Coronary heart disease prevention and age inequalities: the first year of the National Service Framework for CHD

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ABSTRACT

Background

The National Service Framework for Heart Disease sets national standards and defines service models for coronary heart disease (CHD). Little is known about the impact of this intervention on age inequalities.

Aim

To determine the changes in the uptake of coronary prevention measures before and after the first year of implementation of the National Service Framework for Coronary Heart Disease, and to compare these changes in uptake of coronary prevention in patients aged 75 years and over with younger patients.

Design of study

Repeated cross-sectional survey using routinely collected data.

Setting

Seventeen general practices in 17 primary care groups in the Trent Region.

Method

All registered patients at baseline and follow-up aged ≥35 years were categorised into three groups: those with either coronary heart disease or a history of stroke; those with diabetes or hypertension who were not in in the first group; and the remaining population. Data from electronic records was collected to show differences in the proportions of patients with coronary risk factors recorded in the previous year. Data was also collected about differences in the proportions of patients with adequate disease control measures.

Results

Improvements were demonstrated in the recording of coronary risk factors and of disease control measures. However, compared with patients aged <75 years, older patients were significantly less likely to have a serum cholesterol level recorded at baseline; to be on lipid lowering drugs; to be on β blockers post myocardial infarction and to have well controlled blood pressure. These differences persisted at follow-up.

Conclusion

There have been substantial improvements in both the recording of coronary risk factors and disease control measures following the implementation of the National Service Framework for Coronary Heart Diease. However, there needs to be an effort to strengthen the focus on the care of older patients.

Keywords

blood pressure; body mass index; cholesterol; coronary heart disease; cross-sectional survey; primary prevention.

INTRODUCTION

The National Service Framework for Coronary Heart Disease[1] sets national standards and defines service models for a service or care group. It also puts in place programmes to support implementation and establish performance measures against which progress within agreed timescales can be measured. While initially launched in England in March 2000, it is also being implemented in Scotland and Wales. The National Service Framework requires GPs to identify all patients aged 35 to 74 years with coronary heart disease (CHD) and to reduce their coronary risk. This includes treatment with statins, which reduce cardiovascular events and improve survival.[2–5] The scale of the task for general practice is shown in a previous article looking at the baseline for recording and disease control in the Trent region.[6]

When an intervention first occurs, it may increase baseline inequalities[7] if those who need the intervention least take it up first, with those at greatest risk being late to adopt the change. There is now good evidence that women with CHD are less likely than men to receive appropriate coronary prevention care, investigation, referral and treatment in both primary and secondary care.[8–14]

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There are national concerns that age may influence the provision and uptake of treatments.[15] While older people are less likely to undergo angiography, angioplasty and bypass grafting,[16] evidence for the uptake of secondary prevention within primary care for older patients is lacking.

Until recently, trial evidence for treatment of older people with CHD with statins was scant because older people tended to be excluded from trials. For example, the 4S Study had an upper age limit of 70 years.[2] However, there has been no reason to suspect that elderly patients will not benefit from statins, and, given the higher initial risk in older people, benefits are likely to be more substantial.[17] We now have robust evidence from randomised controlled trials to support the use of statins in the elderly.[5–18]

We undertook a study to determine the changes in primary and secondary prevention of CHD before and after the first year of implementation of the National Service Framework for Coronary Heart Disease. Our hypothesis was that, despite the enormous workload,[6] practices were likely to make some progress towards these goals but that the progress would be greater for those under 75 years compared with older patients. If proven, this could indicate inequalities for older patients and would be contrary to standard one of the National Service Framework for Older People, which is to root out ageism.[15] Since the absolute benefit from secondary prevention is greatest in those at highest initial risk,[17] the public health importance of widening inequalities would be substantial but also potentially preventable.

METHOD

Recruitment and ethical approval

Details of practice recruitment have already been described but are repeated here for ease of reference.[14] We asked all 51 primary care groups that existed in the former Trent Region in March 2000 (the date of the implementation of the National Service Framework for Coronary Heart Disease) to produce a list of general practices that used computer systems compatible with MIQUEST (EMIS/Meditel) systems. Nineteen primary care groups volunteered. We numbered each practice and randomly selected three practices from each primary care group using the random number function on SPSS software. We invited these practices to join the study and the first one to reply from each group of three was recruited. If all three refused, we selected another three practices from the primary care group. In total, 65 practices were contacted, 24 volunteered and 19 were recruited. One practice had inadequate diagnostic data recorded on their computer and it was excluded from the study. Eighteen practices were involved in the study at baseline and 17 at 1 year (one practice withdrew because of a major change in the GP partnership). These practices were representative of all practices in the Trent region in terms of morbidity (measured by hospital admission rates for a range of conditions) and socio-demographic characteristics (deprivation, rurality, partnership size, etc).

Target population

Our target population consisted of all registered patients aged ≥35 years. We identified three groups of patients. Group A included patients with a Read code for CHD or stroke or at least one prescription for nitrates. Group B included patients with a Read code for diabetes or hypertension (excluding those in group A) who were at high risk of developing coronary heart disease. Group C included all other patients with no evidence of ischaemic heart disease, stroke, diabetes or hypertension. In order to examine the hypothesis regarding the relative change in primary and secondary prevention by age, we also categorised patients into those aged 75 years and those <75 years.

Variables

We used MIQUEST[19] to extract the following data at baseline during March and April 2000 and at follow-up during May and June 2001 for all registered adult patients:

- CHD: first recorded onset of CHD and myocardial infarction if present;
- Other morbidity: diabetes, hypertension; stroke and recorded contraindications to aspirin (upper gastrointestinal disease, clotting or bleeding disorders, and history of intra-cranial bleeding);
- Drug treatment: name and date of last prescription of aspirin, β blockers and lipid lowering drugs;

How this fits in

There have been substantial improvements in both the recording of coronary risk factors and disease control measures for patients in the first year following the implementation of the National Service Framework for Coronary Heart Disease. However, older people were less likely than the young to be screened and treated for hyperlipidaemia, and differences in blood pressure control worsened over the year. There needs to be an effort to strengthen the focus on the care of older patients.

- Other risk factors for heart disease: age, sex, family history of cardiovascular disease, most recent smoking status, weight, height, body mass index (BMI), systolic and diastolic blood pressure, and all serum cholesterol values.

Analysis

Our primary outcome measure was the change in the proportion of patients with CHD or stroke (group A) receiving prescriptions for lipid lowering drug therapy 1 year after the implementation of the National Service Framework compared with baseline.

Our secondary outcome measures were changes in levels of data recordings of cardiovascular risk factors and levels of appropriate disease management as follows:

- Levels of data recording for cardiovascular risk factors: fasting serum cholesterol, BMI, blood pressure, smoking status and family history of cardiovascular disease. We calculated the proportion of patients in each group with at least one value recorded in the year before and the year after the implementation of the National Service Framework for Coronary Heart Disease;
- Appropriate disease management: the proportion of patients on aspirin, the proportion taking β blockers after a myocardial infarction; the proportion of patients with a serum cholesterol of >5 mmol/l; the proportion of patients whose last recorded blood pressure was <140/85 mmHg (also <150/90 or <160/90 mmHg) and the proportion of patients with a BMI of <30 kg/m^2.

We reported these outcomes in all three groups (A, B and C), although we would not expect GPs to be routinely screening and treating the lower-risk population (for example, for hyperlipidaemia). This analysis, however, enables us to determine the extent to which GPs are focusing on primary and secondary coronary prevention in line with the recommendations of the National Service Framework for Coronary Heart Disease. We have included different blood pressure thresholds to reflect changing clinical guidelines.

We used logistic regression to calculate univariate and multivariate odds ratios (ORs) with 95% confidence intervals (CIs) to determine the difference in each outcome for patients aged ≥75 years compared with younger patients. We adjusted for sex (male versus female) smoking status (current smoker, ex-smoker, non-smoker or not recorded), obesity (BMI >30 kg/m^2 or not, or not recorded), and the patients' registered general practice.

To determine whether there was a change in odds ratio before and after the implementation of the National Service Framework we included age and time of study as interaction terms in the regression equation. Our analysis took clustering by practice into account using a robust standard error. We used SPSS version 10.04 and STATA version 7.0 software for the analyses.

Table 1. Characteristics of the study population in the year before and the year after publication of the National Service Framework for Coronary Heart Disease.

	Number at baseline	Percentage of baseline total (*n* = 54 567)	Number at follow-up	Percentage of follow-up total (*n* = 56 985)
Females	28 597	52.4	29 827	52.3
Males	25 970	47.6	27 158	47.7
Age (years)				
35–44	13 582	24.9	14 330	25.1
45–54	14 486	26.5	14 546	25.5
55–64	10 707	19.6	11 418	20.0
65–74	8515	15.6	8679	15.2
≥75	7277	13.3	8012	14.1
Group A CHD or stroke	5193	9.5	5784	10.2
Group B Diabetes or hypertension[a]	7288	13.4	8374	14.7
Group C Remaining population	42 086	77.1	42 827	75.2

[a]*Excluding those in group A. CHD = coronary heart disease.*

RESULTS

Study population

Table 1 shows the characteristics of the population at baseline and at follow-up. There were 54 567 patients registered with the 17 practices at baseline and 56 985 at follow-up. The age–sex breakdown was broadly similar, as was the proportion of patients in each of the groups A, B and C; for example, at baseline, 5193 (9.5% of 54 567) patients had either CHD, stroke or a current prescription for nitrates compared with 5784 (10.2% of 56 985) at follow-up.

Overall cardiovascular risk factor recording

Table 2 shows the changes in recording of cardiovascular risk factors in the year before and the year after the implementation of the National Service Framework for Coronary Heart Disease. There was a relative 59.5% increase in recording of all items for group A, a 40.3% increase for group B and a 23.9% increase for group C.

For patients with either CHD or stroke (group A), there was a 12.1% absolute increase in patients with a BMI recorded in the preceding year (P = 0.002) compared with baseline, a 16.3% increase in recording of smoking habits (P = 0.001), a 9.3%

Table 2. Changes in recording of cardiovascular risk factors for patients in the year before and the year after publication of the National Service Framework for Coronary Heart Disease.

	Baseline		Follow-up		Change	
	Number who had value recorded in previous year	Percentage of total	Number who had value recorded in previous year	Percentage of total	Absolute percentage increase in annual recording	*P*-value for change[a]
Group A: CHD or stroke		(*n* = 5193)		(*n* = 5784)		
Blood pressure	3260	62.8	3993	69.0	6.3	0.240
Body mass index	1332	25.6	2184	37.8	12.1	0.002
Smoking habits	1171	22.5	2246	38.8	16.3	0.001
Family history	390	7.5	972	16.8	9.3	<0.001
Serum cholesterol	1471	28.3	2763	47.8	19.4	0.001
Total items recorded in 1 year	7624		12158		59.5[b]	
Group B: diabetes or hypertension		(*n* = 7288)		(*n* = 8374)		
Blood pressure	5455	74.8	6231	74.4	-0.4	0.930
Body mass index	2404	33.0	3243	38.7	5.7	0.038
Smoking habits	1712	23.5	3023	36.1	12.6	<0.001
Family history	678	9.3	1165	13.9	4.6	0.011
Serum cholesterol	1318	18.1	2566	30.6	12.6	0.001
Total items recorded in 1 year	11 567		16 228		40.3[b]	
Group C: remaining population		(*n* = 42 086)		(*n* = 42 827)		
Blood pressure	10 962	26.0	12871	30.1	4.0	0.029
Body mass index	6201	14.7	7325	17.1	2.4	0.162
Smoking habits	5884	14.0	8109	18.9	5.0	0.006
Family history	3749	8.9	4449	10.4	1.5	0.291
Serum cholesterol	1027	2.4	1728	4.0	1.6	0.006
Total items recorded in 1 year	27 823		34482		23.9[b]	
Overall total	47 014		62 868		33.7	

[a]P-value from corrected χ^2 test, taking clustering by practice into account. [b]Relative increase in recording. CHD = coronary heart disease.

increase in recording of family history (*P* = 0.001) and a 19.4% increase in patients with a serum cholesterol recorded in the preceding year (*P*<0.001). These increases occurred despite an increase of more than 10% in the total number of patients identified as having CHD or stroke from 5193 at baseline to 5784 (11.4% increase) after 1 year.

We found a similar pattern showing substantial increases in annual recording rates of risk factors for patients with a recorded diagnosis of diabetes or hypertension (group B). This occurred despite an overall increase in the total number of patients recorded with either diabetes or hypertension, from 7288 to 8374 (a 14.9% increase) over the course of the year. The greatest increase was in serum cholesterol values recorded on computer: at follow-up, 30.6% of patients had a serum cholesterol recorded in the previous year compared with 18.1% at baseline.

There was a smaller but significant increase in the percentage of patients in group C who had had a serum cholesterol recorded in the preceding year, from 2.4% at baseline to 4.0% at follow-up (*P* = 0.006). There was also a significant increase in the proportion with smoking status recorded (*P* = 0.006).

Disease control measures

Table 3 shows the changes in appropriate disease management before and after the implementation of the National Service Framework for Coronary Heart Disease. The proportion of patients with CHD or stroke being prescribed lipid lowering drugs increased from 30.7% to 40.4% (*P* = 0.002). There was an increase in the proportion of patients whose last serum cholesterol was >5 mmol/l due to increased recording. There was a 4.3% reduction in the percentage of patients recorded as current smokers (*P* = 0.004). Blood pressure control improved significantly, with the greatest increase occurring for the target value of 140/85 mmHg (*P*<0.001). The percentage of patients with a myocardial infarction who were not prescribed a β blocker fell from 40.6% to 34.5%, although this was not statistically significant once clustering by practice had been taken into account. There was also a 3.7% decrease in the proportion of patients not on aspirin without a contraindication (*P* = 0.005).

In group B, there was an increase in the number of patients prescribed lipid lowering drugs (from 6.4% to 8.9%, $P<0.001$), a decrease in the number of current smokers ($P = 0.004$), and a substantial increase in the percentage of patients with blood pressure recordings within target ranges. A similar pattern was observed for group C, except there was no significant increase in the proportion of patients taking lipid lowering drugs.

Almost one quarter of patients in group C at baseline and at follow-up were recorded as taking aspirin, even though there was no evidence of CHD stroke, hypertension or diabetes. This was not explained by differences in the proportion with a family history of cardiovascular disease.

Recording and disease control for older compared to younger people

Supplementary Table 1 shows the comparison between older and younger patients for recording of coronary risk factors in the year before and the year after the implementation of the National Service Framework for Coronary Heart Disease. At baseline, despite adjustment for sex, smoking, obesity and practice, older patients in each of the three groups were substantially less likely than younger patients to have serum cholesterol values recorded in the preceding year (group A, adjusted OR = 0.23; 95% CI = 0.14 to 0.39). This pattern persisted at follow-up for all patients.

Older patients were less likely to have their family history recorded at baseline and at follow-up except for group C, where the difference in recording rates for older people improved significantly over the year. There was no difference between older and younger patients in recording rates for other risk factors such as blood pressure, BMI and smoking at baseline or follow-up. The exception to this was that older patients in group C were more likely to have their blood pressure recorded than younger patients at baseline (adjusted OR = 2.25, 95% CI = 1.64 to 3.07) and at follow-up (adjusted OR = 2.34, 95% CI = 1.81 to 3.02).

Table 3. Changes in appropriate disease management in the year before and the year after publication of the National Service Framework for Coronary Heart Disease.

	Baseline		Follow-up				
Group A: CHD or stroke	*n*	Percentage of 5193	*n*	Percentage of 5784	Relative percentage change	Absolute percentage change	*P*-value for change[a]
Lipid lowering drugs	1596	30.7	2335	40.4	31.4	9.6	0.002
Last FSC >5 mmol/l	1361	26.2	1854	32.1	22.3	5.8	<0.0001
Obesity	929	17.9	1146	19.8	10.8	1.9	0.030
Current smoker	937	18.0	797	13.8	-23.6	-4.3	
BP <140/85 mmHg	2288	44.1	2940	50.8	15.4	6.8	0.002
BP <160/90 mmHg	3987	76.8	4652	80.4	4.8	3.7	0.018
Had MI but not on β-blockers[b]	559	40.6	547	34.5	-14.9	-6.1	0.240
On aspirin	3880	74.7	4583	79.2	6.0	4.5	0.004
Not on aspirin, and no contraindications	1015	19.5	919	15.9	-18.7	-3.7	0.005
Group B: diabetes or hypertension	*n*	Percentage of 7288	*n*	Percentage of 8374	Relative percentage change	Absolute percentage change	*P*-value for change[a]
Lipid lowering drugs	465	6.4	748	8.9	40.0	2.6	<0.001
Last FSC >5 mmol/l	1929	26.5	3235	38.6	46.0	12.2	0.741
Obesity	1764	24.2	2182	26.1	7.7	1.9	0.042
Current smoker	1254	17.3	1120	13.4	-22.3	-3.8	
BP <140/85 mmHg	1840	25.2	2638	31.5	24.8	6.3	0.001
BP <160/90 mmHg	4684	64.3	5940	70.9	10.4	6.7	0.003
On aspirin	2355	32.3	2904	34.7	7.3	2.4	0.093
Group C: remaining population	*n*	Percentage of 42 086	*n*	Percentage of 42 827	Relative percentage change	Absolute percentage change	*P*-value for change[a]
Lipid lowering drugs	398	0.9	422	1.0	4.2	0.0	0.669
Last FSC >5 mmol/l	3169	7.5	4259	9.9	32.1	2.4	0.242
Obesity	4346	10.3	4878	11.4	10.3	1.1	0.013
Current smoker	9388	22.3	7562	17.7	-20.8	-4.6	
BP <140/85 mmHg	22 008	52.3	24 309	56.8	8.5	4.5	0.003
BP <160/90 mmHg	30 807	73.2	33 075	77.2	5.5	4.0	0.008
On aspirin	10 020	23.8	10 471	24.4	2.7	0.6	0.088

[a]P-value from corrected $\chi 2$ test, taking clustering by practice into account. Only those with a recorded value have been included in the analysis. [b]Percentage is of those with a myocardial infarction. BP = blood pressure. MI = myocardial infarction. FSC = fasting serum cholesterol.

Supplementary Table 2 compares the proportions of older and younger patients with appropriate disease control measures. At baseline, despite adjustment for sex, smoking, obesity and practice, older people in group A were substantially less likely to be on lipid lowering drugs (adjusted OR = 0.17, 95% CI = 0.12 to 0.25), more likely to have a serum cholesterol >5 mmol/l (adjusted OR = 1.66, 95% CI = 1.25 to 2.21) and less likely to have good blood pressure control, whichever threshold was examined. Older people who had had a myocardial infarction were less likely to be on β blockers than younger patients but were more likely to be on aspirin. Older patients were significantly less likely to be obese than younger patients, and were less likely to be ex-smokers or current smokers. All these results at baseline were highly significant ($P<0.001$) on multivariate analysis. At follow-up, there were no improvements in the discrepancies found between older and younger people. Indeed, older people were less likely to have their blood pressure controlled to <140/85 mm/Hg than younger patients, and this difference had significantly worsened over the year ($P = 0.01$). The comparable results for patients in groups B and C are shown in Supplementary Table 1 and the overall pattern observed was very similar to that found for group A.

DISCUSSION

Summary of main findings

This study has demonstrated substantial improvements in both the recording of coronary risk factors and disease control measures for patients following the implementation of the National Service Framework for Coronary Heart Disease. The greatest improvements occurred in those with established CHD or stroke, followed by those at high risk of developing it because of diabetes or hypertension. We also found important differences in measures to prevent CHD for older people compared to younger people. Older people were less likely to be screened and treated for hyperlipidaemia and less likely to have good blood pressure control. These differences have not improved — and may have deteriorated — during the first year of implementation of the National Service Framework for Coronary Heart Disease.

Strengths and limitations of the study

This study represents a repeat measure of routine clinical care in a large cohort of practices, with a substantial group of patients. The data are not individually matched and therefore the two cohorts and the composition of the groups will differ to an extent between the two time periods, through new diagnoses, deaths and changes in registration. The patients of these and similar practices have been shown to be representative of the patients in the Trent region, but these practices may be unusual in their response to this National Service Framework. The recruitment and undertaking of this research has been 'low key', but a surveillance bias cannot be totally excluded. We were surprised by the reduction in the proportion of patients identified as smokers, but acknowledge that the data in this study reflect self-reported measures.

Implications for general practice

We previously reported on the substantial workload facing general practice in meeting the expectations of the National Service Framework for Coronary Heart Disease.[6] This study broadens the baseline by including those over 74 years, primary as well as secondary prevention, and compares changes in annual recording rates. It also reports on progress towards delivering the National Service Framework in the first year.

Given the magnitude of the task, we might have expected one of two undesirable outcomes: the size of the effort required might have demotivated general practices with no or negative progress, or the number of other demands on primary care might have meant slow but unexceptional progress. However, these data demonstrate that there has been a substantial improvement in activity and clinical control. There are a number of possible reasons why this initiative has worked while many other health service interventions have failed. Firstly, it could be due to the increasing weight of evidence showing health gains from statins. Secondly, there have been many years of research underpinning this National Service Framework and, finally, financial rewards were likely to be attached to achieving targets. This possibility has now become a reality with the new General Medical Services contract for GPs.

These practices differentially targeted their efforts on secondary prevention (group A), but also showed substantial increases in recording activity for both people at high risk (group B) and the general population (group C). While group A still need further targeting with serum cholesterol estimations, the 69% relative increase in recording of cholesterol levels in the previous year shows the progress that is being made. This offers clear evidence that primary care health professionals are identifying those patients at highest risk and are differentially targeting their efforts on them.

Most importantly, there have been substantial improvements in disease management during the year, particularly for those with CHD. There has been an increase in the proportion of patients on lipid

lowering drugs, from 30.7% to 40.4%; a decrease in current smokers from 18.0% to 13.8%; and an increase in the percentage of patients with excellent blood pressure control (140/85 mmHg). These achievements are all substantial in themselves; taken together they represent an outstanding shift in the quality of care, and if the predictions from the evidence are correct, of lives saved.

Even in the general population, the reduction in coronary risks in this large cohort of almost 50 000 people who do not have hypertension, diabetes or established cardiovascular disease, and the reduction in smoking and blood pressure is gratifying. It is somewhat counterbalanced by the increasing obesity of the population, a trend that general practice is relatively powerless to influence. The fact that a quarter of this low-risk cohort is recorded as taking aspirin, either on prescription or over-the-counter, is surprising and interesting. It may reflect a growing awareness of cardiovascular risk and its prevention.

When an intervention first occurs, it is likely to increase inequalities.[7] Those who need the intervention least often take it up first, with those at greatest risk being late in adopting the change. The data presented here bear this out for CHD in one dimension of inequality. We have shown that older people are disadvantaged in terms of coronary risks recorded and clinical management achieved, and that the care divide between older and younger patients is widening for blood pressure control. Primary care is concentrating on patients aged 35 to 74 years, and achieving great success. As the National Service Framework is implemented, there needs to be an effort to strengthen the focus on the care of the older patient, especially those at high risk (in groups A and B) to ensure that the benefits of improved care are enjoyed by all. This is particularly pertinent now that the evidence base for the reduction in coronary risk for older people is more robust.[5–18] Longitudinal studies are needed to determine the trend over time.

Funding body

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Ethics committee

Ethical approval was obtained from the Multi-Centre and Local Research Ethics Committee in Trent Region, MREC/99/4/025

Competing interests

None

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