

Preventing the Age Risk in Blood Pressure: Relevance, Feasability and Methods

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Serious consideration has been given to blood pressure levels in the elderly only in the last decade. There has been a slow but perceptible increase in interest in this important clinical problem dating from the late 1960s. Clearly the increased concern stems from the realization that raised blood pressure in the elderly is associated with significant morbidity and mortality. The mounting evidence provided by the ongoing Framingham Study on the inter-relationship of age, blood pressure and cardiovascular disease has been the main stimulus. While awareness of the problem has increased it must be stated that review papers on the subject probably greatly outnumber important original reports. There is interest, but to date little information exists other than the epidemiological data which will allow us to make definitive statements. The poverty of data is illustrated by the observation of Koch-Weser (1978) that only 10% of the patients in 41 clinical studies of hypertension were over the age of 60 years. In this review we discuss the more important aspects of this problem, highlighting, where appropriate, gaps in our knowledge.

High Blood Pressure: A Risk Factor in the Elderly

Both blood pressure and aging are continuous variables and therefore arbitrary cut-off points must be used if we are to classify people according to these parameters. In this paper we define elderly as those above 65 years and hypertension is defined as blood pressure in excess of 160/90 mmHg. Blood pressure both systolic and diastolic rise with age until about 50 years of age in both males and females. As age progresses diastolic pressure remains fairly constant in males but climbs further in females. In both sexes systolic pressure rises progressively into the ninth decade and thereafter falls slightly (Miall and Brennan, 1981). In quite a large number of people but particularly in those who become hypertensive the rise in systolic pressure dominates - disproportionate systolic hypertension (Koch-Weser, 1973). An extreme form of this is isolated systolic hypertension. Here the systolic blood pressure is greater than 160 mmHg and the accompanying diastolic is less than 95 mmHg (Kannel *et al.*, 1981). From the Framingham Study it is becoming increasingly obvious that the level of systolic blood pressure is a major risk factor for cardiovascular and cerebrovascular disease and this applies to isolated systolic hypertension as well as elevated systolic pressure combined with an increase of diastolic values (Table 1).

Stroke is two to four times more common in people with isolated systolic hypertension than in normotensive subjects. "While diastolic pressures related to stroke incidence, in the subjects with systolic hypertension the diastolic component adds little to risk assessment . . ." (Kannel *et al.*, 1981). In congestive heart failure and myocardial infarction blood pressure is also an important risk factor (O'Malley and O'Brien, 1980). In congestive heart

Table 1 Risk of stroke according to systolic and diastolic blood pressure

Systolic blood pressure mmHg ^a	2 year rate per 1000	
	Men	Women
< 140	5.0	3.3
140-159	9.4	8.0
≥ 160	29.4	17.0
Diastolic blood pressure ^b		
< 90	29.4	17.0
90-94	12.0	14.9
≥ 95	24.8	17.8

^a DP < 95 mmHg; ^b SP < 160 mmHg; adapted from Kannel *et al.*, 1981.

failure systolic pressure also appears to be more important than diastolic. This is probably because cardiac work depends largely on systolic pressure (Tarazi and Gifford, 1978). In the elderly population the other risk factors for cardiovascular disease which operate in young people are of minor significance. Clearly blood pressure dominated as the major risk factor and systolic pressure has better predictive value than the diastolic pressure.

Measurement of Blood Pressure

The ability to measure blood pressure accurately is important but in the elderly there is some doubt as to whether we can do so. Spence *et al.* (1978) have published data which purport to show that cuff blood pressure measurement grossly overestimates diastolic blood pressure. In a selected group over the age of 60 years they found that cuff blood pressure exceeded the intra-arterial level by 10 mmHg or more in one-fifth of patients. Such findings, if confirmed, are important because they question ones whole approach to the detection and management of blood pressure in this age group.

Feasibility

We will consider feasibility under the headings – compliance, blood pressure reduction and benefit.

Compliance

The elderly have long been considered to be poor compliers with therapeutic regimens. We have not been able to find data to support this contention (O'Hanrahan and O'Malley, 1981). Clearly, patients who are confused or dementing cannot be relied upon to take medications but we suspect the average elderly hypertensive takes his medication as well if not better than any of his younger counterparts. Data from the Hypertension Detection and Follow Up Program study (HDFP, 1979) agrees with this view. Of patients who entered that study just as many patients in the age range 60-69 remained in follow-up for five years as did those in the 50-59 year age group. Both of these age groups were if anything better than the 30-49 year olds.

Blood Pressure Reduction

Is it possible to lower blood pressure in elderly hypertensives? The evidence from both the European Working Party on Hypertension in the Elderly

Group (EWPHE) Study (Amery *et al.*, 1981) and the HDEF study is that it is possible. In both studies the first drug employed was a thiazide diuretic. In the EWPHE Study the thiazide (plus methyldopa in a small percentage of cases) reduced sitting blood pressure by an average of 27/18 mmHg. In the HDEF study the elderly patients achieved goal blood pressure more often than did say the 30-49 year old group - 75% vs 49%. This indicates that not only do the elderly take their medication, but under the circumstances of these two studies blood pressure reduction occurs.

Reduction in Morbidity and Mortality

We do not know if treating mild to moderate hypertension in the elderly reduces mortality and morbidity. The mortality data from the HDEF study suggests that an aggressive approach to blood pressure management in the 60-69 year old range is worthwhile. The group thus managed showed an overall improvement in mortality, the stepped care group having a 16.4% lower mortality rate than did the referred group. This study does not compare active vs inactive drug regimens rather the mortality rates with two health care systems were compared. Hopefully the ongoing EWPHE study will give us a definite answer to this central question.

How to Lower Blood Pressure

As stated thiazide diuretics lower blood pressure in this age group. We do not have data on side-effects from the HDEF study but information from the EWPHE study shows that thiazide diuretics behave predictably. Thus there is an increase in fasting glucose of 12%. It is perhaps a little worrying that glucose intolerance which is itself a risk factor (at least in younger people) for ischaemic heart disease, should increase with thiazide treatment. Thus the balance between the increased risk invoked by the rise in blood glucose and the decrease likely with a reduction in blood pressure remains to be determined. Serum urate increased by 25% but there was no difficulty with clinical gout. Serum creatinine also increased. The rise in serum creatinine was presumably due either to a decrease in glomerular filtration rate commensurate with the fall in blood pressure or to an effect of the thiazide on renal secretory function. As triamterene is combined with the thiazide diuretic any change in potassium levels has been anticipated.

Beta Adrenoreceptor Blocking Drugs

In view of these side-effects with thiazides it is worth considering other antihypertensives as drugs of first choice in the management of hypertension

in the elderly. There are many aspects of the pathophysiology of hypertension that are different in the young and the old. One of the most striking of these is the difference in the renin angiotensin aldosterone status. Low renin essential hypertension is a more common feature in the elderly. Weidmann *et al.* (1975) have shown that renin concentration, plasma renin activity and aldosterone concentrations are all lower in the elderly. Throughout life there tends to be an inverse relationship between serum renin levels and blood pressure and some authors (Niarchos and Laragh, 1980) hold that the decrease in renin in the elderly is merely a feedback inhibition induced by their higher arterial pressures. The low renin levels in the elderly would suggest that anti-renin agents such as beta adrenoceptor blocking drugs would be less effective in the treatment of hypertension than in the young. In a large study Buhler *et al.* (1975) found that older patients less often achieved goal blood pressure on long-term beta adrenoceptor blocking monotherapy (Table 2).

However various other studies do not confirm these findings (Birkenhager and de Leeuw, 1980). In studies that we have just completed (unpublished) we did not observe any case of failure of blood pressure to respond to atenolol, labetalol or nadolol. However, achievement of goal blood pressure levels is another matter and one that requires additional study.

Methyldopa

Methyldopa has been used in many studies including the EWPHE trial. In this study there does not appear to have been an excess of unwanted effects though in general we recommend caution in the use of centrally active drugs in the elderly.

Conclusions

High blood pressure is common in the elderly and it is a potent risk factor for cardiovascular disease and particularly stroke. Systolic pressure is an in-

Table 2 Percentage of patients in whom diastolic blood pressure was normalized by beta adrenoceptor blocking drugs

Age (years)	%
> 60	20
40-60	50
< 40	80

Buhler *et al.*, 1975.

dependent risk factor for stroke. It is feasible to lower blood pressure (systolic as well as diastolic) with thiazides but the pattern of response to beta blockers remains to be clarified. Many gaps in our knowledge need filling—not only those implied in the above statement but more information is required on the indications for treatment, drug of first choice, effects of treatment on mortality and morbidity, the pathophysiological significance of elevated systolic pressure and the best means of lowering systolic pressure.

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