Preventing ischaemic heart disease in one general practice: from one patient, through clinical audit, needs assessment, and commissioning into quality improvement

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Since the introduction of clinical audit[1 2] and the creation of medical audit advisory groups,[3] general practice has begun to look beyond reactive care and, more recently, proactive care, towards the new doctrine of clinical effectiveness.[4 5] The white paper *Health of the Nation*[6] set a range of strategic goals, and fundholding and commissioning gave general practice the means to achieve these goals and more. These changes, together with the need to implement established research findings[7] and to use resources most effectively,[8] put into place a new philosophical framework for the strategic delivery of primary care.

If practices are to act within this framework they need some tools, and they need the skills to use them. Conventional clinical audit—looking at the care of cohorts of patients[1 2]—is useful, but increasingly it is being linked to significant event auditing in which insights from the care of individual patients are integrated into quality assurance.[9–12] Health needs assessment[13] can then be used to put the results of audits into context and to help a practice prioritise. These priorities (each evaluated against the prevailing evidence and guidelines[14–16]) form the basis of commissioning decisions which improve patient care.

Although this sounds straightforward, few practices have adopted this approach systematically. Often clinical audits are not linked to health needs assessment or commissioning and commissioning is not linked to evidence of need or effectiveness. This article illustrates how one practice linked the elements in the new framework to improve its care for one group of patients—those at risk of ischaemic heart disease.

Summary points

- To make best use of resources practices have to use clinical audit, scientific evidence and guidelines, and analysis of cost effectiveness before commissioning new strategies of health care
- Reports of these processes being integrated are rare
- This article describes how one practice attempted to use best practice to improve prevention of ischaemic heart disease
- A 30-fold increase in the prevalence of diagnosed hyperlipidaemia was accompanied by a large increase in use of lipid lowering drugs
- The estimated cost of £20 000 per life saved needs to be considered against the costs and benefits of other interventions

The patient

The call came at 6 10 am on a mild Tuesday morning in October 1995. Margaret reported that her husband, Phil, had given a few deep sighing breaths and was now unconscious. It was only a little over a mile to their house, but by the time I had thrown on some clothes and driven there nearly 10 minutes must have elapsed. Phil had no pulse, was not breathing, and was cold. I attempted resuscitation for 40 minutes, by which time the ambulance had arrived and the electrocardiogram confirmed asystole. A postmortem examination confirmed ischaemic heart disease and an acute myocardial infarction. He was 52 years old.

The audit

For all general practitioners this will be a depressingly familiar story. Such deaths are common and are often greeted with fatalism and resignation. The approach of our practice, however, is to discuss significant clinical events,[9–12] and I prepared Phil's case for discussion.

He had attended our well man clinic in July 1985 when he was recorded as a former smoker who drank 20 units of alcohol a week; he had a blood pressure of 130/90 mm Hg and weighed 84 kg. He had a strong family history of ischaemic heart disease so his lipid concentrations were measured. His total fasting cholesterol concentration was 6.8 mmol/l and he was treated with diet alone. Regular monitoring over the next decade showed cholesterol concentrations fluctuating between 5.2 and 6.4 mmol/l.

During the winter of 1991-2 his diastolic pressure was 100 mm Hg or above on three recordings and essential hypertension was diagnosed. I started him on a diuretic and a year later changed the prescription to atenolol 100 mg daily. His control continued to be erratic, so in late 1993 I changed his prescription

to Co-tenidone (100 mg atenolol plus 25 mg chlorthalidone). His blood pressure was acceptable in 1994 (160/90 and 165/90 mm Hg) and 1995 (150/85 mm Hg).

In the discussion my partners naturally focused on possibilities for prevention. His attendance at a well man clinic and detection of his family history of ischaemic heart disease were encouraging, as was the early detection and prompt management of his hypertension. However, his response to a low cholesterol diet had been poor. At that time our practice protocol was clear: Phil was not a candidate for lipid lowering drugs. Yet again we discussed our management of raised cholesterol concentrations and resolved to review the literature and consult local cardiologists.

I had worked my way through the hierarchy of treatment for hypertension set out in our practice protocol—diuretic, β blocker, and then a combination of the two—but it had taken nearly two years to achieve satisfactory control. We discussed the balance between quickly moving up the therapeutic ladder against the need to allow patients to settle on each treatment, minimise treatment, avoid unnecessary side effects, and avoid sudden changes which may need reversing.

This led to a discussion of our ability to control hypertension adequately and of our effect on the problem of multiple risk factors. We agreed to consider the practice's programme for primary and secondary prevention of ischaemic heart disease—one key element in global health needs assessment.

Table 1 Number (percentage) of patients aged 16 and over with four risk factors for ischaemic heart disease recorded on practice computer in October 1995 and March 1997

Recording	1995 (n=4678)	1997 (n=4734)
Blood pressure within past 5 years	3976 (85)	3835 (81)
Last diastolic pressure >90 mm Hg	250 (5)	577 (12)
Last systolic pressure >160 mm Hg	129 (3)	226 (5)
Family history*	2132 (46)	2854 (60)
Positive family history of ischaemic heart disease	645 (14)	838 (18)
Body mass index or weight	4008 (86)	4113 (87)
Body mass index >30	320 (7)	528 (11)
Smoking habit*	4173 (89)	4256 (90)
Current smoker	1035 (22)	1060 (22)
Fasting serum cholesterol	65 (1)	509 (11)

*Includes negative entries: if patients are recorded as not having a family history of anything or as non-smokers they are included in these totals.

Table 2 Disease control and risk factors among patients aged 16 and over with essential hypertension in October 1995 and March 1997. Values are numbers (percentages) of patients

	1995 (n=434)	1997 (n=483)
Reviewed for hypertension in past 14 months	373 (86)	388 (80)
Creatinine concentration measured in past 14 months	191 (44)	279 (58)
Last diastolic pressure <90 mm Hg	256 (68)	329 (68)
Last systolic pressure <160 mm Hg	295 (59)	278 (58)
Last creatinine concentration <100 μmol/l	352 (81)	289 (60)
Recorded as smoking	60 (14)	85 (18)
Body mass index >30	91 (21)	111 (23)
Family history of ischaemic heart disease	110 (25)	195 (40)

The assessment

We used the practice's computer system, which has been shown to be acceptably accurate and complete,[17] to search for the recording of risk factors in our 4678 adult patients (aged 16 or over). This showed (table 1) 85% recording of blood pressure (89% in the important 30-64 age group) but low recording of family history (46%). Low recording of serum fasting cholesterol concentration (1.4%) reflected both low levels of screening—at that time we had only 13 patients with recorded hyperlipidaemia—and the fact that we had only just started entering cholesterol concentrations on to the computer. However, the finding that 5% of our patients aged 16 or over (9% of those aged 30-64) had a diastolic pressure above 90 mm Hg at their last reading illustrated the scale of the epidemic we (and other practices) faced.

We then questioned how effective we were at managing hypertension (table 2). The 434 patients with essential hypertension represented 7.6% of the entire practice population of 5676 and 9.3% of the adult population. The computer files showed that 86% had had an annual review (the minimum requirement), suggesting that a seventh were either defaulting or we had not entered their review on the computer. We had set ourselves an exacting standard for control: all diastolic pressure readings should be under 90 mm Hg and systolic readings under 160 mm Hg. Just over two thirds of patients with hypertension had a last diastolic pressure under 90 mm Hg.

A quarter of patients with hypertension had a recorded family history of ischaemic heart disease and 21% were obese (table 2). However, only 14% smoked—less than the 22% for the practice's adult population.

We then looked at the patients with ischaemic heart disease to assess our secondary prevention. Of the 299 (5.3% of whole practice population; 7.5% of those aged 30 and over) patients with ischaemic heart disease who were still alive, 19% smoked, 20% were obese, and 22% had a recorded family history of ischaemic heart disease.

The evidence

In 1996 we reviewed the literature on hyperlipidaemia and the cost effectiveness of its control,[18–26] which has subsequently been supplemented by further studies.[27–29] For our purposes, the most important publication was the meta-analysis by Rembold[26] (recently summarised[30]), which showed that for primary prevention—as in Phil's case—we would need to give lipid lowering treatment to 69 people over five years to prevent one death from myocardial infarction or stroke. When trials of secondary prevention were considered the number needed to treat fell to 16.[26]

Although its report was not available when we were making our decisions, the Standing Medical Advisory Committee has recently suggested that lipid lowering "statins" should be used only when the risk of a major coronary event exceeds 3% a year.[31] According to the Sheffield table (which ignores family history) that the committee published with its guidance, Phil did not even qualify for having his serum cholesterol concentration measured, and certainly not for treatment. However, our practice protocol used guidelines from other sources and included patients with a strong family history of ischaemic heart disease such as Phil.

Targets for improved care of patients with hypertension, ischaemic heart disease, and risk factors

- 90% of patients to have recorded:
  Blood pressure within past 5 years
  Family history
  Body mass index
  Smoking habits
- Write protocol for surveillance, detection, and management of hyperlipidaemia based on existing evidence and targeted at high risk groups
- Introduce systemic use of lipid lowering drugs where the evidence supports it
- 90% of hypertensive patients to have been reviewed within past 14 months
- 60% of hypertensive patients to have had creatinine concentrations measured within past 14 months
- 80% of hypertensive patients to have had last recorded diastolic pressure under 90 mm Hg

In the light of our research we decided on some improvements in care. The box sets out the targets. The most important elements in the strategy to meet the targets were increased use of computer templates (data entry screens tailored to the diagnosis) and a more aggressive approach to managing hyperlipidaemia.

Protocol for managing hyperlipidaemia

Criteria for screening

- Patients with ischaemic heart disease, peripheral vascular disease, or diabetes
- Patients with hypertension aged under 60
- Patients aged under 60 with a first degree relative who has or had ischaemic heart disease, peripheral vascular disease, stroke, or transient ischaemic attack
- Patients with a first degree relative with hyperlipidaemia aged under 60
- Patients with xanthoma or xanthelasmata
- Patients aged under 50 with arcus senilis
- Patients aged under 60 who request hyperlipidaemia screening

Criteria for treatment

Low density lipoprotein (mmol/l)	Treatment
Without ischaemic heart disease:	
<3.5	Lifestyle and general dietary advice only
3.5-7	Advice to stop smoking, reduce alcohol, and adopt low fat diet. Consider primary causes
>7	As above and arrange liver functions tests and measurement of creatine kinase, random blood sugar, thyroid stimulating hormone, urea and electrolytes. Consider lipid lowering drugs
With ischaemic heart disease:	
<3.5	Lifestyle and general dietary advice only
≥3.5	Advice to stop smoking, reduce alcohol, and adopt low fat diet. Arrange liver functions tests and measurement of creatine kinase, random blood sugar, thyroid stimulating hormone, urea and electrolytes. Consider primary causes. If not reduced on repeat testing consider lipid lowering drugs

If only low density lipoprotein is raised prescribe fluvastatin 40 mg daily
If mixed hyperlipidaemia or diabetes prescribe fenofibrate micro 200 mg daily

The new approach to hyperlipidaemia is summarised in the box. This protocol targets screening at the high risk groups while trying to select those patients most likely to benefit from lipid lowering drugs. Subsequent publications[26 31] may make our approach look too conservative.

Commissioning

We had to estimate the costs of this programme and decide how, if at all, it was to be funded. The cost for fluvastatin 40 mg daily was about £15 per month and for fenofibrate micro 200 mg daily £25 per month. Taking a mean cost of about £20 per patient per month and using a highest estimate of 200 patients requiring lipid lowering treatment, we estimated drug costs to be £48 000 per year. We also estimated that we would require an extra 600 cholesterol tests at about £4 each, giving a further annual cost of £2400. Thus the total cost was £50 000.

Around 800 consultations a year would be required for screening and monitoring, many of which would be undertaken by nurses. In addition, we would have to take and enter an extra 250 blood pressure readings a year as well as recording full data on new patients and those reaching 16 years (about 2500 recordings).

We included the extra £50 000 in our fundholding budget planning for 1996-7 to come from existing and projected savings. This use of the fundholding budget was approved by North Nottinghamshire Health Authority. The practice staff agreed to shoulder the extra consultations and workload, which was a considerable commitment.

Improving care

A programme such as this cannot be implemented without consensus among doctors, nurses, and support staff. It requires information systems and an awareness of how commissioning works. This programme could have been instigated in a non-fundholding practice with a consensus on how to incorporate the costs within the notional prescribing budget, but fundholding made it easier.

Eighteen months after the new targets were introduced 81% of our adult patients (down from 85%) had had blood pressure recorded within the past five years and recording of smoking had improved to 90%, meeting our target (table 1). Recording of family history improved to 60%. The recording of body mass index improved slightly, accompanied by a worrying doubling in numbers of patients with an index over 30.

Although the number of patients with a diagnosis of hypertension increased by 49, we were disappointed that a smaller proportion had had a review recorded within the past 14 months (table 2). This may reflect poor data entry, fewer reviews, or poor patient compliance. The figure of 58% with a recent serum creatinine concentration recorded suggests that staff are taking routine surveillance of hypertension more seriously. The proportion of patients with adequate level of control was stubbornly static, with two thirds still having a diastolic blood pressure under 90 mm Hg.

By March 1997, a total of 389 patients (227 men and 162 women) had a diagnosis of hyperlipidaemia recorded (a 30-fold rise). Of these, 107 (47%) men and

73 (45%) women were taking lipid lowering drugs. Rembold's analysis suggests that this might lead to 11 lives saved over five years.[26] The overall cost to our drug and investigations budget over the five years is estimated at £223 200 (£20 per month for drugs and £8 for cholesterol tests each year), a projected cost per life saved of just over £20 000.

Discussion

This case study cannot be generalised. Not all practices have an equivalent commitment to proactive care, information systems, auditing significant events, and commissioning, and many do not have the financial flexibility that fundholding offers. Many would find the extra workload unacceptable or impractical. However, this account illustrates a philosophy that is compatible with the way that the health service is developing. It shows how one case can offer insight into quality of care that can lead to audit questions, quality programmes, and, hopefully, improved care. In fact under our new protocol Phil still would not have been offered lipid lowering drugs (unless he had survived his myocardial infarction). However, his case helped us to throw a spotlight on an important aspect of our care.

Any decision to change policy has major resource implications. The continuing rise in the prevalence of hypertension alongside the burgeoning numbers with hyperlipidaemia in our practice has implications for workload and prescribing budgets. We estimated a cost of £50 000 a year, which current experience suggests was reasonably accurate. The money came from practice savings, but we still have to ask whether it could be deployed by the practice to greater effect on quantity or quality of life.

When setting standards for care we had a shortage of objective comparative data. For example, we agreed to aim to have 80% of patients with hypertension with a last recorded diastolic pressure under 90 mm Hg on the basis of the practice's performance at that time and on the assumption that control can be improved. Our failure to improve the proportion with good control is disappointing but may reflect the fact that not all patients with hypertension can be well controlled. Comparative data from other sites would be welcome. Data aggregation schemes, such as the Collection of Health Data from General Practice, should improve our ability to compare our performances in future.

The epidemic of ischaemic heart disease and the prevalence of its risk factors explains why only the most determined practices can get to grips with an integrated approach. If the long term benefits of a primary care intervention programme—as measured by deaths and functional status—are to be shown convincingly we will need data from many sites; in the meantime practices are individually struggling to address some remedial risk factors while, for example, the rate of obesity in the population escalates.

The challenge for primary care is to maximise its use of opportunities for improving quality. One model for this process is illustrated here. Using significant events to give context and emotional relevance to raw statistics can help to motivate change. The process of assessing progress (we audit the variables every three months) provides continual reinforcement and encouragement. Even with the benefit of hindsight, Phil's death was probably not preventable. Nevertheless we need to look at the population as a whole and work with our patients to reduce their risks.

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Commentary: Clinical and economic perspectives have to be integrated when selecting priorities for intervention

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In placing a service development in "an economic context," the temptation is to look for previously reported costs associated with the condition. Numerous estimates exist for cardiovascular disease because of its high prevalence and devastating effects—early death and disability with consequent lost productivity. A frequently cited source estimated the costs of coronary heart disease as £500 million a year, with an extra £10 million attributable to prevention.[1] In 1987 the Office of Health Economics estimated the costs of coronary heart disease to the NHS as £953 000/100 000 population, split roughly equally between primary and hospital care. Most of the primary care expenditure is on medicines, whereas most expenditure in hospital is on inpatient care.[2] A more recent study estimated inpatient costs for coronary heart disease as £2 million/100 000 population (at 1994-5 prices).[3] This represented 6% of total expenditure on acute care, which extrapolated to £1.1bn for England and Wales (the Office of Health Economics estimate would be £1.5m at 1994-5 prices, extrapolated to £0.75bn for England and Wales). The figures suggest that previous attempts have seriously underestimated the hospital costs of coronary heart disease or that the study method (disaggregating hospital expenditure using diagnosis related group average cost weightings) has systematically overestimated use of resources.

Such cost of illness estimates are presented for use in policy making[4] by identifying the main areas of expenditure on health or other care services and opportunity costs of illness (typically lost productivity). However, these figures provide little information for priority setting or for identifying areas for service developments since they do not show potential changes associated with intervention. Donaldson and Mooney criticise needs assessment as a basis for priority setting and commissioning for the same reason—that it is concerned with quantifying the burden of disease rather than the changes that can be brought about by health services.[5]

An alternative method is to use an economic approach, which recognises that resources are scarce and that not all needs can be met. The questions it raises are not "what is the burden of disease?" but "is this intervention worth providing?" (that is, do the benefits exceed the costs) and "if this intervention is worth providing, what is the best way of providing it?" (what is the cheapest way of producing a given output). To illustrate this approach Donaldson and Mooney show how a quality of life years (QALY) table can be used to identify interventions with lower marginal costs per QALY gained with resources to be re-allocated accordingly—though this use of QALYs is not without problems.[6 7]

The approach reported by Pringle does not fit with those presented above. The focus on individual cases will tend to lead to a limited form of needs assessment. Reviewing evidence on cost effectiveness of treatments will address only the second question raised by the economic approach (how to ensure the technical efficiency of interventions, assuming they are worth providing). It cannot take account of the allocative issue (in this case, should the practice be extending care for patients with, or at risk of, ischaemic heart disease in preference to other groups). As the role of general practitioners in determining the commissioning of health services expands (as with the development of primary care groups[8]) integration of clinical perspectives on developing services and providing quality care (as presented by Pringle) with broader perspectives (the epidemiological or economic) becomes essential.

Approaches focusing on individual cases can offer relevant and immediate insight into practices' ability to meet the aim of providing high quality care. However, without criteria that specify what might constitute a "significant event" this approach may lead to concentration on conditions that kill, and particularly those that affect younger, economically active individuals to the disadvantage of others (for example, older non-working patients or those whose conditions are not life threatening but may be highly distressing). The task involves not only reconciliation of different perspectives on making choices in health care but also recognition of the information requirements and range of analytical skills that will be required for primary care professionals to become fully involved in rational resource allocation decisions.

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Endpiece

All in a day's work

A human being should be able to change a diaper, plan an invasion, butcher a hog, conn a ship, design a building, write a sonnet, balance accounts, build a wall, set a bone, comfort the dying, take orders, give orders, cooperate, act alone, solve equations, analyze a new problem, pitch manure, program a computer, cook a tasty meal, fight efficiently, die gallantly. Specialisation is for insects.

Robert A Heinlein, quoted in *Wired*, August 1998