A four-year audit of secondary prevention in a single general practice

A Scottish general practice managed to improve secondary prevention of ischaemic heart disease by auditing these patients over a four-year period using computer records. Here they write about their study.

Abstract

Scotland has one of the highest mortality rates for ischaemic heart disease (IHD) in the world, accounting for one quarter of all deaths. Much evidence demonstrates aggressive management of risk factors can make a significant difference to this high morbidity and mortality. Current evidence suggests that secondary prevention of IHD is currently not carried out well in primary care in the UK. Our practice set out to see if this could be improved by using computer records. Over the course of four years more than 80% of IHD patients are now on aspirin, almost 90% have blood pressure recorded annually (average 130/74 mmHg), 82% are non-smokers, 84% have an annual cholesterol check, 65% have a cholesterol < 5 mmol/L, 56% are on a cholesterol-lowering drug (average cholesterol is 4.76 mmol/L), 61% are on cardioprotective drugs, and there was one acute infarct. We suggest that secondary prevention can be improved at a practice level with a good recording system, and a motivated primary care team.

Key words: secondary prevention, ischaemic heart disease, primary care.

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Table 1. Evidence for secondary prevention

Lifestyle
Stopping smoking, modifying diet, and increasing aerobic exercise all reduce the risk of further IHD.[5,10-12]

Blood pressure
Raised blood pressure is a risk factor for subsequent cardiovascular events in patients after myocardial infarction.[13] The extrapolation of primary prevention trials, suggests patients with IHD and systolic BP > 140 mmHg and/or diastolic > 85 mmHg should have antihypertensive drug treatment.[5] Beta blockade has been shown to reduce mortality in myocardial infarction by 23%[14] and is recommended in raised blood pressure.[5]

Heart failure
Benefits of ACE inhibitors in heart failure after myocardial infarction are clearly established.[15]

Serum lipids
Strong evidence that patients with IHD benefit from cholesterol reduction.[16-18] The 4S study demonstrated:

- Overall relative risk of death in treated (simvastatin) group: 0.7
- Relative risk of cardiovascular death: 0.58
- Relative risk of one or more major coronary events: 0.66
- 37% reduction in revascularisation procedures in treated group
- 25% reduction in total cholesterol in treated group
- 35% reduction in LDL cholesterol in treated group.[17]

Aspirin
Recommended for all patients who have IHD unless specifically contraindicated.[5,19]

Introduction

Scotland has one of the highest mortality rates from ischaemic heart disease (IHD) in the world[1] accounting for more than one quarter of all deaths. The annual standardised mortality rate is in excess of 1 in 1,000 of the Scottish male population under 65 years of age,[1] the prevalence of IHD in the UK is 3–7%.[2] Symptoms of angina pectoris have been reported in 5.5% of Scottish men and 3.9% of Scottish women aged between 45 and 59 years, rising to 20% of men and women aged between 65 and 74 years.[3] The clinical presentation of chest pain accounts for more than 10% of all emergency hospital admissions.[4]

> ***'We hoped audit would improve the identification of patients with IHD, identify and improve their risk factors, and ultimately improve outcomes'***

Angina pectoris is the most common manifestation of IHD. Stable angina is usually due to a fixed atherosclerotic stenosis. In contrast, unstable angina and myocardial infarction are usually due to coronary thrombosis complicating rupture or fissure of an atherosclerotic plaque.

IHD is preventable.[5] This can be done through public health strategies emphasising the importance of diet, exercise, and non-smoking as outlined in the gov-

Table 2. Additional information recorded on the patients computer record

1. Risk factor information
- smoking status
- blood pressure
- serum cholesterol
- cardiac failure

2. Interventions
- lifestyle education
- aspirin
- blood pressure control
- lipid-lowering agents
- cardioprotective drugs

Table 3. Outcomes recorded during the audit and the standards chosen

1. Outcomes recorded during the audit
- Number of acute MIs in the identified group
- Number of deaths attributable to IHD
- Number of patients on aspirin
- Number of patients with smoking habit recorded
- Number of non-smokers
- Number of patients with cholesterol recorded
- Number of patients with serum cholesterol > 5 mmol/L
- Number of patients with cholesterol > 5 mmol/L on lipid-lowering agents
- Average serum cholesterol
- Number of patients with a blood pressure reading and the average systolic and diastolic readings
- Number of patients correctly on blood pressure-lowering agents
- Number of patients on cardioprotective drugs
- Number offered advice on lifestyle issues

2. Audit standards
- All patients will be known
- The number of acute myocardial infarcts in this group will fall year on year
- Mortality due to IHD shall fall year on year
- All patients shall be taking aspirin, unless contraindicated
- All patients shall have their smoking habit recorded
- The proportion of current non-smokers shall rise year on year
- All patients shall have their cholesterol recorded annually
- All patients who require cholesterol-lowering agents shall receive them
- The average cholesterol for this group of patients should be below 5 mmol/L
- All patients will have their blood pressure checked annually
- All patients who require their blood pressure to be lowered shall be treated
- Average systolic and diastolic blood pressure should be below 140/90 mmHg
- Patients requiring cardioprotective drugs should receive them
- All patients should be offered advice on lifestyle issues and weight

ernment's *Health of the Nation* document.[6] General practitioners and specialists have responsibility for preventive medicine in routine clinical practice but published evidence suggests that secondary prevention is not well done in primary care and that recording systems miss up to 30% of patients with IHD.[2,7-9] The Healthwise study looked at 24,431 patients in primary care throughout Britain[2] and highlighted the following deficiencies: under-recording (prevalence 2.5%), smoking rates of 25%, poor management of blood pressure in diabetics, and poor control of hypercholesterolaemia (41% had not had a recorded cholesterol, 44% had a cholesterol level above 5 mmol/L). In addition, only 50% of patients were taking aspirin and only 16% were on cholesterol-lowering agents.

Clinicians see patients who either have IHD or are at high risk of developing it through hypertension, dyslipidaemia, diabetes, smoking, or a combination of these factors.[5] The evidence for lifestyle and drug intervention in secondary prevention is summarised in table 1.

We hoped that by audit we could improve the identification of patients with IHD, identify and improve their risk factors, and ultimately improve outcomes.

Methods

The audit was carried out over four years in a rural West Perthshire practice based in purpose-built premises with an attached community hospital. Patients' records are computerised.

Diagnosis

The headline diagnosis of IHD appeared in the current and summary pages of the patient's computer record (Torex System 6000). It included patients in the following categories – those with:
- a documented history of myocardial infarction (MI)
- abnormal coronary artery angiography
- a coronary artery bypass graft (CABG)
- an abnormal exercise tolerance test (ETT)
- a good clinical history of angina pectoris.

We hoped our audit would overcome the problems identified in a previous study, which suggested that using the IHD code alone missed 30% of patients with IHD.[8] One doctor searched all practice records and moved every entry for MI, coronary angiography, CABG, abnormal ETT, and angina pectoris under the IHD heading. All new patients with a first coronary event, such as MI, are also entered under this IHD heading, so we are confident our data are robust.

Recording

Significant events, such as MI and CABG, were recorded both under the headline diagnosis and separately on the summary page of the patient's computer record.

Additional information – outlined in tables 2 and 3 – was also recorded annually during the four years of the audit. This included risk factor information for each patient and any intervention undertaken (table 2), the outcomes of the audit each year, and the achievement of audit standards (table 3). Our goal was to attain a standard of 80% of patients meeting 14 of the criteria we considered most important in the secondary prevention of IHD in our practice.

Figure 1. Smoking status during the four-year audit

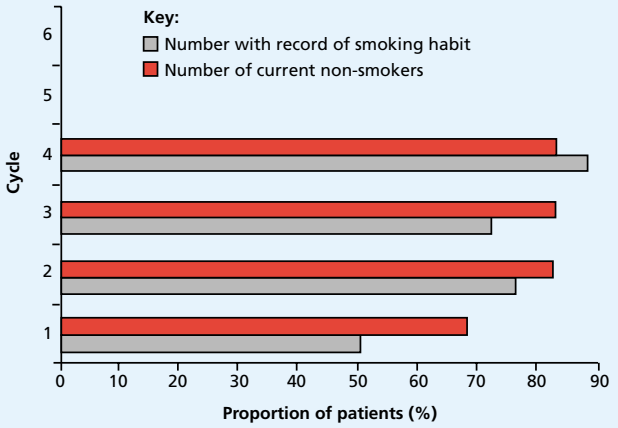


Figure 2. Percentage of patients who had undergone a cholesterol check in the four-year audit

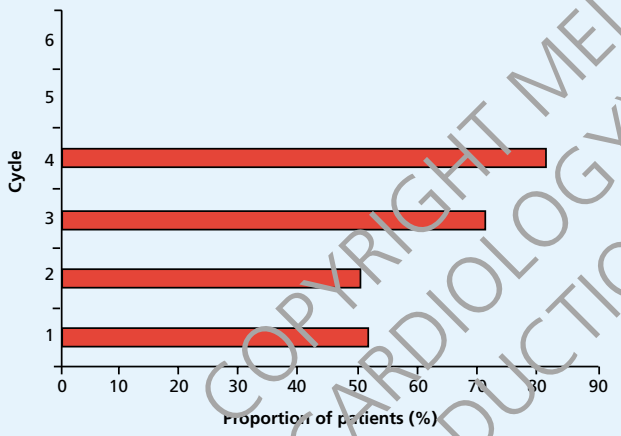
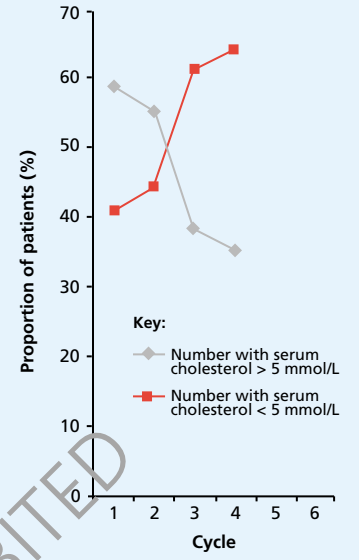


Figure 3. Proportion of patients with a cholesterol level above and below 5 mmol/L during the four-year audit



Results

Figures 1–7 and table 4 show the results we achieved in each of the four annual cycles of audit.

Cycle 1 (1998)

In a list size of 3,192, we had 182 patients with IHD (males 58%, females 42%, average age around 73 years). There were five infarcts and no deaths. Only 50% of patients were taking aspirin and there was no record of any contraindications. Only 50% had a record of smoking status and 68% of these were non-smokers. Only 54% had undergone a cholesterol check – of these 59% had a cholesterol above 5 mmol/L. Only 15% of patients with a cholesterol above 5 mmol/L were on a cholesterol-lowering agent. It was difficult to collate information and we were unable to calculate average cholesterol. There were 88% of patients with a record of a previous blood pressure recording, but there was no record for the preceding 12-months. Only 34% were on cardioprotective drugs and there was no record of diabetic or CABGs patients or body mass index (BMI).

Cycle 2 (1999)

In a list size of 3,288 the number of patients with IHD was 175. The age and sex characteristics were unchanged. There had been one MI, which was non-fatal. The number of patients on aspirin had risen to 65% but there was no record of patients with valid contraindications. The number with a recorded smoking status had risen to 76% with 81.95% of these being non-smokers. The number of patients who had had a cholesterol check was 51.4% of whom 55.5% had a cholesterol above 5 mmol/L. Of these patients, 54% were now on a cholesterol-lowering agent. The average cholesterol was 5.81 mmol/L. Only 54.28% had had a blood pressure recorded in the preceding 12-month period, and the average blood pressure was 136/78.8 mmHg. Some 55.4% were on cardioprotective drugs, but barely 2% had recorded lifestyle advice.

Cycle 3 (2000)

There were 3,307 patients of whom 161 had IHD. Males now accounted for 61.5% of patients. There were two MIs and two deaths due to infarction. Patients on aspirin had risen to 81.9%,

Figure 4. Average serum cholesterol of patients during the last three cycles of the four-year audit

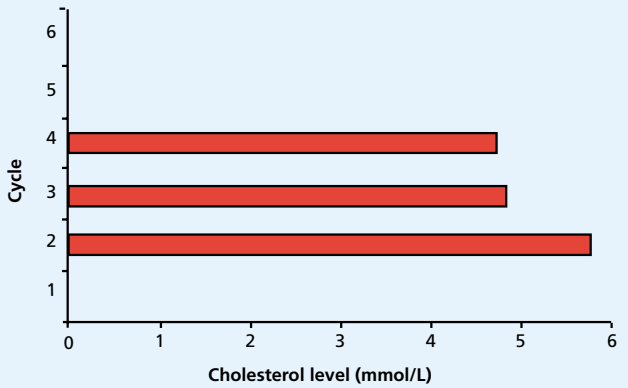


Figure 5. Proportion of patients who had undergone a blood pressure check during the four-year audit

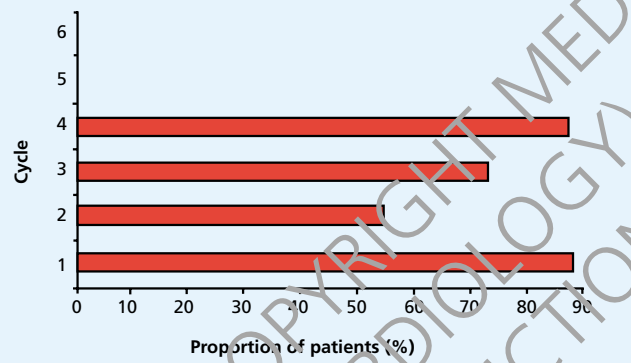
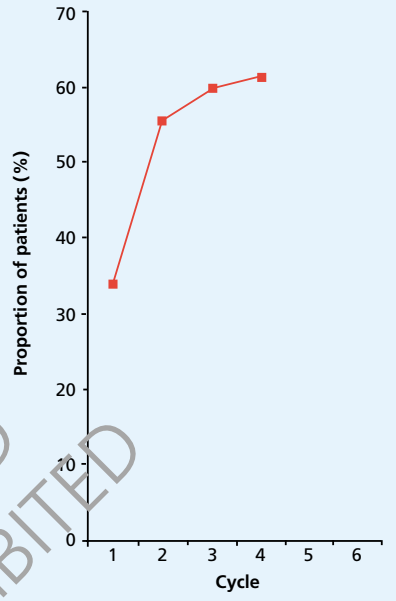


Figure 6. Proportion of patients on cardioprotective drugs during the four-year audit



and 3.7% had a valid contraindication. Smoking status was recorded in 72.04% of patients of whom 82.75% were non-smokers. Cholesterol had now been checked in 73% of patients of whom 38.46% had a cholesterol of > 5 mmol/L and 61.54% < 5 mmol/L. Average cholesterol had fallen to 4.87 mmol/L. Some 44.72% of IHD patients were on a cholesterol-lowering agent, 72.6% of patients had a blood pressure recording (average 135.99/80.3 mmHg), 59.62% of IHD patients were on cardioprotective drugs, and lifestyle advice had now been given to 49.06%. Of the IHD patients 14% were diabetic, BMI was recorded in 39.75%, and the average BMI was 28.17 kg/m^2.

Cycle 4 (2001)

In a practice of 3,374 patients, 172 had IHD. There had been one fatal MI. Only 43 patients with IHD were under 65 years, a prevalence of 1.56% versus a prevalence of 20.44% in our patients over 65 years. Some 83.13% of IHD patients were on aspirin and 9.3% had a valid contraindication. A record of smoking status had been recorded in 87.9% with 82.78% being non-smokers; 83.7% had had their cholesterol checked with 35.4% having a cholesterol above 5 mmol/L and 64.6% having a cholesterol below 5 mmol/L; average cholesterol was 4.76 mmol/L and 55.8% of IHD patients were on a cholesterol-lowering agent. Some 87.2% had had their blood pressure recorded (average 130.35/74.9 mmHg), 61.04% of IHD patients were on cardioprotective drugs, and 84.43% had had lifestyle advice. The number of diabetics had risen to 16.86%, BMI was recorded in 50% of IHD patients (average 28.19 kg/m^2). Three coronary artery bypass grafts had been carried out.

Discussion

It is important to identify those patients in each practice who require secondary prevention for IHD. This problem is helped but not necessarily solved by computerisation. The accuracy of any computerised data depends on the accuracy of data fed into that system. There is, therefore, no substitute for working on an accurate database, which needs a robust maintenance system. We believe our data and system are both accurate and robust.

The first cycle of our audit confirmed previous reports that secondary prevention is generally not well carried out in primary care.[2,7,9] Information was difficult to extract from the record and

Figure 7. The number of acute myocardial infarctions during the four-year audit

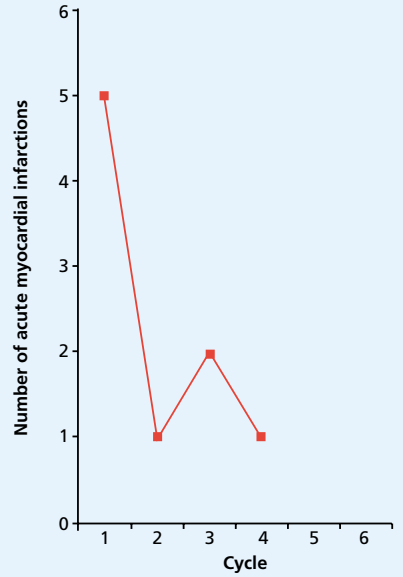


Table 4. Results from each of the audit's four annual cycles

	Cycle 1 1998	Cycle 2 1999	Cycle 3 2000	Cycle 4 2001
List size	3,192	3,288	3,307	3,374
Number of patients with IHD	186	175	161	172
Males	58%	58.40%	61.50%	59.30%
Females	42%	41.60%	38.50%	40.70%
Average age (years)	73.36	73.87	72.65	72.18
Number of acute MIs	6	5	4	11
Number of deaths due to IHD	1	0	2	3
Number on aspirin	50%	65%	81.90%	83.13%
Aspirin contraindicated			3.70%	9.30%
Record of smoking habit	50%	76%	72.04%	87.79%
Current non-smokers	68%	81.95%	82.75%	82.78%
Cholesterol checked	54%	51.40%	73%	83.70%
Serum cholesterol > 5 mmol/L	59%	55.50%	38.46%	35.40%
Serum cholesterol < 5 mmol/L	41%	44.40%	61.54%	64.60%
% of > 5 mmol/L on lipid-lowering drug	15%	54%	50.00%	43.13%
Total % on lipid-lowering drug	********	*******	44.72%	55.80%
Average serum cholesterol	*******	5.81 mmol/L	4.87 mmol/L	4.76 mmol/L
Record of BP	88%	54.28%	72.67%	87.20%
Average BP	********	136/78.3	135.99/80.3	130.35/74.9
% on appropriate treatment	********	82%	91%	92%
% on appropriate cardioprotective drugs	34%	55.40%	59.62%	61.04%
Lifestyle advice	*******	1.71%	49.06%	84.43%
BMI recorded	*******	*******	39.75%	50%
Average BMI	*******	*******	28.17	28.19
Diabetics	*******	*******	14%	16.86%
CABG	*******	*******	*******	3

******** Not assessed in that cycle.

Key: MI = myocardial infarction; IHD = ischaemic heart disease; BP = blood pressure; BMI = body mass index; CABG = coronary artery bypass grafting

where it was recorded it was mostly not acted upon. Only half the patients known to have IHD had a recorded smoking status or were taking aspirin. Although 54% had a recorded cholesterol only 15% of those who should have been on treatment were. Overall our performance in this area – the most serious health problem affecting our nation – was poor and reflected the 'norm' for primary care in the UK.

The second cycle a year later showed a marginal improvement brought about by better recording and commitment. The number of patients taking aspirin had risen to 65% but 35% were still not taking the drug. There was a valid contraindication to aspirin in only 7.5% of patients. Although smoking status was recorded in 76% of patients, it was still not known in 24%. Encouragingly, in patients whose smoking habits were known, 82% were current non-smokers. Sadly even fewer patients had a record of cholesterol in this cycle but the percentage on active treatment had risen. The average serum cholesterol was high at 5.81 mmol/L. The most disappointing aspect of this cycle was the very poor recording of blood pressure. It was recorded in just 54% – poor for important treatable risk factors, but in those patients whose blood pressure had been recorded, control was good. Although the number of patients on cardioprotective drugs had risen, lifestyle advice was seldom given. Overall, the practice's performance remained poor, but there were signs of improvement. In addition we decided to record patients' BMI as a measure of whether we were tackling the major problem of obesity, which also contributes to IHD. This adapted our protocol to take account of recently published guidelines on secondary prevention of IHD.[20]

The third cycle showed some important improvements. Importantly 81.9% of patients were now taking aspirin, 82.75% of those with a record of smoking status were not smoking, 73% had a cholesterol check, 44.72% were on a cholesterol-lowering drug, and the average cholesterol had fallen to 4.87 mmol/L. Also encouraging was the increase in the number of patients with a recorded blood pressure reading and an average blood pressure still well below 140/90 mmHg. The number of patients on cardioprotective drugs, although increasing, remained low at 59.62%. Lifestyle advice and BMI recording still remained below 50%.

The fourth cycle demonstrated major improvements. The overwhelming number of patients were now on aspirin or had a valid contraindication with fewer than 8% not using prophylaxis. (The figure for the Healthwise study in primary care was 50% not using prophylaxis.[2]) 82% of patients with a recorded smoking habit were now non-smokers but this still leaves many current smokers.

Key messages

- The problems of obesity and lack of exercise still need to be addressed
- Aggressive management of risk factors can help reduce the morbidity and mortality from ischaemic heart disease
- This was borne out by a four-year audit on the secondary prevention of ischaemic heart disease in a Scottish rural general practice using computer records
- There were major improvements in the prescribing of aspirin, cholesterol-lowering agents and cardioprotective drugs
- The measurement of blood pressure and the number of non-smokers increased
- The measurement of cholesterol levels also increased and the average cholesterol level of the IHD patient population fell

We found almost 84% of IHD patients had had at least an annual cholesterol check compared with 59% in the Healthwise study; some 35.4% of our patients had a cholesterol > 5 mmol/L compared with 44% in the Healthwise study.[2] In addition 56% of our patients are on a cholesterol-lowering agent compared with 16% in the Healthwise study. The secondary care cohorts examined in European Action on Secondary and Primary Prevention by Intervention to Reduce Events (EUROSPIRE) I and II showed a reduction in patients with a cholesterol > 5 mmol/L from 86.2% to 58.8% in five years,[9] less than we had managed in our practice. The Heart Protection Study confirms the value of these agents.[18] Improvements in blood pressure control and management have also been seen over the four years of audit, and 61% of patients are on cardioprotective drugs: mainly atenolol and lisinopril. The number of identified diabetics had also risen and further research may be needed to see whether a secondary prevention audit process may be a way of identifying undiagnosed diabetes mellitus. As a result of our audit we have set up a nurse-led smoking cessation clinic and a health visitor-led lifestyle clinic. Eighty-four per cent of our patients have now been given some form of lifestyle advice but recording of BMI remains poor.

'The implementation of an evidence-based protocol, a good recording system, a motivated primary care team and aggressive management of risk factors does represent an improvement in the management of the secondary prevention of IHD'

Summary

The number of acute infarcts in this group has fallen from five in the first cycle to only one in the fourth cycle, but mortality is still high. An audit has been set up as a form of critical incident analysis to examine the standards of secondary prevention in patients with known IHD who have a subsequent MI. It is difficult to extrapolate from our small numbers but there would seem to be a trend in the direction of a fall in infarcts.

We still have to tackle the problem of obesity, and lack of exercise. In addition we perform poorly with patients in nursing, residential homes, and in those patients who are largely housebound. These patients account for 25% of our patients with IHD. We should also be prescribing more cardioprotective drugs. These are the areas that we shall try to tackle in the future.

Despite continuing shortcomings in management we feel that the implementation of an evidence-based protocol, a good recording system, a motivated primary care team, and aggressive management of risk factors does represent an improvement in the management of secondary prevention in IHD.

There are limitations to our study, which include the semi-rural nature of the practice, the size of the practice, a patient population who were universally white and Scottish, and the relative affluence of the area. These make our practice different from most practices in the UK. However, the existence of a commitment allied to good records and policies based on evidence should be applicable everywhere.

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