

The Elderly Hypertensive: A Neglected Patient?

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A cohort of 1,002 elderly hypertensive patients who received care at six family practice residency program clinics in Iowa was followed for nearly four years in a historical prospective design study. Demographic and clinical data were abstracted and the end points of the study were the occurrence of a cerebrovascular accident ($n = 37$), myocardial infarction ($n = 27$), or death ($n = 102$). Survival regression analysis showed that the risk of cerebrovascular accident is greater than any other major morbid event and that risk is proportional to increasing levels of both systolic and diastolic blood pressure. The findings are in agreement with published studies of hypertension and its treatment in other age groups.

Family physicians treat elderly hypertensive patients daily, and many are unsure that the advantages of treatment outweigh the disadvantages for this age group. The elderly bear the burden of the highest prevalence rate for hypertension and incidence rate of stroke of any age group, and there is now no doubt that high blood pressure is a major cause of stroke.^{1,2} The incidence of stroke has declined slowly in the first half of this century and more rapidly since 1970. Secular trends, the availability of antihypertensive medications, and recent public education referral systems have been responsible for this decline.² Despite this association, opinions differ regarding the benefit of lowering the blood pressure of elderly hypertensive patients. This may be due to the comparatively small amount of research concerning these elderly pa-

tients.^{3,4} It is felt that because of the obstructive nature of arteriosclerosis, a higher perfusion pressure is required to meet brain, heart, and kidney tissue demands. In addition, the side effects of many hypertensive medications are thought to lead to consequences that are more serious than those of elevated blood pressure.^{5,6} On the other hand, epidemiological studies and clinical trials, such as the Framingham Study,⁷ the Veterans Administration Cooperative Study on Antihypertensive Agents,⁸ and the Hypertension Detection and Follow-up Program Cooperative Group,⁹ have shown that reduced rates of cardiovascular morbidity and mortality are associated with lower blood pressure levels. Although all three studies included older persons in their samples, none was designed exclusively to study this relationship among elderly patients.

The purpose of this study was to determine the association between hypertensive and cardiovascular morbidity and mortality and overall mortality in a population of elderly ambulatory hypertensive patients treated by family physicians.

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Table 1. Direction of Adjusted Risk of an Event to the Cohort and Those With Systolic Hypertension

Event	Total Group (n=1,002)		Group with Systolic Hypertension (n=524)
	Initial Systolic Blood Pressure	Initial Diastolic Blood Pressure	Initial Systolic Blood Pressure*
Death	↔	↔	↔
Cardiovascular death	↔	↑**	↔
Myocardial infarction	↔	↑**	↔
Cerebrovascular accident	↑†	↑†	↑**

Note: Adjusted for age, sex, concomitant disease, and treatment status
 *Initial diastolic blood pressure <90 mmHg
 **P < .05
 †P < .001

Methods

Within an historical prospective design, demographic and clinical variables were abstracted by one of the investigators (MRS) from the charts of all diagnosed essential hypertensive patients 65 years of age and older who had ever attended one of six family practice residency program clinics affiliated with the University of Iowa. The follow-up period began for each member of the cohort on the date of the last of three events: the 65th birthday, the first visit to the clinic, or at the time of diagnosis of essential hypertension. Follow-up ended on the date of a myocardial infarction (MI), cerebrovascular accident (CVA), or death (the three end points of the study), or the last visit to the clinic if no morbid or fatal event occurred after the follow-up period began. The study group included only those without a history of MI or CVA before the follow-up period began.

Of particular interest were blood pressure recordings for this group. The average of the first two and the last three blood pressure readings recorded at the beginning and end of the follow-up period, respectively, were used for analysis after adjustment for significant confounding variables,

primarily age and sex. The dates and causes of death in the cohort were verified by Iowa death certificates.

Data were analyzed by the Cox regression model, which incorporates life table methods and regression analysis and is appropriate for censored or lost to follow-up data.¹⁰

Results

The cohort included 708 women and 294 men whose mean ages at the beginning of the follow-up period were 70 and 72 years, respectively. The average follow-up period was approximately four years. Mean initial blood pressures were 163/88 mmHg for the women and 159/90 mmHg for the men, and the mean decreases in blood pressure over the follow-up period were 7.8 mmHg in systolic and 7.4 mmHg in diastolic blood pressures. There were 102 deaths and 136 combined cardiovascular events, including 72 cardiovascular deaths, 37 CVAs, and 27 MIs.

Table 1 shows the direction of risk of each event

Table 2. Direction of Adjusted Risk of an Event by Age Stratification		
Event	Initial Systolic Blood Pressure	Initial Diastolic Blood Pressure
Death		
<75 years (n=693)	↔	↔
≥75 years (n=309)	↔	↔
Cardiovascular death		
<75 years	↔	↔
≥75 years	↔	↑*
Myocardial infarction		
<75 years	↔	↔
≥75 years	↔	↔
Cerebrovascular accident		
<75 years	↑**	↑**
≥75 years	↑†	↑†
Note: Adjusted for sex, concomitant diseases, and treatment status *P = .05 **P < .05 †P < .001		

for continuous initial systolic and diastolic recordings for the total group, and for those with systolic hypertension. In this study systolic hypertension was operationally defined as continuously elevated systolic blood pressure and initial diastolic blood pressure less than 90 mmHg. The horizontal arrows indicate no significant association between the event and an increasing initial blood pressure measurement, while an upward pointing arrow shows a significant increase in risk as the initial blood pressure increased.

In general, there was no association between death and blood pressure in the entire study group and in those with systolic hypertension. There was an association between increasing initial diastolic blood pressure and the two events, cardiovascular death and MI.

A strong risk association was found between increasing levels of both systolic and diastolic blood pressure levels and CVA in the total group. For that segment of the cohort considered to have systolic hypertension, the risk of CVA was also shown to be associated with increasing systolic blood pressure levels. These risks were proportional to the increasing blood pressure levels; that

is, as the respective initial blood pressure increased, so did the risk of the significant events.

The cohort was stratified into those patients 75 years of age and older to compare them with those patients between the ages of 65 and 74 years (Table 2). There was a slight risk of cardiovascular death to those 75 years and older with higher initial diastolic blood pressures. The risk of MI was not shown by this stratification, possibly because there was no other age adjustment. Again there was a strong risk associated with higher initial systolic and diastolic blood pressure, particularly to those below 75 years of age, although those 75 years of age and above with higher initial systolic and diastolic blood pressure were at significant risk of CVA.

Discussion

This study has shown that it is possible to follow a group of MI- and CVA-free elderly hyper-

tensive patients by their medical records and determine the risk of these events in relation to initial blood pressure, which is similar to the risk known to exist in well-studied younger populations of adults. Because these clinics all utilized problem-oriented medical records and the ICHPPC coding system (International Classification of Health Problems in Primary Care), it was possible to obtain a sample size large enough to yield powerful statistical results. These results show that elderly ambulatory hypertensive patients already identified and treated are at a greater risk for CVA than for other major cardiovascular events and that risk is proportional to both high systolic and diastolic blood pressure levels. The Framingham Study and the Veterans Administration Cooperative Study Group on Antihypertensive Agents have previously reported this strong association between blood pressure and CVA in younger populations.^{7,8} In addition, the Framingham Study reported a weaker association between blood pressure and MI, as found in the present study.

No association was found between all causes of death and blood pressure in any of the analyses. This does not imply that hypertension is not a risk factor for death in the elderly. Rather, it may be that identification and treatment of hypertension among these elderly patients may reduce the risk of death, while the risk of CVA remains proportional to the level of blood pressure and may indicate the effectiveness of the treatment.

The underlying question is whether the decrease in both the systolic and diastolic blood pressure levels during the follow-up period was caused by antihypertensive treatment. It is logical to make this association although the principle of regression toward the mean must also be considered as a contributing factor. Because most patients in this study were being treated for hypertension in the early and mid 1970s, before they began receiving care at the family practice clinics, pretreatment blood pressures generally could not be obtained. Judgments, therefore, cannot be made from this study about the causal relationship between the reduced risk of CVA and blood pressure reduction resulting from treatment.

This study, designed for the elderly, adds weight to other studies that show substantial reduction in the risk of cardiovascular events, particularly CVA, to hypertensive patients with lowering of blood pressure. Results of the European

Working Party on High Blood Pressure in the Elderly¹¹—a prospective study due to be completed in the early 1980s—are being anticipated by physicians concerned about the best treatment for elderly hypertensive patients. The study includes patients older than those who have been studied previously and should indicate how aggressively an elderly hypertensive patient should be treated. If treatment is shown to be effective in reducing morbidity and mortality, as this and other studies suggest, concerted effort must be made to educate physicians, develop medications that are free from side effects, and help patients comply with treatment regimens. Elderly patients will then be treated the same as younger patients with high blood pressure.

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