A comparison of blood pressure control in hypertensive patients treated in hospital clinics and in general practice

THE DHSS HYPERTENSION CARE COMPUTING PROJECT*

SUMMARY. Two thousand and twenty hypertensive patients of 45 years and over were treated and followed up for either 6 months, 12 months, 18 months or 2 years. Seventeen hundred and forty of these patients were seen in hospital outpatient clinics, 280 in general practice.

The patients followed in general practice had an average blood pressure of 182/111 mmHg prior to treatment. The blood pressure after follow-up for 18-24 months averaged 156/97 mmHg. The corresponding results for the patients followed in hospital clinics were 195/115 mmHg untreated and 150/92 mmHg after follow-up.

The untreated blood pressures were higher in the hospital patients ($p < 0{\cdot}001$ for systolic, $p < 0{\cdot}05$ for diastolic pressure) and the treated diastolic pressures at 18-24 months were lower in the hospital than the general practice group ($p < 0{\cdot}001$). The hospital patients did not receive a greater variety of drugs but were prescribed them in higher doses. Blood pressure control was considered to be inadequate in many patients in both groups. At 18-24 months, 26 per cent of the general practice group had diastolic pressures of 105 mmHg or more, as had 13 per cent of the patients followed in the hospital clinics.

Introduction

IN the United States, the Hypertension Detection and Follow-up Program Cooperative Group (HDFP) has compared an antihypertensive treatment programme conducted at specialized clinics with treatment in the community (HDFP, 1979a, 1979b). After five years, systematic care produced an average diastolic blood pressure 5 mmHg lower than the average pressure in patients referred for community care, a 20 per cent reduction in mortality for mild hypertension and 7 to 13 per cent reduction for moderate hypertension.

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Aim

Our aim was to compare blood pressure control at specialized hospital-based hypertension clinics in the United Kingdom with that achieved in general practice.

Methods

The DHSS project

The DHSS Hypertension Care Computing Project (DHCCP) has been recording information on patients with hypertension since 1971 (Beilin *et al.*, 1974; Coles *et al.*, 1976). Patients are entered into the study when they present to one of the hospital hypertension clinics or when seen in general practice. The criterion for entry is a diagnosis of hypertension, not a specified level of systolic or diastolic blood pressure. Once patients join the project, information about their condition is entered into a computer record every time they attend. The hospital clinics taking part in the project are The Hammersmith Hospital, London; Radcliffe Infirmary, Oxford; King's College Hospital, London; Aberdeen Royal Infirmary, Aberdeen; and Dudley Road Hospital, Birmingham. The general practitioners are based in Norwich, Kentish Town (London), Oxford and Harlow (Essex).

The study patients

The patients included in this report were over the age of 45 and had project records available in July 1979. No patient was older than 84 years. Two thousand and twenty patients had had repeated measurements of

blood pressure for the first six months after entering the project and 836 (41 per cent) for 18-24 months. Two hundred and eighty patients had been seen in general practice clinics (14 per cent), the rest in the specialized hospital clinics. The apparent failure to follow up many patients attending the hospital clinics was due to a policy of returning them to their general practitioner. This policy varied between clinics.

Wherever possible, the patients were divided into those who had been previously treated and those who had not. Previously treated patients (43 per cent of those for whom this information was available) were defined as those taking antihypertensive treatment at some time during the three months before they entered the study; previously untreated patients had not been given treatment during this three-month period.

Table 1. Characteristics of the patients at presentation.

	General practice patients	Hospital outpatients
Number	280	1740
Percentage male	*43*	*49*
Average age (years)	57.5	56.4
Average untreated blood pressure (mmHg):		
Systolic	182 ± 2.73 (102)***	195 ± 0.98 (941)
Diastolic	111 ± 1.31 (102)*	115 ± 0.52 (941)
Average plasma urea (mmol/l)	6.0 ± 0.15 (140)*	6.4 ± 0.08 (1496)
Average serum creatinine (μmol/l)	94.2 ± 2.8 (81)**	102.4 ± 1.4 (1025)
Cardiothoracic ratio	0.48 ± 0.005 (75)***	0.50 ± 0.002 (1129)
ECG, $sV_1 + rV_{5-6}$ (mm)	23.2 ± 1.0 (108)***	28.5 ± 0.3 (1295)
Previously treated (per cent)	*61.9*	*57.7*

Mean and standard errors of the means *$p<0.05$, **<0.01, ***$p<0.001$ for between-group differences. Figures in parentheses are the numbers for which the information was available.

Statistical methods

Blood pressure was usually recorded both standing and lying on each occasion. The readings were averaged to give one result per visit. The visit blood pressures were then averaged to give a mean systolic and diastolic pressure over six-month periods. The patients were followed for varying lengths of time; more were followed for shorter periods. Blood pressure control was examined in four six-month periods and the patients were divided into four cohorts according to the duration of follow-up. Thus 2,020 patients were followed up for an initial 1–6 months, a subset of 1,437 were followed up for 12 months, 1,095 for 18 months and 836 for two years. The results are presented separately for these cohorts.

The blood pressures were taken using standard mercury sphygmomanometers and diastolic pressures usually as the point of muffling of sound. The untreated blood pressure was defined as the most recent single blood pressure measured within a year of the first documented visit and recorded on or prior to that visit at a time when the patient was not on treatment. Only 1,043 patients (52 per cent) had such a measurement. The results were also analysed by age. Patients were divided into three age groups at entry: 45–54 (802 patients), 55–64 (784 patients) and 65+ (434 patients).

The results for the hospital and general practice groups were compared using the unpaired 't' test.

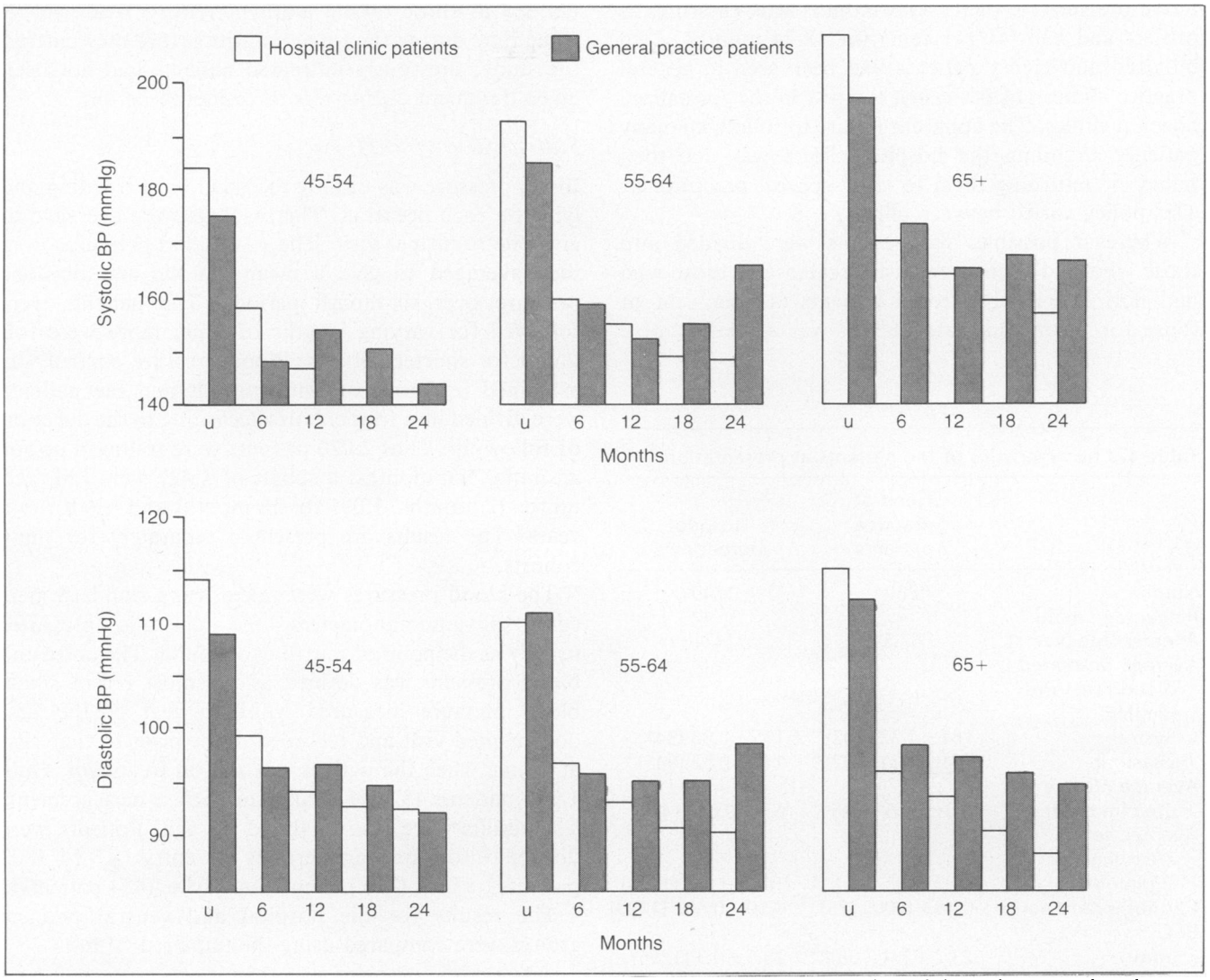
Results

Table 1 compares the general practice and hospital patients. The patients seen in general practice were, on

Table 2. Average blood pressure during follow-up in the hospital clinic and general practice groups and the difference in pressure control achieved.

	Blood pressure*														
	Before treatment			First six months			Second six months			Third six months			Fourth six months		
	n	S	D	n	S	D	n	S	D	n	S	D	n	S	D
Previously untreated patients															
Hospital (i)	536	191	113	736	161	98	517	152	94	388	147	91	288	146	91
General practice (ii)	62	181	111	108	157	98	90	156	96	71	156	95	54	158	96
Difference in pressure (i—ii, mmHg)		+10	+2		+4	0		−4	−2		−9	−4		−12	−5
Previously treated patients															
Hospital (i)	405	202	119	1004	161	98	681	155	95	518	154	94	401	153	93
General practice (ii)	40	184	112	172	157	97	149	158	98	118	156	96	93	155	97
Difference in pressure (i—ii, mmHg)		+18	+7		+4	+1		−3	−3		−2	−2		−2	−4
Totals	1043**			2020			1437			1095			836		

*S = systolic blood pressure (mmHg), D = diastolic blood pressure (mmHg), n = number of patients.
**Information available for this number only.



Average blood pressure when untreated and during the first, second, third and fourth periods of follow-up. The results are presented for previously untreated patients according to site of treatment and for age groups 45–54, 55–64 and 65+.

average, one year older than the hospital outpatients, but the untreated blood pressures were higher in the hospital-treated group ($p < 0{\cdot}001$ for systolic and $p < 0{\cdot}05$ for diastolic pressure). Other characteristics indicated that the patients attending hospital had more severe hypertensive disease. The average plasma urea, serum creatinine, cardiothoracic ratio on the chest radiograph and left ventricular hypertrophy (the sum of the S wave in lead V_1 and the tallest R wave in leads V_5 and V_6) were all significantly greater in the hospital than in the general practice group. It should be noted that a large number of patients had been previously treated.

The blood pressure control during follow-up, divided into previously untreated and previously treated patients, is shown in Table 2. The hospital outpatients had higher untreated blood pressures, but by the 6–12 month period blood pressure control was better in the hospital patients than in those followed in general practice. Results are shown according to the three age groups 45–54, 55–64 and 65+ in the Figure. The differences between hospital and general practice patients were more marked in the older age groups, although in the age group 45–54, after 18–24 months the blood pressure control was similar in the hospital and general practice patients. A similar pattern was observed for previously treated patients: blood pressure control at the end of the observational period was better for hospital clinic patients, especially the elderly.

Table 3 shows the treatment the patients were receiving after one year. Both general practice and hospital groups were being prescribed similar treatment regimes, about half receiving a beta-blocker and 80 per cent a diuretic.

Table 4 shows the average dosages of the most commonly prescribed antihypertensive drugs, according to whether the patients were attending hospital or general practice. Of the nine preparations considered, all were prescribed in higher doses in the hospital group. The hospital patients received, on average, over twice as much oxprenolol when this drug was prescribed; 88 per

Table 3. Types of treatment being prescribed after one year.

	General practice patients (per cent)	Hospital outpatients (per cent)
Thiazide diuretic ± other drug	*44*	*60*
Combination diuretic ± other drug	*31*	*21*
Beta-blocker ± other drug	*48*	*51*
Methyldopa ± other drug	*27*	*28*
Aldrenergic neurone blocker ± other drug	*8*	*8*
No treatment	*6*	*7*

Table 4. Final average dose of drugs prescribed, one year after entry into the project.

	General practice patients		Hospital outpatients	
	Dose	n	Dose	n
Propranolol	179 mg	84	242 mg	501
Bendrofluazide	5.6 mg	31	7.4 mg	467
Methyldopa	812 mg	73	1,175 mg	484
Atenolol	117 mg	23	127 mg	223
Navidrex-K	1.5 tabs	34	2.1 tabs	301
Moduretic	1.2 tabs	31	1.9 tabs	227
Hydralazine	79 mg	7	123 mg	233
Oxprenolol	164 mg	9	361 mg	103
Frusemide	34 mg	12	64 mg	48

cent more frusemide; more than a third extra of propranolol, methyldopa, Moduretic and hydralazine; and more than 25 per cent extra of Navidrex-K and bendrofluazide.

Discussion

After two years the systolic and diastolic blood pressures were an average of 5 mmHg lower in the hospital patients than in those treated in general practice. The hospital-treated patients were given a similar range of drugs but in higher doses. Control of blood pressure was inadequate in many patients in both groups.

The numeric difference in blood pressure after treatment was not great, but important if we recall that the hospital-treated patients had higher average initial blood pressures. When the untreated pressures were recorded at the initial visit to the hospital, they may have been high because of the stressful effect of visiting a hospital clinic. Barlow and colleagues (1977) found that blood pressure tended to be higher when measured by a screening unit than when measured by a general practitioner, although Joesbury and colleagues (1976) found no difference in patients who were familiar with both hospital and general practice settings. However, our study shows that the average plasma urea and serum creatinine were also higher in the hospital group, and that this group had more electrocardiographic and radiographic evidence of left ventricular hypertrophy than the general practice patients. It is probable that the hospital group consisted of more severely hypertensive patients.

The degree of blood pressure control was more satisfactory in hospital than in general practice patients after 18–24 months, except in the age group 45–54. However, in this age group the untreated blood pressure averaged 176/110 mmHg in the general practice group and 189/116 mmHg in the hospital group. It is reasonable to conclude that, even in this age group, blood pressure reduction was greater in hospital patients.

The present study did not involve random allocation to hospital or general practice care. The hospital patients who were followed for two years may not have been representative of all hospital-treated patients. At the time of analysis, 91 per cent of the general practice group were being followed using the computer-held record system, whereas only 50 per cent of the hospital group were still being seen in the hospital clinics. Of the 50 per cent not being followed, 70 per cent had been deliberately discharged and constituted a group who had responded well to treatment or who did not require treatment. The remainder who were not followed (15 per cent of the original hospital group) had defaulted or died and may have been a group with severe hypertension. However, analysis of cohorts of hospital patients with different durations of follow-up gave similar estimates of blood pressure control, suggesting that bias due to withdrawal of patients may not be a severe problem and that withdrawal from the hospital group may have removed both severe and mild hypertensives.

The general practice group received as many antihypertensive drugs but not in such large doses. The specialist clinics prescribed larger amounts of medication and this presumably led to the better blood pressure control observed. We assume that non-compliance with therapy was similar in the two groups.

In the Hypertension Detection and Follow-up Program (1979a, 1979b), there was random allocation to stepped (hospital) care and referred (community) care. For patients with untreated diastolic pressures over 104 mmHg, a 7 mmHg difference in diastolic blood pressure control at two years was associated with at least a 10 per cent difference in total mortality after five years. The benefits of stepped care were greatest in blacks. No benefit was observed in white women, however; their diastolic pressures were still 5 mmHg lower in the stepped care group after two years. It is possible that 'referred care' was particularly poor in certain sectors of the American community. There is evidence that no such differences exist in hospital clinics in the United

Kingdom (Munro-Faure *et al.*, 1979), and it is possible that the results of the HDFP study are not applicable to this country.

Possibly more important than the differences between the general practice and hospital groups is the poor blood pressure control observed in both groups. At two years only 30 per cent of the general practice group and 38 per cent of the hospital group had diastolic pressures less than 90 mmHg. Similarly, 26 per cent of the general practice group and 13 per cent of the hospital group had diastolic pressures above or equal to 105 mmHg. Thus hospital specialists and general practitioners interested in hypertension frequently did not achieve satisfactory control of blood pressure.

Blood pressure control has been found to be unsatisfactory in many other studies. For example, Parkin and colleagues (1979) reported an average treated diastolic blood pressure of 97 mmHg when measured in general practice. They also reported that patients with high initial pressures were referred to hospital clinics, but that subsequent blood pressure control was similar for patients treated by the general practitioner and those referred to hospital. In 1972 blood pressure control in general practice was such that between 37 and 56 per cent of treated hypertensive patients had diastolic pressurers over 99 mmHg (Barlow *et al.*, 1977). In hospital clinics we have previously reported that only a quarter of treated patients have a diastolic pressure under 90 mmHg (Beilin *et al.*, 1980).

Poor blood pressure control is not surprising, since Fulton and colleagues (1979) reported that only 66 per cent of 420 general practitioners aimed to maintain the diastolic blood pressure of 40- to 60-year-old patients below 95 mmHg. In the HDFP trial (1979a, 1979b), patients with an untreated diastolic pressure greater than 104 mmHg had average treated pressures measured at home of 88–92 mmHg for stepped (hospital) care but 96–100 mmHg for referred care. Blood pressures reported in this present study occupy an intermediate position. The reduction in mortality in the HDFP trial suggests that treatment should aim for a diastolic pressure of less than 90 mmHg.

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Administering cephalexin

The efficacy of cephalexin administered twice a day was compared to the same drug administered four times a day for the treatment of skin and skin structure infections due to staphylococcus and/or streptococcus. One hundred and fifty-four patients (aged one month to over 70 years) were assigned at random to the two regimes. The total daily dose was the same in each regime. Administration twice a day proved just as effective as four times a day. Both regimes were more than 97 per cent effective and side-effects were minimal.

Source: DiMattia, A. F., Sexton, M. J., Smialowicz, C. R. *et al.* (1981). Efficacy of two dosage schedules of cephalexin in dermatologic infections. *Journal of Family Practice,* **12,** 649-652.

Vitamin C

The present British official recommended daily amount of 30 mg is amongst the lowest in the world, being sufficient only to prevent scurvy. It has been suggested that the amount should be increased to 100 mg and that the criteria for establishing it should be re-examined.

Source: Hughes, R. Elwyn (1981). *Vitamin C—Some Current Problems.* London: British Nutrition Foundation.