Secondary prevention in coronary heart disease: baseline survey of provision in general practice

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Abstract

Objective: To determine secondary preventive treatment and habits among patients with coronary heart disease in general practice.
Design: Process of care data on a random sample of patients were collected from medical records. Health and lifestyle data were collected by postal questionnaire (response rate 71%).
Setting: Stratified, random sample of general practices in Grampian.
Subjects: 1921 patients aged under 80 years with coronary heart disease identified from pre-existing registers of coronary heart disease and nitrate prescriptions.
Main outcome measures: Treatment with aspirin, β blockers, and angiotensin converting enzyme inhibitors. Management of lipid concentrations and hypertension according to local guidelines. Dietary habits (dietary instrument for nutritional evaluation score), physical activity (health practice indices), smoking, and body mass index.
Results: 825/1319 (63%) patients took aspirin. Of 414 patients with recent myocardial infarction, 131 (32%) took β blockers, and of 257 with heart failure, 102 (40%) took angiotensin converting enzyme inhibitors. Blood pressure was managed according to current guidelines for 1566 (82%) patients but lipid concentrations for only 133 (17%). 673 of 1327 patients (51%) took little or no exercise, 245 of 1333 (18%) were current smokers, 808 of 1264 (64%) were overweight, and 627 of 1213 (52%) ate more fat than recommended.
Conclusion: In terms of secondary prevention, half of patients had at least two aspects of their medical management that were suboptimal and nearly two thirds had at least two aspects of their health behaviour that would benefit from change. There seems to be considerable potential to increase secondary prevention of coronary heart disease in general practice.

Introduction

The 1996 health promotion package for British general practitioners represented a huge change from the previous highly prescriptive health promotion banding scheme. It aims to offer "flexibility to develop a wide range of approaches to health promotion."[1] Reducing mortality from coronary heart disease remains a priority, and as one approach to this, general practitioners have been encouraged to target patients with established coronary heart disease for secondary prevention.[2]

There is convincing evidence that secondary prevention is effective.[3 4] Reductions in mortality have been found with aspirin treatment,[5] blood pressure control,[6] and lowering of lipid concentrations,[7 8] and selected patients have benefited from β blockers[9] and angiotensin converting enzyme inhibitors.[10] Exercise,[11] stopping smoking,[12] dietary modifications,[3 4] and, in obese patients, weight loss[13] have also been found to reduce risks from coronary heart disease.

Little is known, however, about current secondary preventive practices and treatment among patients in primary care. There is potential for greater uptake among patients discharged from hospital after coronary events,[14] but most patients with coronary heart disease are cared for in general practice.[15] We studied secondary preventive treatment and habits among patients with coronary heart disease registered in general practice so that we could assess what could be achieved by targeting secondary prevention in primary care.

Subjects and methods

This study was undertaken in preparation for a randomised trial of secondary prevention clinics in general practice. All 89 Grampian general practices were divided into four groups by size and location (urban or rural), and a random sample that provided the same percentage from each group was obtained by pulling names from a hat. Our target sample was 2000 case notes for review and 1400 (70%) questionnaire responses. Based on a prevalence of coronary heart disease of 3% and a limit of 150 case notes per practice, we estimated that 18 practices should provide sufficient patients. Twenty eight practices were invited to participate in the study and 19 were recruited.

Patients who were less than 80 years old and had been prescribed nitrates or had coronary heart disease were identified by computer or manual searches of pre-existing morbidity and prescribing records. (Previous studies have reported that morbidity records are 80% sensitive for myocardial infarction and 60% for angina,[16] and nitrate prescriptions are 73% sensitive for angina.[17]) We identified 3172 patients, which represented 2.3% of the total (all ages) practice populations (135 581).

We had placed a limit of 150 patients per practice for data collection, so 937 patients were excluded by selecting every third or fourth patient (depending on the reduction required in each practice) from alphabetical lists at larger practices. On 73 occasions, when two patients lived at the same address, one was selected by tossing a coin. Case notes were reviewed to ensure that patients were documented by hospital letter or general practitioner as having coronary heart disease, which resulted in 95 exclusions. In addition, 18 patients had died, 11 had moved away, and notes for 38 patients were unobtainable. Seventy nine patients who were terminally ill, had dementia, or were housebound with serious comorbidity were excluded because comprehensive prevention may not have been appropriate. This left a total of 1921.

Data collection and analysis

Data on prescriptions for cardiac and secondary preventive drugs, blood pressure and lipid recordings, relevant medical conditions, and allergies were collected from the medical records. Lifestyle data were collected by postal survey, but 31 patients were excluded at the request of their general practitioners. The response rate was 71% (1343/1890). The questionnaire included the health practices index[18] and dietary assessment with the dietary instrument for nutritional evaluation (DINE), a validated instrument for measuring dietary fat.[19]

We used Microsoft Access to manage the data and SPSS for WINDOWS release 6.0 for analysis. The χ^2 test and independent samples *t* test respectively were used for comparing proportions and means between respondents and non-respondents. To provide cumulative ratings for medical management and health behaviour, the number of missed opportunities for secondary prevention was calculated for each respondent according to the following criteria. For medical management one point was allocated for aspirin not taken nor contraindicated (allergy or active peptic ulceration)[5]; β blockers not taken nor contraindicated (allergy, heart failure, asthma, or peripheral vascular disease) in patients with recent (past five years) myocardial infarction[9] or angiotensin converting enzyme inhibitors not taken nor contraindicated (allergy or renal contraindication) in patients with heart failure[10]; blood pressure management outside British Hypertension Society guidelines[20]; cholesterol management outside local guidelines (which recommend lipid lowering drugs for cholesterol concentrations >5.2 mmol/l).[21] For health behaviour one point was allocated for little or no physical activity[18]; current smoking[12]; obesity (body mass index ≥25)[18]; and high fat diet (≥83 g/day).[19]

The study was approved by the Grampian Health Board and University of Aberdeen joint ethics committee. Case notes were audited with the consent of general practitioners, and responding patients gave informed consent to the study.

Results

Table 1 compares the characteristics of respondents and non-respondents with regard to demography and secondary prevention. There were few differences, but a higher proportion of respondents than non-respondents were prescribed aspirin and β blockers and had had recent cholesterol and blood pressure checks.

Table 1 Demographic data and secondary prevention of coronary heart disease in respondents and non-respondents. Values are numbers (percentages) of respondents unless stated otherwise

	Respondents (n=1343)	Non-respondents (n=578)	P value
Sex (men)	782 (58)	314 (54)	0.11
Mean (SD) age (years)	66.2 (8.2)	66.6 (8.7)	0.30
Urban practice	720 (54)	331 (57)	0.14
Practice size:			
<5000	190 (14)	105 (18)	
5-10 000	523 (39)	238 (41)	0.016
>10 000	630 (47)	235 (41)	
Previous myocardial infarction	605 (45)	269 (47)	0.55
Mean (SD) time since myocardial infarction (years)	7.5 (6.3)	7.4 (6.1)	0.76
Prescribed drugs:			
Aspirin	508 (38)	189 (33)	0.032
β Blockers	450 (34)	148 (26)	0.0006
Angiotensin converting enzyme inhibitors	123 (9)	62 (11)	0.28
Cholesterol:			
Checked within 3 years*	340 (26)	114 (20)	0.008
Mean (SD) total cholesterol (mmol/l)	6.5 (1.2)	6.5 (1.2)	0.92
Blood pressure:			
Checked within 3 years†	1207 (93)	488 (88)	0.0005
Mean (SD) systolic pressure (mm Hg)	142 (20)	142 (21)	0.60
Mean (SD) diastolic pressure (mm Hg)	81 (10)	81 (10)	0.45

*Of 1322 respondents and 570 non-respondents managed in general practice. †Of 1298 respondents and 554 non-respondents managed in general practice.

Full analysis of aspirin treatment was conducted on questionnaire data because 332 of 825 patients (40%) who reported taking aspirin obtained it over the counter. Table 2 shows the use of aspirin according to patients' history of infarction. After patients with allergy to aspirin or active peptic ulcers were excluded, 784 out of 1233 (64%) took aspirin. The proportion rose to 69% (536/ 775) when patients with dyspepsia or taking warfarin were also excluded.

β Blockers were taken by 598 (31%) of all 1921 patients and by 131 (32%; 95% confidence interval 27% to 36%) of 414 patients who had had a myocardial infarction in the past five years. After the 550 (29%) patients with contraindications (asthma, heart failure, peripheral vascular disease) or previous side effects were excluded, 520 of the remaining 1371 patients (38%) took β blockers.

In all, 185 (10%) patients took angiotensin converting enzyme inhibitors. Of 257 patients with a diagnosis of heart failure, 102 (40%; 34% to 46%) took angiotensin converting enzyme inhibitors. Previous side effects were documented for 12 patients, of whom six continued to take the drugs.

Of all 1921 patients, 1761 (92%) had had their blood pressures checked in the past three years

Table 2 Numbers (percentages) of patients taking aspirin according to history of myocardial infarction

Myocardial infarction	Aspirin
None	380/721 (53)
<5 years ago	240/284 (85)
5-10 years ago	116/162 (72)
10-15 years ago	48/76 (63)
>15 years ago	41/76 (54)
All patients	825/1319 (63)*

*95% confidence interval 60% to 65%.
χ^2 test for linear trend 93.3, df = 1, P<0.0001.

Table 3 Blood pressure and cholesterol management for all patients (n=1921)

	Total No	No (%) treated with drugs	No (%) untreated but checked within 3 months
Blood pressure			
Hospital managed	69	65 (94)	0
No record for 3 years	160	79 (49)	0
Most recent record (mm Hg):			
Systolic < 160, diastolic < 90*	1061	773 (73)	72 (7)
Systolic 160-199, diastolic < 100 or diastolic 90-99, systolic < 200†	541	391 (72)	45 (8)
Systolic ⩾200 or diastolic ⩾100‡	90	73 (81)	9 (10)
Total cholesterol			
Hospital managed	29	20 (69)	0
No record for 3 years	1441	2 (<1)	0
Most recent record (mmol/l)§:			
⩽5.2	71	9 (13)	9 (13)
-6.5	168	2 (1)	32 (19)
-7.8	153	24 (16)	24 (16)
>7.8	59	11 (19)	14 (24)

* No treatment recommended under British Hypertension Society guidelines.[20]
† Guidelines recommend observe or treat if other factors (for example, coronary heart disease).
‡ Guidelines recommend treatment.
§ Categories taken from Grampian general practice lipid management guidelines[21] and represent low, mild, moderate, and high risk.

(table 3). In the 1692 patients managed in general practice and checked within three years, mean systolic pressure was 142 mm Hg (SD 20.5, range 80 to 230 mm Hg) and mean diastolic pressure was 81 mm Hg (SD 10.0, range 34 to 130 mm Hg). In all, 1566 patients (82%; 95% confidence interval 80% to 83%) had normal blood pressure or mild to moderate hypertension that was receiving attention (treated or recently checked).

Four hundred and eighty patients (25%) had had their total cholesterol concentrations checked within the past three years (table 3), and the mean cholesterol concentration for the 451 patients managed in general practice was 6.5 mmol/l (SD 1.18, range 3.1 to 9.8 mmol/l). At the time of the study, local guidelines[21] advised treatment for patients under 65 years so data from this group were analysed separately. Of 783 patients, 311 (40%) had had cholesterol measured, and the mean concentration for the 292 patients managed in general practice was 6.5 mmol/l (1.16, range 3.1 to 9.8 mmol/l). Cholesterol concentrations were ⩽5.2 mmol/l or moderately raised (5.3 to 7.8 mmol/l) and receiving attention for 133 patients (17%; 95% confidence interval 14% to 20%).

Table 4 shows the physical activity, smoking status, body mass index, and dietary fat intake of the subjects. In all, 673 of 1327 patients (51%; 48% to 53%) took little or no exercise, 245 of 1333 (18%; 16% to 20%) were current smokers, 808 of 1264 (64%; 61% to 67%) were overweight, and 627 of 1213 (52%; 49% to 55%) ate more fat than recommended. Only 626 respondents (47%) ate at least six portions of fruit a week and 442 (33%) ate at least six portions of vegetables (other than potatoes).

Table 5 shows the number of measures of medical and lifestyle secondary prevention that were not being addressed in the patients that responded to the questionnaire. Only 10% of patients would not have benefitted from further changes in lifestyle and only 7% were receiving all the medical management for optimal secondary prevention of coronary heart disease.

Discussion

We have attempted to measure the use of secondary prevention in Grampian general practice. Patient response rates were good, but to assess the possible effect of respondent bias we compared available data for respondents and non-respondents. Non-respondents were slightly less likely to have had aspirin or β blockers prescribed or their blood pressures or cholesterol levels checked in the past three years. This suggests that sampling error was modest but that our results may overestimate preventive practices by non-respondents.

Medical management

Treatment with aspirin for patients with coronary heart disease can reduce vascular events by 33%,[5] but we found that less than two thirds of patients took aspirin. The highest uptake was among patients with recent myocardial infarction (85%). A similar figure was reported in the ASPIRE study (action on secondary prevention through intervention to reduce events) of hospital patients in 1996.[14] However, only half of general practice patients who had not had a recent myocardial infarction took aspirin. This suggests considerable potential for increased uptake, especially among the majority of patients with angina treated in general practice.

β Blockers have achieved mortality reductions of 20% following myocardial infarction,[9] and angiotensin

Table 4 Physical activity, smoking, body mass index, and dietary fat intake in patients with coronary heart disease

	No (%) of patients
Physical activity (n=1327)*	
Little or none (0-3)	673 (51)
Moderate (4-8)	603 (45)
High levels (9-16)	51 (4)
Smoking (n=1333)	
Current smoker	245 (18)
Former smoker	729 (54)
Never smoked	359 (27)
Body mass index (n=1264)	
Underweight (< 20)	31 (2)
Normal range (20-24.9)	425 (34)
Overweight (25-29.9)	588 (47)
Obese (30-39.9)	210 (17)
Very obese (⩾40)	10 (1)
Dietary fat (n=1213)†	
Low (⩽ 83 g/day)	586 (48)
Moderate (84-122 g/day)	395 (33)
High (>122 g/day)	232 (19)

*Health practice indices.[18] †DINE dietary fat ratings.[19]

Table 5 Numbers (percentages) of patients with missed opportunities for secondary prevention among respondents (n=1343) to postal questionnaire

No of opportunities	Medical management*	Lifestyle†
0	91 (7)	129 (10)
1	589 (44)	391 (29)
2	522 (39)	501 (37)
3	135 (10)	281 (21)
4	6 (0.4)	41 (3)

*Suboptimal aspirin treatment, β blocker or angiotensin converting enzyme inhibitor treatment, blood pressure management, lipid management.
†Little or no physical activity, current smoking, overweight, and high dietary fat intake.

converting enzyme inhibitors have reduced mortality in patients with heart failure.[10] However, in this study less than a third of patients in general practice with recent myocardial infarction took β blockers. Side effects and contraindications were present for nearly a quarter of patients, which may have contributed to the low uptake but does not explain it fully. Our findings, again, mirror those of the ASPIRE study[14] and confirm that use of β blockers in patients who have had a myocardial infarction was similar to that in those with no infarction. Less than half our patients with a diagnosis of heart failure took angiotensin converting enzyme inhibitors. This may reflect low rates of referral for evaluation of heart failure or low rates of treatment.

The British Hypertension Society advocates aggressive treatment of hypertension for patients with coronary heart disease.[20] In this study more than 90% of patients had received blood pressures checks within the past three years and more than 90% of these were managed in accordance with guidelines. In contrast, lipid management was largely neglected, despite the existence of local guidelines advocating cholesterol lowering for patients with coronary heart disease and total cholesterol concentrations above 5.2 mmol/l.[21] General practitioners may have been awaiting more convincing evidence of benefit from clinical trials before intervening. This evidence has now been provided by two large randomised trials which were published around the time of our study.[7 8]

Lifestyle

Lifestyle changes can modify coronary heart disease[22] and reduce mortality from it. Exercise programmes have reduced death rates after myocardial infarction by 20%,[11] and stopping smoking is associated with halving of mortality.[12] Reductions in mortality from dietary changes have been attributed to a protective effect from certain foods, particularly fruit and vegetables, in addition to cholesterol lowering.[3 4] Weight loss in obese patients reduces coronary risk both independently and by improving lipid concentrations, blood pressure, and glucose tolerance.[13]

Most patients in this study undertook little or no physical activity, and a fifth were current smokers. Half of patients ate too much fat, and consumption of fruit and vegetables was low. Nearly two thirds of patients were overweight. These findings reveal considerable capacity for secondary prevention through changes in lifestyle. Intervention in general practice, however, is only warranted if it achieves meaningful changes. In general, this has proved difficult,[23 24] but health promotion directed at patients with angina has been found to be effective at increasing physical activity and improving diet.[25] Moreover, reductions in symptoms and mortality were also reported. Another study found that patients at highest risk responded best to health promotion,[23] and this suggests that benefit might be derived from targeting all patients with coronary heart disease for health promotion.

Conclusion

Virtually all patients in general practice with coronary heart disease had at least one aspect of their medical management that would benefit from change and half had at least two. In addition, nearly all patients reported at least one high risk behaviour and nearly two thirds had at least two. There is a gap, therefore, between the current situation and "optimal" secondary prevention. How much the gap might be closed by intervention in general practice requires further study, but several difficulties can be anticipated. Patients can be advised to change behaviour and informed about treatments but may not accept the advice. Polypharmacy may complicate treatment, and comorbidity may have higher priority for doctor and patient. However, there seems to be potential for substantial benefits to patients with coronary heart disease by targeting them for secondary prevention in general practice.

Key messages

- Patients with coronary heart disease can benefit from both medical and lifestyle secondary prevention measures
- This study found that half of patients with coronary heart disease in general practice had at least two missed opportunities for effective medical interventions
- Nearly two thirds of patients with coronary heart disease in general practice had two or more high risk lifestyle factors that would benefit from change
- There seems to be plenty of opportunity for improving secondary prevention of coronary heart disease in general practice

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Secondary prevention clinics for coronary heart disease: randomised trial of effect on health

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Abstract

Objective: To evaluate the effects of secondary prevention clinics run by nurses in general practice on the health of patients with coronary heart disease.
Design: Randomised controlled trial of clinics over one year with assessment by self completed postal questionnaires and audit of medical records at the start and end of the trial.
Setting: Random sample of 19 general practices in northeast Scotland.
Subjects: 1173 patients (685 men and 488 women) under 80 years with working diagnoses of coronary heart disease who did not have terminal illness or dementia and were not housebound.
Intervention: Clinic staff promoted medical and lifestyle aspects of secondary prevention and offered regular follow up.
Main outcome measures: Health status measured by the SF-36 questionnaire, chest pain by the angina type specification, and anxiety and depression by the hospital anxiety and depression scale. Use of health services before and during the study.
Results: There were significant improvements in six of eight health status domains (all functioning scales, pain, and general health) among patients attending the clinic. Role limitations attributed to physical problems improved most (adjusted difference 8.52, 95% confidence interval 4.16 to 12.9). Fewer patients reported worsening chest pain (odds ratio 0.59, 95% confidence interval 0.37 to 0.94). There were no significant effects on anxiety or depression. Fewer intervention group patients required hospital admissions (0.64, 0.48 to 0.86), but general practitioner consultation rates did not alter.
Conclusions: Within their first year secondary prevention clinics improved patients' health and reduced hospital admissions.

Introduction

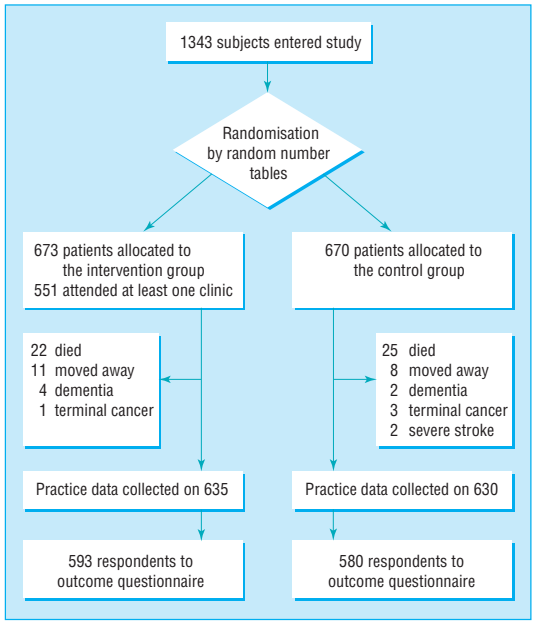
General practitioners have been encouraged to target patients with manifest coronary heart disease for secondary prevention.[1] Strong evidence exists to support this strategy; reductions in cardiovascular events and mortality can be achieved by, for example, taking aspirin,[2] control of blood pressure,[3] lowering lipid concentrations,[4 5] exercise,[6] healthy diets,[7] and stopping smoking.[8]

A comprehensive package of secondary prevention is, however, a considerable undertaking for patients, many of whom are elderly and may have other health priorities.[1] There are risks that health may worsen with polypharmacy, drug side effects, and patient discordance. Weighed against the risks, however, are possible benefits: patients may appreciate extra support, uncontrolled symptoms may be identified earlier, and health promotion to patients with angina can improve symptoms.[9] We conducted a randomised trial of secondary prevention clinics run by nurses in general practice to assess their effects on uptake of secondary prevention. In this paper we report the effect on patients' symptoms and health.

Subjects and methods

Of 28 general practices selected randomly in northeast Scotland (formerly Grampian region), 19 agreed to participate in the study.[10] Patients with diagnoses of coronary heart disease in their general practice records who did not have a terminal illness or dementia and were not housebound were eligible: 1343 (71%) of a random sample of 1890 completed baseline questionnaires and agreed to participate.[10]

We used random numbers tables to centrally randomise patients (by individual after stratification for age, sex, and practice) to intervention or control



Randomisation and exclusion of patients in trial

groups. Patients assigned to the intervention group were invited to attend secondary prevention clinics during which their symptoms were reviewed; treatment was reviewed and use of aspirin promoted; blood pressure and lipid management were reviewed; and lifestyle factors were assessed and, if appropriate, behavioural change negotiated. The clinics ran for one year. Patients were invited for a first appointment during the first three months and were followed up depending on clinical circumstances (usually two to six monthly). Patients in the control group received usual care by their general practitioner.

We collected data on health and symptoms by postal questionnaire before intervention and at one year using the following instruments:

SF-36 health survey questionnaire—This is a general outcome measure that uses eight scales to assess three aspects of health: functional status (physical functioning, social functioning, role limitations attributed to physical problems, role limitations attributable to emotional problems), wellbeing (mental health, energy and fatigue, pain), and general health perception.[11] It has been validated for use in the United Kingdom.[12]

Angina type specification—This is designed for use with the SF-36 questionnaire to assess several aspects of chest pain.[13] Its measurements of presence, frequency, and course of chest pain have been found to predict future cardiovascular events.[14]

Hospital anxiety and depression scale—A well validated and widely used instrument to assess mental state.[15]

We collected data about attendance at general practice by audit of general practice records. Data about hospital admissions were obtained from patients' responses to the angina type specification.

A sample size of 1300 at baseline was projected to give 808 responders at outcome, which was sufficient to detect five point "clinically and socially relevant" differences in all SF-36 domains.[11] We analysed data with standard statistical techniques on an intention to treat basis using SPSS for Windows version 6.1.3. Binary outcomes were analysed by logistic regression and continuous scales by analysis of covariance, with adjustment where appropriate for age, sex, practice, and baseline performance. Frequency of chest pain, length of hospital stay, and numbers of general practitioner consultations were analysed with the Mann-Whitney U test.

The study was effectively open because practice staff who ran the clinics knew which patients were in the intervention group. Questionnaire data were entered blind to group allocation, but masking of data collection about general practitioner consultations was impracticable because indicators were often present in medical records. The study was approved by the Grampian Health Board and University of Aberdeen joint ethics committee.

Results

The figure shows the randomisation of subjects and follow up. Table 1 shows the baseline characteristics of patients in the intervention and control groups. There were no large differences, but the intervention group scored slightly better for "energy" than the control group.

Table 2 shows the mean changes in SF-36 scores that occurred between baseline and one year. Before the analysis of covariance we analysed variables that were thought to be potential confounders (age, sex,

Table 1 Characteristics of control and intervention group at baseline

	No of subjects (intervention/ control)	Intervention group	Control group
No (%) of men	593/580	346 (58)	339 (58)
No (%) with angina at baseline*	554/544	273 (49)	279 (51)
No (%) admitted to hospital in previous year	540/518	132 (24)	137 (26)
No (%) with myocardial infarction	593/580	273 (46)	255 (44)
Median (interquartile range) years since myocardial infarction	271/254	5 (8)	6 (8)
Mean (SD) age	593/580	65.9 (7.9)	66.3 (8.3)
Mean (SD) SF-36 scores:			
Physical	573/555	58.6 (25.7)	57.1 (25.1)
Social	592/579	77.3 (26.4)	76.1 (25.9)
Role physical	550/532	49.7 (43.6)	47.9 (42.4)
Role emotional	545/529	67.2 (41.4)	67.3 (41.4)
Mental	575/563	75.7 (17.6)	73.9 (17.8)
Energy	577/563	54.2 (22.3)	51.3 (21.2)
Pain	590/576	64.8 (26.4)	62.9 (25.5)
General	552/539	56.5 (22.7)	54.7 (21.9)

*Number of subjects with chest pain in the past week.

Table 2 Mean changes in SF-36 scores between baseline and one year in intervention and control groups

Domain	No of subjects (intervention/ control)	Mean change in score: Intervention group	Mean change in score: Control group	Adjusted difference (95% CI)*	P value
Physical	554/541	2.28	−1.58	4.33 (2.12 to 6.54)	<0.001
Social	590/577	0.20	−2.79	3.51 (0.94 to 6.08)	0.007
Role physical	511/497	4.71	−3.04	8.52 (4.16 to 12.88)	<0.001
Role emotional	493/491	2.08	−2.42	4.66 (0.11 to 9.21)	0.045
Mental	556/532	0.32	−0.13	1.05 (−0.50 to 2.61)	0.185
Energy	559/545	1.52	0.71	1.58 (−0.17 to 3.33)	0.077
Pain	583/569	1.45	−0.33	2.50 (0.18 to 4.83)	0.035
General	514/496	1.06	−0.82	2.34 (0.50 to 4.19)	0.013

*Adjusted for age and baseline performance.

Table 3 Hospital anxiety and depression scores at baseline and one year for intervention and control groups

	No of subjects	Mean scores		Difference (95% CI)	P value*
		Baseline	1 year		
Anxiety:					
Intervention	556	5.78	5.77	0.01 (–0.24 to 0.26)	0.932
Control	552	6.14	6.19	–0.05 (–0.27 to 0.17)	0.660
Depression:					
Intervention	568	4.50	4.38	0.11 (–0.09 to 0.32)	0.281
Control	556	4.63	4.60	0.03 (–0.18 to 0.23)	0.794

*Paired samples *t* test.

practice, and baseline performance) for their effect on outcome scores. No significant difference in mean change in score between practices was found in any domain with analysis of variance, and the independent samples *t* test showed no significant differences between sexes. Baseline performance and age, however, were found to correlate significantly with changes in scores, and we therefore adjusted for these in subsequent analyses.

Of 508 patients in the intervention group, 257 (51%) reported chest pain during the past week at baseline and 232 (46%) at one year. The corresponding figures for 498 control patients were 258 (52%) and 250 (50%). After age, sex, practice, and baseline performance were adjusted for, the odds ratio for chest pain in the intervention group was 0.81 (95% confidence interval 0.61 to 1.08, P = 0.143).

Fifty one of 519 (10%) patients in the intervention group reported that the course of their chest pain was worsening ("getting a little worse" or "getting much worse") at baseline and 37 (7%) at one year. The figures for 500 control patients were 47 (9%) and 54 (11%). After age, sex, practice, and baseline performance were adjusted for, the odds ratio was 0.59 (0.37 to 0.94, P = 0.025).

Among patients reporting chest pain, the median frequency during the past week for intervention and control groups at baseline was three (P = 0.110). There was no change at one year (P = 0.722).

Table 3 shows the hospital anxiety and depression scores. Patients from rural practices and men were significantly less anxious, and age and baseline performance significantly correlated with anxiety and depression. These confounders were included in analysis of covariance, which confirmed that there were no significant effects from intervention (adjusted difference – 0.10 (– 0.42 to 0.23, P = 0.560) for anxiety and – 0.16 (– 0.44 to 0.13, P = 0.281) for depression in the intervention group).

Of 540 patients in the intervention group, 132 (24%) were admitted to hospital during the year before the study and 106 (20%) during the study year. The corresponding figures for 518 control patients were 137 (26%) and 145 (28%). After age, sex, general practice, and baseline performance were adjusted for the odds ratio of requiring admission to hospital for the intervention group was 0.64 (0.48 to 0.86, P = 0.003). The difference was explained only partly by "cardiac" admissions: there were 36 (7%) in the intervention group and 49 (9%) in the control group during the study year. It was not due to differences in non-fatal myocardial infarctions: 13 (2%) in the intervention group, 12 (2%) in the control group.

At baseline the median length of stay in hospital was seven days in the intervention group and six in the control group (P = 0.435). The median stay at one year was six days in both groups (P = 0.408). The median number of general practitioner consultations in three months for intervention and control groups at baseline was one (P = 0.107). There was no change at one year (P = 0.488).

Discussion

We assessed the effects of secondary prevention clinics on the health of patients with established coronary heart disease in typical general practices and found that patients receive important early benefits. The effect of clinics on uptake of secondary prevention will be reported later.

Against a background of overall deterioration among the control group, the general health of patients who were invited to attend the clinics improved. There were significant differences in most domains of the SF-36 questionnaire, but the largest improvements were in functional status. It was in these aspects of health that this population scored most poorly at baseline compared with a general population[12] and where, therefore, improvement might be most welcome. The lowest baseline and greatest benefit were in role limitations attributed to physical problems, and the size of this effect would be expected to be clinically and socially relevant.[11]

Although not directly comparable, our findings are similar to those of a study in Belfast of health promotion in patients with angina.[16] The Belfast study had important differences: all its subjects had angina; the intervention did not include medical aspects of secondary prevention; numbers of patients were smaller; and the Nottingham Health Profile was used to evaluate effects on perceived health. However, significant improvements in physical mobility and trends towards improvement in most other scales were reported. Our study provides stronger evidence of benefit to all patients with coronary heart disease in more areas of health but confirms that most benefit occurs in physical aspects.

Chest pain

Fewer patients in the intervention group suffered chest pain at one year, but this difference was not significant and there were no differences in the frequencies of pain among those who reported it. Significantly fewer subjects, however, reported that their chest pain was deteriorating; such patients have been found previously to have poorer prognoses.[14] Overall, therefore, the intervention caused a small but important improvement in chest pain. Once again, these findings are in line with those of the Belfast study, where health promotion was found to reduce angina.[9]

Anxiety and depression

Intervention produced no significant improvement in hospital anxiety and depression scores or in the mental health domain of the SF-36. However, at baseline only 14% of subjects were anxious and 6% depressed (hospital anxiety and depression score >10). These estimates and the baseline mental health scores were similar to those expected in the general popula-

tion,[12 17 18] so it was unsurprising that there were no psychological benefits from intervention.

Most previous studies of anxiety and depression in coronary heart disease have been conducted on patients soon after myocardial infarction, when their psychological distress peaks.[19] Among patients with coronary heart disease in general practice, however, recent myocardial infarction is uncommon.[10] Our results suggest that anxiety and depression do not warrant additional attention in patients with stable coronary heart disease. It was reassuring, however, that the pursuit of comprehensive secondary prevention did not lead to increased psychological distress.

Use of health services

To assess the wider impact of improved general health on patients we studied their use of health services. These patients were high users: a quarter of subjects required hospital admissions in the year before the study. During the study year, however, there was a significant reduction in the numbers of patients in the intervention group requiring hospital admissions. We would not expect the increased secondary prevention to have such an immediate effect, and, indeed, there were no significant reductions in deaths or non-fatal myocardial infarctions. Neither did the fall in other "cardiac" admissions fully account for the difference. It is possible, however, that improved general health and closer monitoring helped to avoid other hospital admissions.

Relevance and limitations

Our study relied on self completed questionnaires to measure health, but we used instruments that have been validated and used extensively.[11–15] Recruitment rates of general practices and patients were good, and differences between respondents and non-respondents were modest.[10] There were few exclusions and response rates were good, so the sample was reasonably representative of northeast Scotland. Local factors may affect results of clinics in other regions or countries, but the concordance between our results and those of the most similar previous study (in Belfast)[9 16] suggests that our results will be widely relevant. A follow up of one year is relatively short, but improvements in secondary prevention should lead to medium and long term reductions in cardiovascular events and deaths. Longer term follow up is planned to study this.

Conclusions

Overall, secondary prevention clinics improved patients' health. Most benefit was in functional status, but there were also improvements in chest pain and less need for hospital admissions. Targeting secondary prevention in a general practice population can achieve significant and important benefits to patients' health within the first year.

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Key messages

- Nurse led clinics in general practice were used to promote secondary prevention to patients with coronary heart disease
- Within the first year the health of patients invited to the clinics improved
- Most benefit was in functional status, but chest pain improved too
- There was no effects on anxiety or depression
- There were significant reductions in hospital admissions in the first year

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