial therapeutic choice didn't achieve satisfactory control despite titration to maximal dose, what would your next choice be? (Please specify drug name, dose and frequency.)

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