

**DAVID J. HYMAN, MD***

Department of Medicine, Baylor College of Medicine, Houston, Tex

VALORY N. PAVLIK, PhD†

Department of Family and Community Medicine, Baylor College of Medicine, Houston, Tex

Poor hypertension control: Let's stop blaming the patients

ABSTRACT

Physician behavior—not patient noncompliance—is the major cause of poor hypertension control in the United States, many studies show. Hypertension control is unlikely to improve unless physicians become more aggressive in treating mildly elevated systolic blood pressure.

KEY POINTS

In spite of extensive education campaigns for physicians and patients, only 27% of Americans with hypertension have their blood pressure controlled to the recommended target of less than 140 mm Hg systolic and less than 90 mm Hg diastolic.

The reasons for poor control have not been clearly delineated, but attention has focused primarily on patient factors such as poor compliance with treatment and lack of access to care.

Studies suggest that physicians are unlikely to diagnose and treat hypertension when systolic pressure is between 140 and 160 mm Hg and diastolic pressure is less than 90 mm Hg.

In patients who use health care services, diastolic hypertension usually is diagnosed and eventually controlled, but systolic elevations may not be diagnosed or treated.

*The author has indicated receiving grant or research support from the Pfizer, Bristol-Myers Squibb, GlaxoSmithKline, and Aventis corporations.

†The author has indicated receiving grant support from the Pfizer corporation.

HYPERTENSION is not well controlled in the United States. The most recent national health examination survey¹ suggests that 32% of persons with hypertension are unaware of it, and another 15% are aware but are not being treated. Of the 53% of people with hypertension who are treated, only half are “controlled,” yielding a net control rate of 27% (FIGURE 1).

Is it the patients' fault? Patient noncompliance is frequently proposed as a major cause of the low control rate and is usually attributed to adverse effects of antihypertensive drugs, financial barriers to treatment, and lack of motivation on the part of the patient to treat a symptomless disease for an indefinite period.

We disagree. While patient noncompliance and financial barriers are undoubtedly important, several lines of evidence suggest that the most important modifiable barrier to hypertension control is the failure of physicians to aggressively pursue recommended goals for blood pressure treatment.

WHAT IS HYPERTENSION CONTROL?

The most widely used source of data on hypertension control in the general population has been the National Health and Nutrition Examination Survey (NHANES), conducted since the early 1970s. Actually a series of surveys, NHANES includes large, representative samples of the noninstitutionalized US population. The most recently completed survey, NHANES III, was conducted in two phases: phase 1 from 1988 to 1991 and phase 2 from 1991 to 1994.

The definition of hypertension has evolved over time, as has the importance placed on diastolic vs systolic blood pressure

NHANES data: Only 27% of people with hypertension are at goal levels

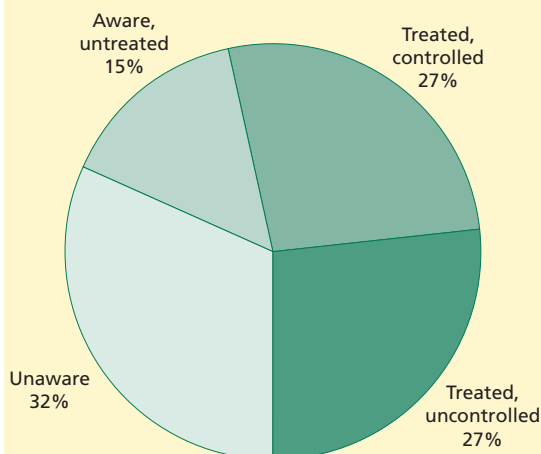


FIGURE 1. Hypertension control in the US population: National Health and Nutrition Examination Survey (NHANES) III phase 2 (1991–1994).

DATA FROM THE SIXTH REPORT OF THE JOINT NATIONAL COMMITTEE ON PREVENTION, DETECTION, EVALUATION, AND TREATMENT OF HIGH BLOOD PRESSURE. ARCH INTERN MED 1997; 57:2413–2446.

Most doctors would not treat SBP 140–160 mm Hg in a patient > 70 years

control. Before 1988, NHANES defined hypertension as systolic blood pressure 160 mm Hg or higher or diastolic blood pressure 95 mm Hg or higher. However, in NHANES III, the criterion was lowered to systolic blood pressure 140 mm Hg or higher or diastolic blood pressure 90 mm Hg or higher.

Although epidemiologic research has always emphasized both systolic and diastolic blood pressure, the focus of most clinical research and effort throughout the past century has been on diastolic control. It was believed that the diastolic pressure was pathophysiologically more important than the systolic pressure, so the early large randomized treatment trials had diastolic end points.

Using the strict epidemiologic definitions (TABLE 1), a 68-year-old man who states he was never told he has hypertension but has a calculated average blood pressure of 142/82 mm Hg during the study examination would be classified as an “unaware hypertensive.” If the same patient recalled ever having been told he

had hypertension but was not currently taking antihypertensive medication, he would be classified as “aware, but untreated,” even if he had made lifestyle changes to lower his blood pressure and was keeping regular appointments with a physician who is satisfied with his blood pressure level. If he was prescribed antihypertensive medication, this blood pressure would make him an “uncontrolled hypertensive.”

We suspect that these standards simply do not correspond to those used by most physicians in practice.

■ WHAT STANDARDS DO PHYSICIANS USE?

What physicians say they do

Surveys conducted before 1990 revealed that many physicians did not accept the notion that mild hypertension should be treated with drugs.

This attitude has persisted. We surveyed a national sample of primary care physicians in the mid-1990s and found that, in a middle-aged patient with uncomplicated hypertension, 33% of physicians would not consider starting antihypertensive medication unless the diastolic pressure was consistently higher than 95 mm Hg.² Forty-three percent of the physicians said that if the diastolic pressure was satisfactory, they would not start treatment for an elevated systolic pressure unless it was higher than 160 mm Hg.

The physicians were even less aggressive in older patients: only 24% of them would start drug treatment in a person over 70 years of age with a systolic pressure consistently between 140 and 160 mm Hg if the diastolic pressure was satisfactory.

Regarding younger patients who were already receiving treatment, 25% of the physicians admitted they would not intensify treatment if the diastolic pressure was consistently between 90 and 95 mm Hg, and 33% admitted they would not change the regimen in the face of persistent systolic elevations in the range of 140 to 160 mm Hg. And in treated patients over 70 years of age, the physicians were almost twice as likely not to intensify treatment in the face of persistent systolic or diastolic elevations.

**TABLE 1****Criteria for the classification of hypertension**

CATEGORIES	CRITERIA
Nonhypertensive	Measured SBP* < 140 mm Hg and DBP* < 90 mm Hg and not currently taking an antihypertensive medication†
Hypertensive	Measured SBP ≥ 140 mm Hg or DBP ≥ 90 mm Hg or currently taking an antihypertensive medication
Unaware	Measured SBP ≥ 140 mm Hg or DBP ≥ 90 mm Hg and answers "no" to question: "Have you ever been told you have hypertension, also known as high blood pressure?"
Aware, untreated	Measured SBP ≥ 140 mm Hg or DBP ≥ 90 mm Hg, answers "yes" to question: "Have you ever been told you have hypertension?" but states they are not currently taking antihypertensive medication
Treated, uncontrolled	Answers "yes" to questions regarding awareness and treatment, but has a measured SBP ≥ 140 mm Hg or a measured DBP ≥ 90 mm Hg
Treated, controlled	Answers "yes" to questions regarding awareness and treatment and has measured SBP < 140 mm Hg and DBP < 90 mm Hg

*SBP = systolic blood pressure, DBP = diastolic blood pressure

†In keeping with the long-standing classification criteria, persons who report having been told they were hypertensive, are not currently on antihypertensive medication, and have a measured blood pressure < 140/90 mm Hg are assigned to the nonhypertensive group.

ADAPTED FROM HYMAN DJ, PAVLIK VN. CHARACTERISTICS OF PATIENTS WITH UNCONTROLLED HYPERTENSION IN THE UNITED STATES. N ENGL J MED 2001; 345:479–486.

Since physicians are likely to overstate how aggressive they really are in practice, the significant proportion who admitted to not prescribing drug treatment for blood pressure levels above the recommended treatment thresholds probably represents an underestimate.

What the charts say

A more valid way to study physicians' behavior is to examine their patients' charts. In a seminal study,³ Berlowitz et al reviewed the records of 800 patients being treated for hypertension at Department of Veterans Affairs sites. Forty percent of the patients had blood pressures higher than 160/90 mm Hg, despite more than six visits for hypertension per year.

Using recursive partitioning analysis, the investigators found that the physicians often increased their patients' antihypertensive medications when the diastolic pressure was higher than 90 mm Hg, but rarely did so if the diastolic pressure was less than 90 mm Hg and the systolic pressure was less than 165 mm Hg, except if the patient had coronary artery disease.

We replicated these findings in a more general population in a study published in 2000.⁴ Calling random telephone numbers in a large city, we asked respondents to identify their physicians and give us permission to obtain their medical records. We received medical records for 169 patients, who had 940 encounters with 175 different providers during a 2-year period. Most patients were seen by office-based private practitioners.

Of these patients, about 25% would likely have been classified as "unaware hypertensives" if they had been surveyed in NHANES III because their medical records showed average pressures higher than 140/90 mm Hg but they did not recall having been told of hypertension, and hypertension was not mentioned in their medical record. More than 80% of these undiagnosed patients had a systolic value higher than 140 mm Hg with a diastolic value less than 90 mm Hg.

Of patients who were taking medications for hypertension, only 24% were controlled according to the definition of a systolic value

TABLE 2

Poor hypertension control is not due to lack of access to care

FACTOR	NORMOTENSIVE	UNCONTROLLED HYPERTENSION			TOTAL	TREATED, CONTROLLED
		UNAWARE	AWARE, UNTREATED	TREATED, UNCONTROLLED		
Mean age (years)	38	58	55	65	60	59
Male (%)	47	59	54	41	51	38
High school graduate (%)	76	66	67	58	63	66
Family income per year (%)						
< \$20,000	27	38	38	42	40	39
\$20,000–\$50,000	47	44	48	40	44	39
> \$50,000	25	18	13	17	17	21
Has health insurance (%)	86	90	90	96	92	94
Has a usual source of care (%)	75	79	80	97	86	95
Visited physician ≥ 1 times in past 12 months (%)	76	72	73	96	81	97
No. of visits to physician in past 12 months	3.5	3.0	3.5	6.1	4.3	6.3
Time since last blood pressure measurement (%)						
< 6 months	59	60	62	89	72	90
6–12 months	18	15	12	8	12	8
1–4 year	19	19	24	3	13	2
≥ 5 years	4	6	2	0	3	0
Current smoking (%)	29	23	26	16	21	19

ADAPTED FROM HYMAN DJ, PAVLIK VN. CHARACTERISTICS OF PATIENTS WITH UNCONTROLLED HYPERTENSION IN THE UNITED STATES. N ENGL J MED 2001; 345:479–486.

**92% of
'uncontrolled
hypertensives'
have health
insurance**

less than 140 mm Hg and a diastolic value less than 90 mm Hg. The mean blood pressure was 147/86 mm Hg. Over a 2-year period, physicians generally intensified the regimen if the diastolic pressure was very high, and persistent milder diastolic elevations eventually led to action in many cases. However, recurrent systolic elevations did not lead to any physician action if the diastolic level was under control.

Another recently published study⁵ in a large Midwestern group practice provided further evidence that physicians do not act to reduce mildly elevated systolic pressure over the course of repeated office visits in which the systolic pressure was higher than 140 mm Hg.

In short, there is now ample evidence to indicate that in patients who use health care services, diastolic hypertension is diagnosed and eventually controlled, but systolic elevations may not be diagnosed or treated.

■ HOW MUCH ARE PATIENTS TO BLAME?

Hypertension control has improved dramatically over the past 30 years (a time of sustained public and professional education)—if we use the same standard over time to judge control rates. Applying the older criterion of 160/95 mm Hg, the overall population control rate improved from 16% in NHANES I (1971–1974) to 64% in NHANES III phase 1 (1988–1991). In persons taking antihypertensive drugs, the proportion with blood pressure lower than 160/95 mm Hg was 82% in phase 1 of NHANES III.⁶

On the other hand, using the newer criterion of 140/90 mm Hg, the total control rate in phase 1 of NHANES III was only 27%, while the control rate among treated persons was 50%.



TABLE 3

Uncontrolled hypertension: A problem of age, elevated systolic pressure

AGE	UNAWARE		AWARE, UNTREATED		TREATED, UNCONTROLLED	
	MEAN BP (MM HG)	% WITH SBP* $\geq$ 140 AND DBP* $<$ 90 MM HG	MEAN BP (MM HG)	% WITH SBP $\geq$ 140 AND DBP $<$ 90 MM HG	MEAN BP (MM HG)	% WITH SBP $\geq$ 140 AND DBP $<$ 90 MM HG
25–44 years	138/91	52	141/94	25	147/95	29
45–64 years	148/86	69	152/89	54	150/87	66
> 65 years	153/77	91	160/81	82	159/78	88
All subjects	148/83	79	151/88	59	155/82	77

*SBP = systolic blood pressure, DBP = diastolic blood pressure

ADAPTED FROM HYMAN DJ, PAVLIK VN. CHARACTERISTICS OF PATIENTS WITH UNCONTROLLED HYPERTENSION IN THE UNITED STATES. N ENGL J MED 2001; 345:479–486.

How do we explain these differences between the NHANES surveys? Is it possible that since 1970, patients with blood pressures higher than 160/95 mm Hg have selectively become more compliant and have acquired significantly improved access to health care, while those with pressures between 140/90 and 160/95 mm Hg remain unmotivated and noncompliant?

A more plausible explanation is that we have done a good job of controlling blood pressures to levels we really believe we should achieve.

International studies also support this explanation. In Canada, for example, using the 140/90 mm Hg criterion, the hypertension control rate is only about half as high as in the United States (13% vs 27%), even though financial barriers should be lower in the Canadian system.⁷

Could it be that Canadian patients are only half as compliant with physicians' prescriptions as persons south of the border? Or does the more conservative physician attitude toward the treatment of hypertension simply persist more strongly in Canada?

In the United States, well-insured, well-educated populations that should be well informed about hypertension remain uncontrolled. A study in Olmsted County, Minnesota, home of the world-renowned Mayo Clinic, found an overall control rate of 16%.⁸ In a managed care population in northern California, only about 30% of those with a diagnosis of hypertension were controlled to

the standard of a systolic value less than 140 mm Hg and a diastolic value less than 90 mm Hg. When only a diastolic value of 90 mm Hg was considered, however, close to 70% were controlled. Is this another example of selective patient noncompliance among those with isolated systolic blood pressure elevation?

■ IS POOR CONTROL DUE TO LACK OF ACCESS TO CARE?

To study the overall contribution of lack of insurance and access to health care to uncontrolled hypertension, we analyzed data from the NHANES III survey, including health insurance status, availability of a usual source of care, and number of physician visits.⁹

We found that uncontrolled hypertension is largely a problem of older people. The average age of an "unaware hypertensive" is 58 years, whereas the average age of a "treated, but uncontrolled hypertensive" is 65 years (TABLE 2).

Moreover, the most common pattern of uncontrolled hypertension is a mild systolic elevation (TABLE 3) in a regular user of medical care (TABLE 2). When we calculated the attributable risk, fewer than 10% of the cases of undetected or uncontrolled hypertension could be associated with lack of health care use.

The finding of controlled diastolic blood pressure with modestly elevated systolic blood pressure in people with treated hypertension again suggests that patient noncompliance is not the major reason for the large number of people labeled as "uncontrolled hypertensives."

Diastolic hypertension is usually treated, but not mild systolic hypertension

■ IS POOR CONTROL DUE TO PATIENTS QUITTING?

Many investigators believe that a substantial portion of patients stop treatment for hypertension against the advice of their physician. For example, an examination of a Canadian provincial prescription database showed that persistence with therapy was “poor” at 6 months, ranging from 80% to 89%, depending on the drug.¹⁰

However, this figure is not really interpretable without data on individual patients. In addition, in prescription database studies, it is important to distinguish between new patients and continuing patients when interpreting the “high” discontinuation rates. In the same Canadian study, 97% of persons with established hypertension persisted with drug therapy, as opposed to 78% with newly diagnosed hypertension.

Because hypertension is usually chronic, most hypertensive patients have established hypertension. And because the blood pressure levels of most patients are mildly elevated, the transition from being a nonuser to a long-term user of antihypertensive medication may have some discontinuity at the start.

In our analysis of the NHANES III data, most “aware but untreated” hypertensive people were under the care of physicians and had a very mild systolic elevation and diastolic values less than 90 mm Hg.

Many people who qualify for antihypertensive treatment in randomized trials on the basis of several elevated blood pressure readings on different occasions never have another elevated reading during many years of observation. In the classic Australian National Trial,¹¹ in which a diastolic level higher than 95 mm Hg on two visits was required for randomization, 21% of the 1,119 subjects who were randomized to receive no treatment never had a follow-up diastolic blood pressure value above the threshold of 95 mm Hg, and 47% averaged less than 95 mm Hg.

It is quite likely that patients experiment with not taking their medications, and their physicians find the resulting blood pressures satisfactory.

■ ARE THE DRUGS TO BLAME?

The fact that many patients stop taking their medications (if indeed they do) is sometimes attributed to unpleasant side effects of the drugs. It is possible, however, that the contribution of drug side effects to patient noncompliance with antihypertensive therapy is misinterpreted.

For example, in randomized double-blind studies that compared several antihypertensive agents and placebo, the overall proportion of patients who discontinued the study medication was similar in the placebo and active treatment groups.

In one large randomized trial comparing five antihypertensive drugs,¹² the patients who took beta-blockers and diuretics, which many physicians believe are poorly tolerated, reported fewer side effects and had lower overall discontinuation rates than those who received placebo. Furthermore, the variability in side-effect profiles among the active drug groups was relatively small.

The notion that the development of antihypertensive medications with fewer side effects would dramatically improve compliance has little published data to support it.

■ SPECIAL ISSUES IN AFRICAN AMERICANS

African Americans have a higher prevalence of hypertension and suffer an increased burden of its sequelae. It is often assumed that these unfavorable outcomes are the consequence of socioeconomic disparities that lead to lower utilization of health care services for screening and treatment and to worse compliance with treatment.

However, the NHANES data reveal that rates of awareness and treatment of hypertension are very similar in African Americans and non-Hispanic whites. Several local surveys of African Americans have yielded similar findings.

In a detailed study of a very economically deprived inner-city area of Baltimore,¹³ most “unaware hypertensives” had had recent blood pressure checks, and most people with uncontrolled hypertension were under the care of health professionals.

In large trials, drug discontinuation rates were similar to those for placebo



A series of studies described the dynamics of hypertension care among African Americans in low-income areas of Houston, Tex.^{14,15}

In a telephone survey (using random digit dialing) of more than 3,200 African Americans in that city, 92% of the respondents reported having had a blood pressure measurement during the previous 2 years.¹⁴ Of those with a history of hypertension, more than 90% said they were receiving some type of treatment, and 87% of those who ever had been prescribed medications were still taking them. Over half of those who had been on a medicine but were currently not taking one said a physician had told them to stop.

In another study that examined 932 African American adults sampled from this same community, only 27% of those with hypertension would be classified as controlled if both the 140-mm Hg systolic and the 90-mm Hg diastolic criteria were applied, but 75% would be controlled if only the 90-mm Hg diastolic criterion were used.¹⁵ Among the

few respondents who reported having dropped out of medical care for hypertension, the mean blood pressure was 150/85 mm Hg.

Overall, the African American community should be commended for the extent to which it has mobilized to fight hypertension.

■ PHYSICIANS MUST BE MORE AGGRESSIVE

Many health care organizations now endorse blood pressure targets even lower than 140/90 mm Hg for specific groups of patients, such as those with renal insufficiency. It is clear that practicing physicians have yet to adopt this paradigm. It is beyond the scope of this article to discuss whether or not the lower blood pressure targets are evidence-based, cost-effective, or achievable in practice. However, it is time to stop blaming the patient or even blaming the drugs for the current state of hypertension control and to reflect on how aggressively we as physicians pursue treatment goals. ■

■ REFERENCES

1. **Joint National Committee on Prevention, Evaluation, and Treatment of High Blood Pressure.** The sixth report of the Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure. *Arch Intern Med* 1997; 157:2413–2446.
2. **Hyman DJ, Pavlik VN.** Self-reported hypertension treatment practices among primary care physicians: blood pressure thresholds, drug choices, and the role of guidelines and evidence-based medicine. *Arch Intern Med* 2000; 160:2281–2286.
3. **Berlowitz DR, Ash AS, Hickey EC, et al.** Inadequate management of blood pressure in a hypertensive population. *N Engl J Med* 1998; 339:1957–1963.
4. **Hyman DJ, Pavlik VN, Vallbona C.** Physician role in lack of awareness and control of hypertension. *J Clin Hypertens* 2000; 2:324–330.
5. **Oliveria SA, Lapuerta P, McCarthey BD, L'Italien GJ, Berlowitz DR, Asch SM.** Physician-related barriers to the effective management of uncontrolled hypertension. *Arch Intern Med* 2002; 162:413–420.
6. **Burt VL, Cutler JA, Higgins M, et al.** Trends in the prevalence, awareness, treatment, and control of hypertension in the adult US population: data from the health examination survey, 1960 to 1991. *Hypertension* 1995; 26:60–69.
7. **Joffres MR, Hamet P, MacLean DR, L'Italien GJ, Fodor G.** Distribution of blood pressure and hypertension in Canada and the United States. *Am J Hypertens* 2001; 14:1099–1105.
8. **Meissner I, Whisnant JP, Sheps SG, et al.** Detection and control of high blood pressure in the community: do we need a wake-up call? *Hypertension* 1999; 34:466–471.
9. **Hyman DJ, Pavlik VN.** Characteristics of patients with uncontrolled hypertension in the United States. *N Engl J Med* 2001; 345:479–486.
10. **Caro JJ, Salas M, Speckman JL, Raggio G, Jackson JD.** Persistence with treatment for hypertension in actual practice. *CMAJ* 1999; 160:31–37.
11. **Untreated mild hypertension: A report by the Management Committee of the Australian Therapeutic Trial in Mild Hypertension.** *Lancet* 1982; 1:185–191.
12. **Preston RA, Materson BJ, Reda DJ, Williams DW.** Placebo-associated blood pressure response and adverse effects in the treatment of hypertension: observations from a Department of Veterans Affairs Cooperative Study. *Arch Intern Med* 2000; 160:1449–1454.
13. **Bone LR, Hill MN, Stallings R, et al.** Community health survey in an urban African-American neighborhood: Distribution and correlates of elevated blood pressure. *Ethn Dis* 2000; 10:87–95.
14. **Hyman DJ, Pavlik VN, Vallbona C, et al.** Blood pressure measurement and antihypertensive treatment in a low-income African-American population. *Am J Public Health* 1998; 88:292–294.
15. **Pavlik VN, Hyman DJ, Vallbona C, Toronjo C, Louis K.** Hypertension awareness and control in an inner-city African-American sample. *J Hum Hypertens* 1997; 11:277–283.

.....
ADDRESS: David J. Hyman, MD, Department of Medicine, Ben Taub General Hospital, 1504 Taub Loop, Houston, TX 77030; e-mail dhyman@bcm.tmc.edu.

Many organizations now endorse targets lower than 140/90 mm Hg for specific patient subgroups