

Patterns of Care for Hypertension Among Hospitalized Patients

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ELEVATED BLOOD PRESSURE WAS SHOWN by the Framingham study to be the single most important risk factor in cardiovascular morbidity and mortality (1). More recently the Hypertension Detection and Follow-up Program has demonstrated that cardiovascular mortality can be reduced by systematic treatment of elevated diastolic blood pressure (DBP) ranging from 90 to 104 mm Hg (2). With these facts firmly established, a high priority at the national level has been assigned to making hypertension control an integral part of health care delivery and to making efficient use of the existing resources of high blood pressure

programs. Maryland is one of seven States that has received funding under a National Heart, Lung, and Blood Institute contract to establish and evaluate a statewide coordination program for high blood pressure control.

To obtain a data base for planning and evaluating such a program, a baseline records survey was done on patients who had been discharged from Maryland hospitals during 1978. Estimates from the records survey have been used in setting up a statewide high blood pressure control program. To measure the changes in selected parameters and to assess the effect that the statewide coordination efforts have had on hypertensive care in Maryland, a repeat records review is planned.

A summary of this study was sent to the directors of medical and nursing services of all hospitals in the State to alert them to any problems in hypertension care and control. These results were also discussed with members of the Professional Practices Committee of the Maryland Hospital Association and were used in setting up professional education modules, as part of a statewide coordination plan.

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Methods

Abstracts of hospital discharge records comprised the main data base for our study. Data from the household survey were used to substantiate the hospital discharge data.

Abstracts of hospital discharge records. The target population of the abstracts survey was patients 18 years or older who had been discharged from any acute care hospital in Maryland in 1978. The State Professional Standards Review Council, the local Professional Standards Review Organizations (PSROs), the Maryland Hospital Association, and the Maryland Medical Records Association worked closely with the Hospital Protocols and Procedures Committee of the Maryland High Blood Pressure Coordinating Council on this project during the planning stage. These organizations also assisted in refining the abstract form and in obtaining the support of the staffs of the 50 acute care hospitals in the State. A 5 percent systematic random sample of discharges from each of the 40 acute care hospitals that agreed to participate in the survey was selected for study.

The medical records personnel of the 40 hospitals were requested to do the record abstracting in such a way that confidentiality would be preserved and accuracy assured. In most hospitals, the persons doing the abstracting had been working in the facility's Quality Assurance Program. They were paid a nominal fee for pulling the records and preparing the abstracts. The abstracters were asked to scan the entire medical record of selected patients. Each hospital took a number between 1 and 20 at random, and from then on every 20th record was abstracted on a standardized form. Information about medicine prescribed for hypertension and advice or instruction about followup care that had been given was abstracted only if the patient's chart showed a least one DBP \geq 100 mm Hg

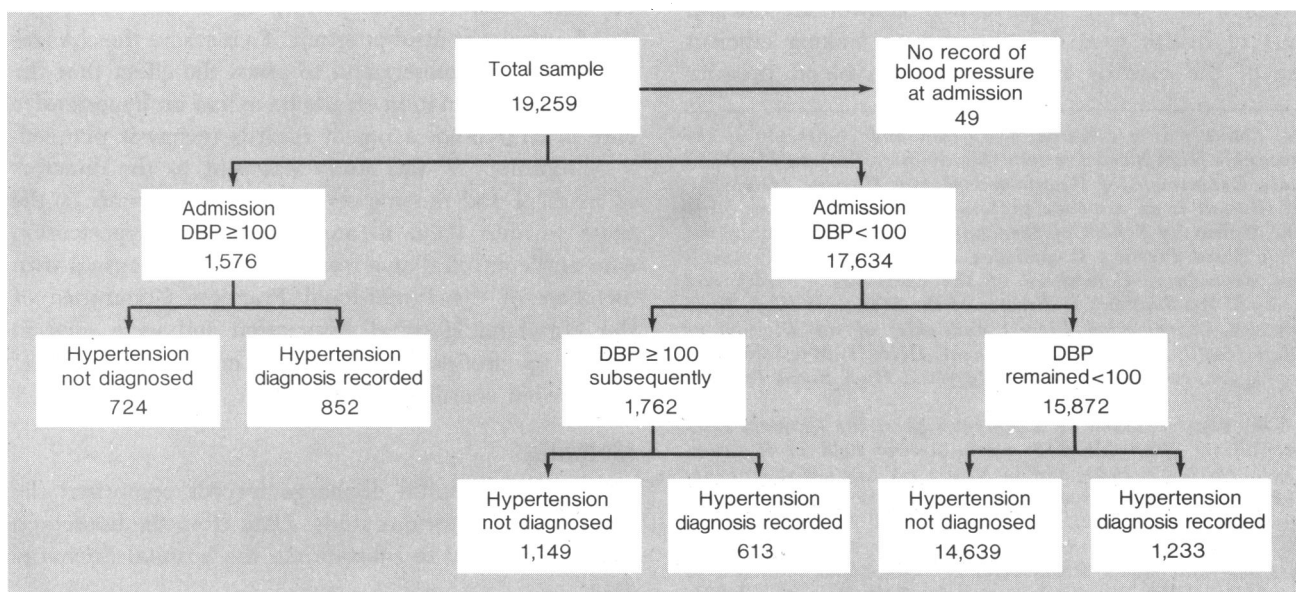
or a diagnosis of hypertension. The final sample consisted of 19,259 records, and abstracts of these were sent to the State health department for editing and computerization. The project was completed in 18 months. No checks on the reliability of the abstracts were possible because of the project's limitations.

No significant differences between the participating and nonparticipating hospitals were found with respect to size, location, or teaching status. Comparison of the hospital survey sample with the total adult population discharged from Maryland hospitals in 1978 failed to identify any significant differences in the distributions by age, race, sex, or length of stay.

Household survey. Between July 1978 and March 1979, a probability sample of 6,425 Maryland residents 18 years of age and over were interviewed in their homes, and their blood pressure was measured. Technical details of the design and conduct of this survey have been reported previously (3).

Among other matters, such as awareness and treatment for high blood pressure, the 6,425 adults were asked if they had been hospitalized in the 12 months before the interview. Approximately 12 percent (763) of the respondents said that they had been hospitalized in the specified period. This percentage, when projected to the State population of adults, matches the total percentage of adults discharged from all hospitals in Maryland in that period. (The household survey recall period coincided approximately with the period of this hospital discharge survey.)

Figure 1. Distribution of the sample of adult hospital patients by diastolic blood pressure (DBP) status



Results

Prevalence. As figure 1 shows, overall, 17.4 percent (3,338) of the 19,259 patients whose records were abstracted had elevated DBP (that is, a diastolic blood pressure ≥ 100 mm Hg had been recorded in their charts at least once). Of the 19,259 patients, 8.2 percent (1,576) had a high diastolic blood pressure recorded at admission; 9.2 percent (1,762) had such a reading recorded subsequently in their hospitalization; 6.4 percent (1,233) had diagnosed hypertension (that is a diagnosis of hypertension had been entered in their charts) without elevated DBP; 76 percent (14,639) had neither elevated DBP nor diagnosed hypertension. The prevalence of elevated DBP or diagnosed hypertension was higher among blacks than whites, as the following table shows.

Demographic category	Percentage of total sample within each category		
	DBP ≥ 100 but hypertension not diagnosed	DBP < 100 with diagnosed hypertension ¹	DBP ≥ 100 with diagnosed hypertension ¹
Race and sex:			
Black males	15.3	9.2	16.8
White males . . .	13.3	5.9	7.2
Black females . . .	8.6	8.1	13.1
White females . .	7.1	6.0	5.3
Age (years):			
18-34	5.6	1.1	1.9
35-49	10.6	4.1	7.1
50-64	12.7	9.8	12.1
65 and over	12.0	12.6	12.0
Total sample	9.7	6.4	7.6

¹ Hypertension diagnosis entered in patient's chart.

The prevalence of elevated blood pressure regardless of diagnosis and the prevalence of diagnosed hypertension regardless of blood pressure level showed significant variations by race, sex, and age. Almost one of four patients 50 years and over had elevated DPB; more than one-third of this age group had elevated blood pressure or diagnosed hypertension.

Diagnosis. Forty-four percent (1,565) of the 3,338 patients with elevated DBP had a diagnosis of hypertension entered in their charts. Significant variations in the percentage of patients with a hypertension diagnosis were observed among age, race, and sex groups (fig. 2). Hypertension was more frequently diagnosed among blacks of all ages than among whites. Among young adults (18 to 34 years old) with a DBP ≥ 100 mm Hg, only 1 of 4 patients overall and less than 16 percent of white males were diagnosed as hypertensive. In all age groups, hypertension was less frequently diagnosed in white males than in other race-sex groups ($P < 0.01$). Such age, race, and sex differences existed in almost all hospitals.

The percentage of patients with a diagnosis of elevated blood pressure entered in their charts was independent of the length of stay in the hospital. Twenty-five percent of the patients with an admission DBP ≥ 115 mm Hg had no diagnosis of hypertension entered in their charts.

Medication. Sixty-two percent (1,673) of the 2,698 patients with a recorded diagnosis of hypertension were on antihypertension medication (diuretics or any specific antihypertension drugs ordered in the hospital). Age, race, and sex differences among the diagnosed hypertensives were significant with respect to treatment (fig. 3). Among diagnosed hypertensives who also had elevated DBP (not shown), the proportions treated while in the hospital ranged from 48 percent of white males to 70.0 percent of black females; the corresponding percentage for white females was 58.8 percent and for black males, 71.5 percent ($F = 13.0, P < 0.001$). The percentages of diagnosed hypertensives among adult age groups treated while in the hospital was as follows: 18-34 years, 46.8 percent; 35-49 years, 54.5 percent; 40-64 years, 64.3 percent; and 65 years and over, 64.1 percent ($F = 9.7, P < 0.001$).

Less than a third of white females aged 18-34 who had a diagnosis of hypertension received medication while in the hospital (fig. 3). White males received medication less frequently than any other race-sex or age groups except the group 18 to 34 years old.

The actual percentage of hospital patients receiving medication for hypertension may have been less than our figures indicate, since a proportion of the patients received some of the medications included in this analysis as treatment for other ailments, such as diabetes and heart conditions.

The medications that were ordered did not show any significant correlation with the length of the hospital stay. Almost a third of the hypertensives who stayed for 5 days or more received no antihypertension medication.

In the baseline household survey, 12 percent (763) reported that they had been hospitalized in the 12 months before the interview. The following table shows the effect of hospitalization on awareness about hypertension and on treatment among 310 household survey respondents with an average DBP ≥ 95 mm Hg.

Hospitalization status	Not on medication		Aware and taking medication	Total
	Not aware	Aware		
Hospitalized in previous 12 months . .	11	9	19	39
Not hospitalized in previous 12 months . .	121	70	80	271
Total	132	79	99	310

Figure 2. Percentage distribution of diagnosed hypertension among patients with elevated diastolic blood pressure, by race-sex and age group

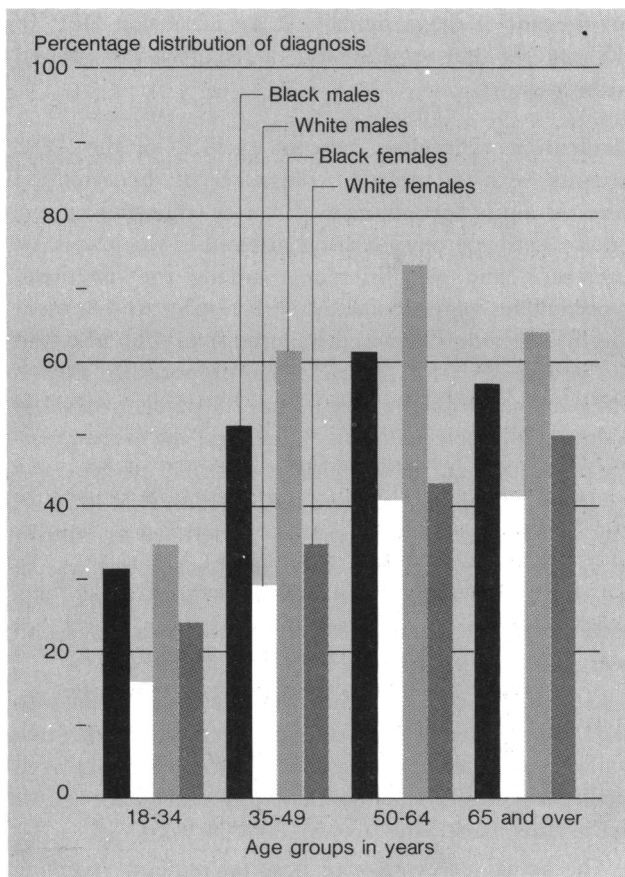
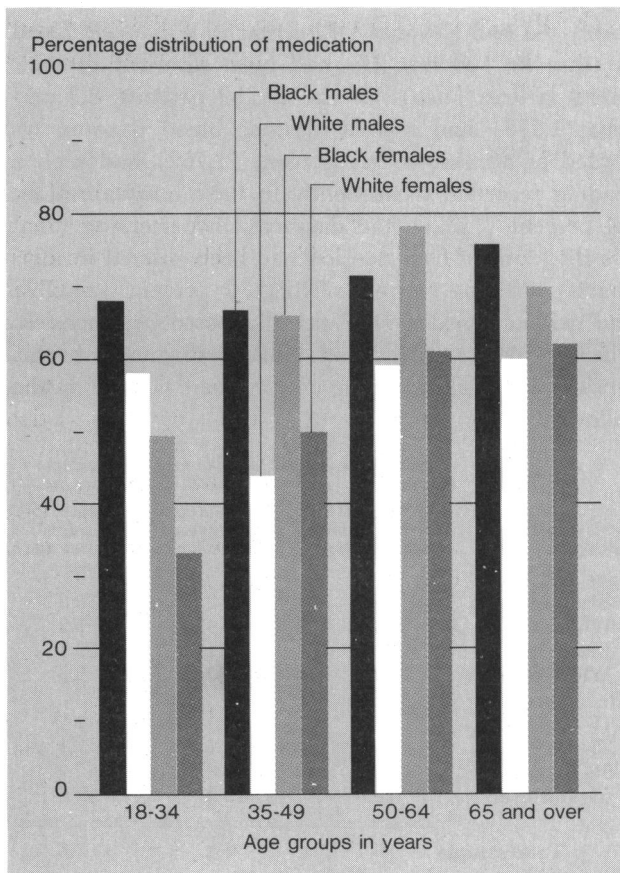


Figure 3. Percentage distribution of patients with medications ordered among those patients with diagnosed hypertension, by race-sex and age group



Although those respondents who had been hospitalized within the previous 12 months were slightly more likely to be on antihypertension medication ($X^2 = 6.20$, $P < 0.05$), no significant differences were noted between hospitalized and nonhospitalized persons with respect to awareness or with respect to treatment among those who were aware, as the following table shows.

Awareness and treatment status	Hospitalized	Not hospitalized	Chi square	P
Aware	28	150	3.77	> 0.05
Not aware	11	121		
Treated	19	80	2.016	> 0.15
Not treated	9	70		

Instruction or advice. Patients with diagnosed hypertension regardless of the elevation of blood pressure were more likely to have had instructions concerning diet or followup care recorded in their charts than those who had an elevated DBP regardless of diagnosis. This percentage was also significantly higher among blacks than whites in all age and sex groups. The following table shows the percentages of the various age-

race-sex categories receiving instruction by blood pressure status:

Age-race-sex category	Diagnosed hypertensives (all blood pressure levels)	Elevated DBP (both diagnosed and not diagnosed)
18-34 years		
Black males	84.4	39.1
White males	58.0	23.4
Black females	74.1	41.2
White females	49.2	36.7
35-49 years		
Black males	83.6	54.6
White males	61.4	31.3
Black females	85.3	66.2
White females	61.6	35.9
50-64 years		
Black males	84.6	69.1
White males	64.5	46.2
Black females	88.2	73.8
White females	68.3	50.0
65 years and over		
Black males	73.1	67.0
White males	64.6	50.6
Black females	82.7	67.2
White females	69.8	53.8

With patients who stayed in the hospital 2 days or less

excluded, no significant correlation was observed between length of stay and receiving instructions about the care of hypertension. About half of the patients with $DBP \geq 100$ mm Hg at discharge did not have a record of having received instructions about the care of hypertension.

Discussion

One of the most consistent and significant results of the study related to racial differences. The percentages of patients with $DBP \geq 100$ mm Hg who were diagnosed as hypertensive, were treated, and were given advice about hypertension was consistently lower among whites than among blacks, regardless of age, sex, or type of hospital. One explanation for the lower rate of hypertension diagnosis among whites might be that they have more elective surgery than blacks. On admission for elective surgery, a diagnosis of hypertension might not be recorded as often as for other admissions. Also, treatment for hypertension might be stopped temporarily, or advice about the condition might not be given because the patient was already under the care of his or her family physician.

In the survey of 19,259 hospitalized adult patients, 23.8 percent (4,577) were found to have either an elevation of their $DBP \geq 100$ mm Hg or a diagnosis of hypertension documented in the hospital record. The household survey of 6,425 adults revealed that 19.4 percent (1,247) had a diastolic pressure ≥ 90 or were on antihypertension medication and that 14.9 percent (957) had a $DBP \geq 95$ or were on antihypertension medication.

The finding of one elevated $DBP \geq 100$ mm Hg either on admission or subsequently during a hospital stay is not synonymous with a diagnosis of hypertension. However, such an elevation is sufficiently abnormal under any circumstances to warrant followup and verification. In fact, Sacket and associates have shown that 80 percent of the persons with a single DBP reading ≥ 100 mm Hg will subsequently have other readings in this range (4). Yet, among 3,338 adult hospitalized patients surveyed in our study who had a $DBP \geq 100$ mm Hg, only 44 percent (1,465) were diagnosed as hypertensive, and only 50 percent (1,669) had any record of having received instructions about high blood pressure. Possible reasons for this low rate of diagnosis and lack of instructions are as follows.

1. The patient's length of stay may have been too short to establish the diagnosis.

2. All of the patient's other blood pressure measurements in the hospital may have been within the normal range, that is, less than 90 mm Hg diastolic.

3. Subsequent measurements of the patient's blood pressure may have not been taken or a single elevated $DBP \geq 100$ mm Hg may have been considered unimportant in a hospital setting.

4. Some physicians may have considered blood pressure levels between 100 mm Hg and 104 mm Hg too low to make a definitive diagnosis.

5. The patient's elevated blood pressure could have been overlooked.

6. A diagnosis may have been made or advice given that was not written in the record.

In some cases, one might assume that there was insufficient time to establish a hypertension diagnosis. Glass and associates reviewed charts of emergency departments at three university-affiliated hospitals and reported that "less than half of all patients who had elevated blood pressures were recognized by physicians to be hypertensive" (5). These authors expressed the belief that lack of time and the emergency nature of the visit might have contributed to the low percentage of diagnoses. However, our study indicates that although 80 percent of the patients surveyed stayed in the hospital 4 days or more, the correlation between the length of stay and the diagnosis of hypertension was not significant.

Concerning the second reason for the low rate of diagnosis and of instruction about hypertension, it seems unlikely that 56 percent of the patients with one elevation of blood pressure would have failed to have another.

The third and fourth possible reasons for the low rate of diagnosis and instruction might be physicians' attitudes toward and perceptions of the significance of a single measurement and the significance of blood-pressure levels. Our study was not designed to evaluate these attitudes and perceptions.

In regard to the percentage of patients given advice about hypertension, it is possible that patients had been given advice, but this fact was never recorded in their charts. However, the Maryland baseline household survey revealed that among patients who had a $DBP \geq 95$ mm Hg and had been discharged from the hospital within the previous 12 months, 28 percent (11 of 39) had not been told of their condition. This result lends credence to the possibility that some hospital patients are not informed of their elevated blood pressure nor given any advice about it.

Among patients who had an established diagnosis of hypertension, 38 percent had not been given antihypertension medication. Since the treatment rate did not correlate with length of hospital stay, a short stay could not account for the lack of drug treatment in this group. Thirty-four percent of the diagnosed hyper-

tensives with a DBP ≥ 100 mm Hg on at least one occasion were not on drug treatment, compared with 43 percent of hospital patients with a diagnosis of hypertension who had never had a DBP ≥ 100 mm Hg. According to State and national standards at the time of the study, only persons with a DBP ≥ 105 mm Hg needed to be treated with medication. Perhaps most of the 34 percent did not have a sustained DBP ≥ 104 mm Hg. It has been suggested that antihypertension treatment of some patients might have been discontinued in anticipation of elective surgery. We believe that such discontinuance is rarely necessary and, unfortunately, may convey to the patient the idea that treatment for hypertension need not be resumed after hospitalization unless the patient is specifically told to do so.

The study also revealed that patients with a DBP ≥ 100 mm Hg on admission were more likely to be diagnosed as hypertensive than those with a DBP reading of this level after admission. It could be that admission measurements are brought to the attention of a physician more readily during the admission workup or that subsequent DBP elevations are believed to be related to hospital events such as an operative procedure, and the physician considers such elevations to be transient. On the other hand, a number of studies have shown that the blood pressure of hypertensive patients often falls significantly below outpatient levels during the early days of hospitalization (6,7). In the Veterans Administration Cooperative Study, the average hospital DBP was 15 mm Hg lower than the average clinic DBP (8). And, according to Ayers and associates, "In hospitalized patients blood pressure is reduced with bed rest; thus any patient with an elevated blood pressure is to be followed as an outpatient to determine the course of blood pressure" (9). The finding of an elevated DBP ≥ 100 mm Hg during hospitalization should command as much, if not more, attention than a similar level recorded on admission.

Implications for Medical Practice

Although the results of this study are by no means definitive, they do suggest areas that health professionals in hospital practice may wish to investigate, and if they find problems exist, see if improvements can be made. First, it is possible that the intensive training and education of health professionals in hospitals to look for hypertension in blacks has been so successful that hypertension in whites, especially white males, is not being given adequate attention. Increased attention and response to elevated blood pressure in white males seems in order.

Second, the finding of an elevated blood pressure in

a hospital setting may not be given the importance that it should be accorded. The blood pressure may be considered to be elevated only because the person is in the hospital, or it may be ignored as a routine vital sign measurement. A need exists for providing advice and followup care whenever an elevated blood pressure is found.

Although blood pressure is highly variable, the results of screening in the Hypertension Detection and Followup Program showed, as did the Canadian study reported by Sacket and associates, that an elevated DBP on one occasion predicts a future elevation with an accuracy between 65 and 80 percent (10). In addition, the Framingham study has demonstrated that a single casual blood pressure determination is a good predictor of future cardiovascular risk. Hospitals should institute the procedure of flagging charts that contain a record of undiagnosed elevated DBP. The patient's blood pressure should be measured again, and if found to be elevated on two or more occasions, a diagnostic workup should be undertaken. If the DBP is found to be above 90 mm Hg, the patient should be told that he or she is at risk of developing high blood pressure and should have his blood pressure checked at frequent intervals after discharge.

It is possible also that once high blood pressure is diagnosed by health professionals, the diagnosis, its implication, and what actions should be taken are not communicated to the patient. In the Maryland household survey, when persons who had stopped their antihypertension medications were asked why, 70 percent said that they had stopped because the doctor had told them to, because they no longer had high blood pressure, or because they no longer needed the medication. Since these people had a DBP ≥ 95 mm Hg at the time of the survey, it is unlikely that their physicians had actually told them to stop taking their medication. It seems more likely that they had stopped because the communication between the physician and the patient was not clear. Also, when patients admitted to a hospital for elective surgery have their antihypertension medication stopped, there is a danger that they may believe that they do not have to resume their drug treatment when they return home.

Of the 330,000 adults 18 years or older hospitalized in Maryland each year (12 percent of the total adult population of the State), almost one-fourth will have a DBP ≥ 100 mm Hg or will have diagnosed hypertension. Since more than 90 percent of these hospitalized patients will return to the community, health professionals working in the hospital setting are in an excellent position to contribute to high blood pressure control. The implications of this study, reinforced by

the results of the household survey, indicate the need for more careful assessment of elevated blood pressure levels in hospitalized patients as well as for clear communication of instructions about hypertension to patients.

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SYNOPSIS

SHANKAR, BELAVADI S. (Maryland State Department of Health and Mental Hygiene), RUSSELL, R. PATTERSON, SOUTHARD, JOHN W., and SCHURMAN, E. W.: *Patterns of care for hypertension among hospitalized patients. Public Health Reports, Vol. 97, November-December 1982, pp. 517-527.*

In a sample of 19,210 adult inpatients discharged from Maryland

community hospitals in 1978, 1 in 4 had either an elevated diastolic blood pressure ≥ 100 mm Hg (3,338) or a diagnosis of hypertension (1,233). Among the patients with elevated blood pressure, hypertension was diagnosed in 44 percent, and 48 percent received advice concerning followup care. Likewise, of the patients with diagnosed hypertension, 72 percent were treated in the hospital, and 70 percent received advice concerning followup care. Age, race, and sex differences were significant.

White males were least likely to have hypertension diagnosed, to be treated for it, or to receive instruction about it.

The survey results were used by the Maryland State Department of Health and Mental Hygiene to formulate a statewide high blood pressure coordination plan and to construct modules for the education of professionals in high blood pressure treatment and control. A followup survey is planned to evaluate the effect of these efforts.