Missed opportunities for the prevention of cardiovascular disease among British hypertensives in primary care

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SUMMARY

Background. *High-risk strategies for the prevention of cardiovascular disease (CVD) among hypertensive patients require knowledge of the prevalence and interaction of modifiable risk factors to ensure effective targeting of interventions. Comparatively little is known of risk-factor profiles and their modification among hypertensives in primary care.*

Aim. *The present study was designed to explore relationships between patients' knowledge of CVD risk factors, their perception of personal risk and health behaviours, and their use of lifestyle interventions.*

Method. *A cross-sectional survey of 2676 men and women with mild to moderate hypertension (diastolic blood pressure 95–115 mmHg), and their general practitioners, recruited from 1044 general practices throughout the UK, was conducted.*

Results. *Levels of modifiable risk factors were high, although there was considerable variation by age and sex; most (98.5%) patients had at least one additional CVD risk factor. A lower standard of living was associated with a higher prevalence of 'unhealthy' behaviours. Out of those with a current lifestyle problem, 85% of obese patients, 59% of smokers, 47% of excess drinkers, 49% of those with dietary risk factors and 32% of inactive patients claimed to have adopted healthier behaviours within the past 3 months. Older subjects and those with a lower standard of living were less likely to acknowledge risks, and those who did were less likely to report improving their lifestyles. While 71% of patients recalled receiving lifestyle advice, the coverage and targeting of specific interventions was generally poor. Overall, 60% of the sample had received advice on weight control, 47% on diet, 38% on exercise, 38% on smoking and 36% on alcohol. Women and older people were less likely to be given relevant counselling, and there was no evidence of targeting with respect to subjects' social class, level of hypertension or duration of diagnosis.*

Conclusion. *Lifestyle interventions are welcomed and are viewed as helpful by patients receiving them. Potential health gains among high-risk hypertensives are being lost because of poor targeting and coverage of those at greatest risk.*

Keywords: cardiovascular disease; prevention; hypertensives.

Introduction

HYPERTENSION is an important risk factor for cardiovascular disease (CVD) and has an additive, and sometimes synergistic, interaction with other modifiable risk factors.[1] Therefore, patients with more than one additional risk factor are at substantially increased risk of myocardial infarction (MI) and stroke.[2]

Much of the burden of cardiovascular disease is potentially preventable through the reduction of established behavioural risk factors, such as smoking, obesity, poor diet and lack of exercise.[3-8] More recently, it has been appreciated that in order to be effective and worthwhile, in terms of costs, preventive measures must be appropriately targeted.[9-11]

While a number of large studies have examined the distribution of risk factors in the general population,[12,13] comparatively little is known of risk factor profiles among hypertensive patients in primary care. Previous studies have tended to be small[14] or confined to a single part of the country,[15] and there have been few attempts to define risk profiles for important subgroups, such as women and elderly people, or to examine the relationship between objective and perceived levels of CVD risk and attempts to modify harmful behaviours.[16] However, there is evidence that the hypertensive population is characterized by a higher prevalence of CVD risk factors than the general population[17] and that reductions in cardiovascular disease are best achieved by combining lifestyle interventions with pharmacological control of blood pressure.[18,19]

The present study has examined distribution of CVD risk factors among hypertensives in primary care and explored relationships between patients' knowledge of CVD risk factors, their perception of personal risk and health behaviours, and their use of lifestyle interventions.

Materials and methods

One thousand and forty-four general practitioners throughout the UK were selected to participate in a concurrent post-marketing surveillance survey of a new beta-blocker. A total of 6365 hypertensive patients were recruited between August 1991 and October 1992, 2676 of whom had returned completed baseline questionnaires by October 1993, which could be linked with data provided by their general practitioners. Entry was restricted to men and women over 18 years of age with mild to moderate hypertension (diastolic pressure 95–115 mmHg) that was either newly diagnosed or uncontrolled on conventional treatments.

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Initial data on risk factors were collected using a self-administered questionnaire, based on standard instruments. The questionnaire covered a wide range of cardiovascular risk factors including physical activity, dietary practices, alcohol intake[21] and smoking behaviour.[21] In addition, subjects were asked about any lifestyle changes they had attempted over the preceding 3 months, and efforts made by the primary care team to assess their cardiovascular risk and offer appropriate interventions. Personal details, medical history and sociodemographic characteristics were obtained by patients' general practitioners; the physical examination included blood pressure, weight and height.

Diet was assessed using a scale ranging from 0 to 26, derived by scoring the frequency with which 'healthy' foods (e.g. fresh fruit, vegetables, fish and white meat) were consumed. An overall score of 0 indicated consistently unhealthy eating patterns and a score of 26 indicated consistently healthy habits.

Awareness of CVD risk factors was measured using scores based on patients' correct responses to questions on causation and on methods by which patients might effectively manage their own conditions.

Data were analysed using SAS and STATA-PC statistical software. Comparisons by sex, socioeconomic variables and severity of hypertension were made using chi-square tests on categorical variables, rank sums on score variables, and *t*-tests on continuous variables. Variations by age and duration of diagnosis were analysed by chi-square and nonparametric tests for trend, respectively. Non-responders were excluded from analyses.

Results

Subjects were predominantly white (92.5%) and just over half (54%) were female, with a mean age of 58 years (range 23-88 years). Most (55%) patients had been diagnosed as hypertensive over 3 years previously, 26% between 1 and 3 years previously, and 19% within the past 12 months.

Current cardiovascular disease risk factors

Table 1 shows the age and sex distributions of mean blood pressure, smoking, excess alcohol and salt consumption, lack of physical exercise, obesity, and specific dietary variables. With few exceptions, the prevalence of risk factors was unrelated to severity of hypertension. Notably, women with moderate hypertension (i.e. blood pressure exceeding the sample median of 169/101 mmHg) had higher levels of dietary risk factors than women with mild hypertension ($P<0.05$), while men with moderate hypertension were more likely to be obese than those with lower blood pressure ($P<0.01$). High salt intake increased with duration of diagnosis among women, while the trend was reversed in men.

Lower standards of living were associated with smoking, unhealthy eating habits and physical inactivity in both sexes, and with obesity in women, while lower education was associated with a higher prevalence of excess drinking in men, with physical inactivity in women and with smoking in subjects of either sex.

Combined cardiovascular disease risk factors

A range of possible combinations of common risk factors is shown in Table 2. The majority (98.5%) of subjects had at least one additional modifiable CVD risk factor.

Smoking and lack of exercise were associated with a lower standard of living, while the proportions at risk from both obesity and high salt intake varied significantly with blood pressure level and the subjects' sex. Men with moderate hypertension were more likely to be obese and to add salt to their food than those with mild hypertension (18% versus 12%; P<0.001).

Perceptions of risk and lifestyle modification

Findings for perceived risk and the proportions taking action for obesity, smoking, excess drinking, lack of exercise and dietary factors are presented in Table 3. Primary care teams failed to provide advice on risk factor reduction to a substantial proportion of hypertension patients. Only 60% of participants had been given advice on weight control, 47% on diet, 38% on exercise, 38% on smoking and 36% on alcohol. Men were more likely to have received relevant advice than women, although there were wide variations by age, severity of hypertension and socioeconomic factors. Among patients receiving general practitioners' advice within the past 3 months, 90% claimed to have found it moderately or very useful in altering these behaviours, while only 3% dismissed it as useless.

When the number of lifestyle modifications that patients required were matched against the number of reported interventions, there was evidence of considerable mismanagement, with high proportions of patients receiving too few or too many inter-

Table 1. Age-specific percentages of hypertensive men and women reporting coexisting, modifiable cardiovascular disease (CVD) risk factors.

	Men				Women			
	Age (years)							
CVD risk factors	<45 (*n* = 174)	45–54 (*n* = 320)	55–64 (*n* = 433)	65+ (*n* = 308)	<45 (*n* = 168)	45–54 (*n* = 308)	55–64 (*n* = 459)	65+ (*n* = 506)
Current smoking	24.4	32.1	27.5	23.4	26.4	26.6	20.9	12.4
Diet:								
butter/hard margarine	30.5	32.3	35.6	36.3	29.6	28.3	25.2	36.7
full-fat milk	45.0	36.2	42.9	45.9	43.0	30.5	32.5	43.3
fresh fruit/vegetables < daily	96.5	93.4	89.5	91.8	94.6	88.9	88.3	85.2
added salt	77.8	72.8	74.5	76.9	80.6	80.5	78.8	81.5
diet score < 16	75.9	61.3	60.3	62.0	57.7	46.4	44.4	51.8
Physical inactivity[1]	71.8	77.0	79.4	85.1	76.1	83.9	89.9	92.9
Excess drinking[2]	36.2	32.2	19.6	14.6	11.3	9.4	4.6	3.2
Obesity[3]	26.7	23.4	15.7	12.5	40.4	35.5	30.6	17.2

[1]< 0.5 hours vigorous physical activity per week. [2]>21 units alcohol per week for men; >14 units alcohol per week for women. [3]Quetelet's Index >30.

Table 2. Age-specific percentages of hypertensive men and women reporting various combinations of coexisting, modifiable cardiovascular disease (CVD) risk factors.

Combined CVD risk factors	Men				Women			
	Age (years)							
	<45 (*n* = 174)	45–54 (*n* = 320)	55–64 (*n* = 433)	65+ (*n* = 308)	<45 (*n* = 168)	45–54 (*n* = 308)	55–64 (*n* = 459)	65+ (*n* = 506)
Smoking								
+ physical inactivity[1]	17.8	25.0	23.1	18.5	20.8	20.8	17.9	11.1
+ excess drinking[2]	12.6	13.8	7.6	4.9	4.8	2.6	1.5	0.4
+ obesity[3]	5.2	5.0	3.7	3.3	10.1	6.2	5.0	1.4
+ added salt	17.8	26.6	22.6	16.9	25.0	21.4	16.8	9.1
+ obesity and added salt	5.2	4.4	3.0	2.9	9.5	5.2	3.7	1.2
+ excess drinking and added salt	9.2	12.5	7.2	3.3	4.2	2.3	1.5	0.2
+ excess drinking and physical inactivity	9.8	10.3	6.9	2.9	4.2	1.9	1.3	0.4
+ physical inactivity and obesity	4.0	4.4	3.0	2.6	8.3	4.9	4.6	1.0
+ physical inactivity and added salt	13.8	21.6	19.4	13.9	19.6	17.2	14.8	8.1
Excess drinking								
+ obesity	11.5	8.8	3.9	1.6	5.4	3.6	0.4	0.8
+ physical inactivity	23.0	23.8	16.2	11.0	8.9	7.1	3.7	2.9
+ obesity and physical inactivity	8.1	6.9	3.7	1.3	4.2	2.9	0.2	0.8
+ added salt	29.9	27.5	16.6	11.4	8.3	8.4	3.7	2.4
+ obesity and added salt	10.3	7.2	3.2	1.6	4.2	3.3	0.2	0.6
Obesity								
+ added salt	22.4	16.3	11.5	10.1	30.9	26.6	22.2	12.7
+ physical inactivity	17.2	17.5	12.0	9.7	28.6	28.6	25.5	14.8
+ added salt and physical inactivity	15.5	12.8	9.0	7.8	22.6	24.0	20.0	12.1

[1]< 0.5 hours vigorous physical activity per week. [2]>21 units alcohol per week for men; >14 units alcohol per week for women. [3]Quetelet's Index >30.

Table 3. Percentages of male and female patients with cardiovascular disease (CVD) risk factors (*n*) perceiving risk and attempting to alter behaviours within the past 3 months.

CVD risk factor	Men			Women		
	n	Percentage perceiving risk	Percentage attempting change	*n*	Percentage perceiving risk	Percentage attempting change
Obesity[1]	214	95.8	79.3	365	95.1	85.2
Smoking	326	61.4	57.2	272	70.6	59.9
Excess drinking[2]	291	50.5	47.1	85	49.4	47.6
Physical inactivity[3]	931	62.3	34.7	1170	61.9	29.8
Diet:						
diet score <16	757	39.2	47.9	653	43.8	49.7
added salt	896	36.3	50.3	1067	38.4	55.4

[1]Quetelet's Index >30. [2]>21 units of alcohol per week for men; >14 units alcohol per week for women. [3]< 0.5 hours vigorous physical activity.

ventions (Table 4).

Blood pressure. Blood pressure measurements were known by 32% of men and 26% of women. Older and socioeconomically disadvantaged people were significantly less likely to know their blood pressure than younger people ($P<0.001$).

Cholesterol level. A higher proportion of men than women reported ever having had a cholesterol test (51% versus 40%; $P<0.01$), with the highest-reporting group consisting of men under the age of 44 years (77%). Long-standing patients were no more likely to report having had a cholesterol test than recently diagnosed cases.

Most subjects held appropriate beliefs about the aetiological importance of smoking, alcohol, obesity, dietary fat, salt intake, exercise and stress (median causality score: 4/8 in both sexes), and about non-pharmacological interventions (median intervention score: 7/8 in both sexes). However, patients with a lower standard of living displayed poorer understanding of the causes of both hypertension and raised cholesterol.

Obesity. Approximately 95% of patients at risk from obesity felt that they had a problem, and out of those who perceived the risk, 85% had attempted to lose weight over the preceding 3 months. Duration of diagnosis was unrelated to either perception of risk or attempted change. Older patients and those with a lower standard of living were least likely to acknowledge obesity as a risk factor, or to have made an effort to lose weight. Advice from the primary care team was recalled by 85% of obese men and 70% of obese women ($P<0.001$). Younger subjects with mild hypertension were more likely to recall advice than those at greater

Table 4. Coverage of lifestyle interventions in general practice: comparison of numbers of patients eligible for multiple interventions, with percentages reporting an appropriate number, too few or too many interventions.

	Patients with multiple cardiovascular disease risk factors			
Number of lifestyle Interventions	Number eligible for interventions	Percentage receiving appropriate number of interventions	Percentage receiving too few interventions	Percentage receiving too many interventions
1	350	19.1	5.5	75.4
2	1066	13.0	21.9	65.1
3	697	11.6	29.7	58.7
4+	206	9.8	39.3	50.9

risk. Among obese women, a lower proportion of long-term hypertensives received advice in comparison with those diagnosed within the past 12 months.

Smoking. Many (66%) smokers, but not all, perceived their habit as harmful and, among those who did, 71% had attempted to reduce or give up. More recently diagnosed patients were the most likely both to perceive the hazards of smoking and to have attempted to stop. Surprisingly, higher socioeconomic status was associated with a lower prevalence of attempted change. Among smokers, men were more likely to report primary care interventions than women (69% versus 55%; $P<0.01$).

Excess drinking. Approximately half of excess drinkers acknowledged their problem, although fewer (47%) had attempted to reduce their intake over the previous 3 months. Recently diagnosed excess drinkers were more likely to recognize their risk than patients of longer standing. Higher economic status was associated with a lower prevalence of attempted change in men, although not in women. Only 56% of men and 42% of women drinking to excess had been advised to reduce their intake. There were inverse trends with age in both sexes ($P<0.05$), but no associations with socioeconomic factors.

Unhealthy diet. Under half (41%) of patients with dietary risk factors acknowledged their problem and those who did were less likely to have made changes than subjects who were smokers or obese. Older patients with dietary risk factors were both less likely to recognize their risk and less likely to have adopted healthier habits ($P<0.001$). Perception of an unhealthy diet as a risk factor tended to decline with increasing duration of diagnosis.

Fewer than 50% of men and women with dietary risk factors had been told to improve their diets (48% of men versus 38% of women; $P<0.01$). Recently diagnosed men were more likely to be offered advice than patients of longer standing, but there was no corresponding trend in women.

Lack of exercise. Over one-third (38%) of physically inactive patients failed to recognize their problem, and 68% of these had made no effort to take more exercise within the past 12 months. Both perception of risk and attempted change varied inversely with age ($P<0.001$). In women, economic status was positively associated with increased exercise, while higher education was associated with a lower prevalence of attempted change ($P<0.01$). Only 43% of inactive men and 31% of women had been told to take more exercise ($P<0.001$). Subjects with moderate hypertension were no more likely to receive relevant advice than those at lower risk, while older women were even less likely to be advised than younger women.

Discussion

Hypertensive patients in this sample have reported higher levels of modifiable CVD risk factors, with the majority having three or more in combination. Different subgroups of hypertensive patients tended to have different patterns of risk factors. The patients at highest risk were generally older or socioeconomically disadvantaged, and were more likely to be obese than those with fewer factors. Men were more likely than women to smoke, drink to excess and have relatively unhealthy diets; women tended to have fewer risk factors, but higher proportions were obese, physically inactive and accustomed to adding salt to their food.

Health promotion activities in primary care are based on two assumptions: first, that awareness of the causes of CVD will 'empower' patients to take responsibility for their own health; and secondly, that better-informed patients will make the lifestyle changes necessary to reduce their risk of disease.

While most patients held appropriate beliefs regarding the causes and management of hypertension and raised cholesterol, there was no clear association between awareness of the causes of CVD and perception of personal risk. The finding that people with moderately high blood pressure were no more likely to report modification of risk factors than those with lower pressures, despite their higher risk of cardiovascular disease, was of particular importance. Women were more likely to report changes in lifestyle, whereas older people and those with a lower standard of living were less likely to acknowledge personal risks or to report improvements. The relatively high levels of CVD risk factors and low levels of awareness found among patients with lower standards of living indicate a greater need for counselling in this group.

Although a high proportion of patients had received some advice on risk-factor reduction, specific advice was given less often. Diet and physical exercise were particularly neglected. Substantial proportions of general practitioners, as well as patients, failed to consider diet an independent risk factor for CVD. Low rates of reported intervention might reflect poor recall, rather than general practitioners' failure to provide advice. If this were the case, primary care teams may need to modify their practices in order to make their advice more memorable, and thus more effective.

The targeting of lifestyle interventions was generally poor, with some patients receiving advice that appeared to be unnecessary, while others were missed (Table 4). This suggests that primary care teams may be placing too much emphasis on general health promotion rather than disease prevention. For every risk factor considered, women and the elderly were least likely to have received relevant counselling and there was no evidence of targeting with respect to subjects' background, severity of hypertension or duration of diagnosis.

Among those who had attempted to improve their lifestyles (i.e. over 82% of women and 86% of men), the potential importance of primary care interventions is illustrated by the higher proportion of patients who claimed to have used general practitioner advice. Moreover, out of those patients who had received

counselling on CVD risk factors, over 94% claimed to have found it useful.

It is necessary to consider whether aspects of the study design or the methods used might have influenced our results. The sample was obtained from a wide range of general practitioners, including many who would not usually participate in research organized through academic bodies. Therefore, the levels of risk factors, interventions and lifestyle modifications reported by patients are likely to reflect those encountered in average practices. While substantial, the attrition of the original sample of 6535 hypertensive patients was unlikely to have been caused by systematic error and did not appear to distort the characteristics of the final sample studied. Patient-reported data were used, but care was taken to apply previously validated and reliable measures where possible.

Primary care teams in this national survey have failed to provide relevant counselling on risk factor reduction to important sub-groups of patients, such as women, elderly men, the poor and those with higher systolic blood pressure. However, such advice is both acceptable and helpful to patients already at increased risk of cardiovascular disease. These findings represent 'missed opportunities' for disease prevention and reinforce the need for better targeting of lifestyle interventions in primary care. This might be achieved by raising general practitioners' awareness of the prevalence of modifiable risk factors among hypertensives, highlighting opportunities for reducing health promotion workload by better targeting, and emphasizing the need to improve quality of care for those patients at greatest risk of heart attacks and strokes.

References

1. Kannel WB. Role of blood pressure in cardiovascular morbidity and mortality. *Progress in Cardiovascular Diseases* 1974; **XVIII:** 5-24.
2. Shaper AG, Pocock SJ, Phillips AN, Walker M. Identifying men at high risk of heart attacks: strategy for use in general practice. *BMJ* 1986; **293:** 474-479.
3. Poulter N. Management of multiple risk factors for coronary heart disease in patients with hypertension. *Am Heart J* 1991; **121:** 246-250.
4. Anggard E, Rand JM, Lenihan CJ, *et al.* Prevention of cardiovascular disease in general practice: a proposed model. *BMJ* 1986; **293:** 177-180.
5. Wilhelmsen L, Berglund G, Elmfeldt D, *et al.* The multifactor primary prevention trial in Goteburg, Sweden. *Eur Heart J* 1986; **7:** 279-288.
6. Hjermann I, Holme I, Velve Byre K, Leren P. Effect of diet and smoking intervention on the incidence of coronary heart disease. Report from the Oslo Study Group of a randomised trial in health men. *Lancet* 1981; **ii:** 1303-1310.
7. European Collaborative Trial of Multifactorial Prevention of Coronary Heart Disease. Final report of the 6-year results. *Lancet* 1986; 869-722.
8. Multiple Risk Factor Intervention Trial Research Group. Mortality rates after 10.5 years for participants in the multiple risk factor intervention trial. Findings related to a priori hypotheses of the trial. *JAMA* 1990; **263:** 1795-1801.
9. Family Heart Study Group. Randomised controlled trial evaluating cardiovascular screening and intervention in general practice: principal results of British Family Heart Study. *BMJ* 1994; **308:** 313-320.
10. Imperial Cancer Research Fund OXCHECK Study Group. Effectiveness of health checks conducted by nurses in primary care: final results of the OXCHECK study. *BMJ* 1995; **310:** 1099-1104.
11. Field K, Thorogood M, Silagy C, Normand C, O'Neill C, Muir J. Strategies for reducing coronary risk factors in primary care: which is most cost effective? *BMJ* 1995; **310:** 1109-1112.
12. World Health Organization Principal Investigators. The WHO MONICA project: a major international collaboration. *J Clin Epidemiol* 1988; **41:** 105-114.
13. Shaper AG, Pocock SJ, Walker M, Cohen NM, Wale CJ, Thomson AG. British Regional Heart Study: cardiovascular risk factors in middle-aged man in 24 towns. *BMJ* 1981; **283:** 179-186.
14. Mant D, McKinlay C, Fuller A, Randall T, Fullard EM, Muir J. Three year follow up of patients with raised blood pressure identified at health checks in general practice. *BMJ* 1989; **298:** 1360-1362.
15. Kurji K, Haines A. Detection and management of hypertension in general practices in northwest London. *BMJ* 1984; **288:** 903-906.
16. Silagy C, Muir J, Coulter A, Thorogood M, Roe L. Cardiovasular risk and attitudes to lifestyle: what do patients think? *BMJ* 1993; **306:** 1657-1660.
17. Castelli WP, Anderson K. A population at risk. Prevalence of high cholesterol levels in men and hypertension. *Am J Med* 1986; **293:** 474-479.
18. Hypertension Detection and Follow-up Program Co-operative Group. Five-year findings of the hypertension detection and follow-up program. *JAMA* 1979; **242:** 2562-2571.
19. Morisky D, Levine D, Green L, Shapiro S, Russell R, Smith C. Five-year blood pressure control and mortality following health education for hypertensive patients. *Am J Public Health* 1983; **73:** 153-162.
20. Rowland L, Dickinson EJ, Newman P, Ford D, Ebrahim S. Look after your heart programme: impact on health status, exercise knowledge, attitudes and behaviour of retired women in England. *J Epidemiol Com Health* 1994; **48:** 123-128.
21. Office of Population Censuses and Surveys. *General Household Survey 1987 (self-completion version).* London: HMSO, 1989.

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