

Population based randomised study of uptake and yield of screening by flexible sigmoidoscopy compared with screening by faecal occult blood testing

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Abstract

Objectives: To compare the feasibility of mass screening by flexible sigmoidoscopy with screening by faecal occult blood testing (Haemoccult) and both tests combined.

Design: Patients were randomised to screening by flexible sigmoidoscopy, faecal blood testing, or both tests. The flexible sigmoidoscopy examinations were performed by a general practitioner.

Setting: General practice.

Subjects: 3744 patients aged 50-75 years.

Main outcome measures: Uptake, positive results, detection of neoplasia, complications, and recall for diagnostic colonoscopy.

Results: Uptake was significantly higher in the flexible sigmoidoscopy group (46.6%) than in the faecal blood test group (31.6%; $P < 0.001$) or than in the group having both tests (30.1%; $P < 0.001$). Telephone reminders increased uptake of sigmoidoscopy to 61.8%. In total, 1116 sigmoidoscopy examinations were performed without major complication. Polyps were found in 19.3% (95% confidence interval 17.0% to 21.6%) but only 6.8% (5.3% to 8.3%) had adenomas and 2.4% (1.5% to 3.3%) "high risk" adenomas. Cancer was detected in four subjects. The faecal blood test yielded positive results in 0.8% (0.2% to 1.4%) but missed at least one cancer and 30 cases of adenoma which were found by sigmoidoscopy in the combined group. Use of histological criteria—shown elsewhere to correlate with future risk of colorectal cancer—to select "positive" patients could reduce recall for diagnostic colonoscopy from about 20% to less than 5%.

Conclusions: Some of the predicted obstacles to screening with flexible sigmoidoscopy are surmountable. Clear evidence relating to efficacy will be obtained only from a randomised controlled trial.

Introduction

Colorectal cancer is the second highest cause of death from cancer in England and Wales.¹ Recent evidence suggests that removal of neoplastic lesions at sigmoidoscopy can reduce the incidence of and mortality from distal colorectal cancer.²⁻⁶ This has prompted calls for mass screening by flexible sigmoidoscopy. These data, from cohort and case-control studies, however,

may be subject to biases,^{7,8} giving an overoptimistic impression of efficacy. Given the negative aspects of screening programmes,⁹ policy makers have an obligation to ensure that the benefits (primarily lives saved) outweigh the costs before programmes are introduced.⁷ This could be most objectively shown through a randomised controlled trial.⁷ This feasibility study was conducted to determine key features which could influence the design of such a trial.

Subjects and methods

The study was approved by East Hertfordshire ethics committee.

Study population

The study was conducted in one general practice. The catchment area had a higher proportion of patients from social classes I and II (56%) than in England and Wales as a whole (23.3%) and a lower proportion from ethnic minority groups.¹⁰ A list of practice patients from the family health services authority suggested that 3933 (29%) of the practice population were in the study age range (50-75 years). The general practitioner (RA) identified and removed from the list 189 (4.8%) patients who had died or moved or were ineligible for the study because of a previous diagnosis of colorectal neoplasia, investigation of the colon and rectum within the previous 2 years, and physical or mental disease contraindicating screening.

The remaining 3744 (50% men) nominally asymptomatic subjects were randomised. Throughout the study inaccuracies on the list and postal returns were recorded.

Study design

Households were randomised by using the random number generator in Minitab and invited, by post, to undergo flexible sigmoidoscopy, faecal occult blood testing (Haemoccult), or faecal occult blood testing plus flexible sigmoidoscopy. Reminders were not routinely sent.

Sample size

It was found that inclusion of all eligible subjects would give more than 90% power to estimate the true prevalence rate of adenoma within 2%¹¹ and to detect a 10%

difference in compliance between groups (where one was 50%) at the 5% significance level.¹²

Telephone survey of non-responders to flexible sigmoidoscopy

As little was known about reasons for non-uptake of flexible sigmoidoscopy compared with faecal occult blood testing,¹³ a telephone survey of a random sample of 184 non-responders in the flexible sigmoidoscopy group was conducted to ascertain eligibility and, when appropriate, to make a second offer of flexible sigmoidoscopy screening.

Flexible sigmoidoscopy

An appointment (date and time), a sachet of laxative (sodium picosulphate-magnesium citrate (Picolax; Nordic)), and an explanatory booklet were sent 2 weeks in advance. Appointments could be changed or cancelled by telephone. Subjects were asked to give written consent to the examination.

All examinations were performed by the general practitioner (RA). To minimise recall for colonoscopy a pragmatic approach was adopted so that when diminutive polyps (<5 mm) that seemed hyperplastic were found only in the rectum these were removed at screening for histological examination. Subjects were recalled for colonoscopy only if histological examination showed an adenoma; those with other lesions were recalled for colonoscopy or surgery as appropriate.

Faecal occult blood test

The 3 day, six sample, diet restricted faecal occult blood test (Haemoccult, Rohm Pharma) was sent with a prepaid reply envelope and instruction booklet. The test was developed without rehydration. Patients were recalled if one or more windows yielded a positive result.

Faecal occult blood testing and flexible sigmoidoscopy

Subjects were asked to complete the faecal occult blood test before attending for flexible sigmoidoscopy. The faecal test was developed blind to the results of the flexible sigmoidoscopy examination and vice versa. Subjects were recalled for colonoscopy if either the faecal test yielded positive results or the findings at flexible sigmoidoscopy fulfilled the criteria described above.

Colonoscopy and histology

Colonoscopy was performed by the general practitioner. Subjects with adenomas were classified into high and low risk groups on the basis of lesions found at screening (high risk if at least one adenoma was ≥ 1 cm, villous, or tubulovillous or showed features of severe dysplasia) on histological examination.⁵

Analysis

Crude uptake rates were calculated as the number of responders per group and the number of invited per group.

The information collected on ineligibility (from postal returns and the telephone survey of non-responders) was used to estimate the uptake rate for flexible sigmoidoscopy which could be achieved given an accurate register of eligible subjects as the number responding to the postal or telephone invitations (number invited minus number found to be ineligible).

Table 1 Crude uptake rates of screening tests

Test group	No randomised per test group	No responding	Crude uptake rate (%)
Flexible sigmoidoscopy	1249	582	46.6
Faecal occult blood testing	1245	393	31.6
Combined group (both tests)	1250	376	30.1
Combined group (any tests)	1250	494	39.5

The implications for diagnostic colonoscopy workloads of using various histological criteria for referral were examined according to polyps seen (no histology); at least one adenoma; and only high risk adenoma(s).

The χ^2 test for contingency tables was used to compare proportions. All reported P values are two tailed.

Results

Uptake of screening tests

Crude uptake rates are shown in table 1. In the flexible sigmoidoscopy group the crude uptake rate (46.6%) was significantly higher than in the faecal occult blood test group (31.6%; $P < 0.001$). Similarly, it was significantly higher than in the combined test group whether subjects did both tests (30.1%; $P < 0.001$) or only one of the two tests (39.5%; $P < 0.001$). Of the subjects in the combined test group doing only one test, 80% chose flexible sigmoidoscopy (94 v 24). The uptake of flexible sigmoidoscopy in the combined test group was 37.6%. Although this was significantly lower than the rate in the flexible sigmoidoscopy only group (46.6%; $P < 0.001$) it was significantly higher than in the group that underwent faecal occult blood testing only (31.6%; $P < 0.01$). Conversely, the crude rate for the faecal test in the combined test group was 32.0%, which was not significantly different from the comparable rate in the faecal test group.

The telephone survey of a random sample of non-responders in the flexible sigmoidoscopy group revealed that up to 16% of invitations could have been sent inappropriately. If we take account of both the number of ineligible subjects and the increased uptake after the telephone survey this gives an estimated uptake rate of 61.8% (95% confidence interval 57.3% to 66.3%) for flexible sigmoidoscopy in those eligible to be screened.

Endoscopic findings at flexible sigmoidoscopy

In total 1116 patients (51% men) underwent flexible sigmoidoscopy screening without major complication. Polyps were found in 138 (24.2%) men and 81 (14.9%) women ($P < 0.001$), and two men had overt malignancy. Three subjects were referred for surgical resection (a woman with a 3 cm adenoma and two men with cancer). One hundred and ten subjects with polyps were recommended to return for colonoscopy. One man refused so his polyps were removed during the screening examination. A further 90 (41% of those with polyps) subjects with diminutive rectal polyps had these removed at screening. Seventeen (7.7%) subjects with diminutive (<5 mm) polyps had no intervention (two were taking warfarin and one had acute rectal prolapse after the laxative; contraindications for the others were not elucidated).

Table 2 Diagnoses among 197 subjects whose polyps and cancers were removed from sigmoid and rectum at either flexible sigmoidoscopy or colonoscopy

Diagnosis	No (%) of subjects
Cancer	4 (2.0)
Adenoma	76 (38.6)
Carcinoid	1 (0.5)
Hyperplastic	93 (47.2)
Miscellaneous	23 (11.7)

Findings at colonoscopy

Altogether 123 subjects (78 men) underwent colonoscopy; adenomas were removed from 14 at flexible sigmoidoscopy, and 109 were recalled directly without biopsy at flexible sigmoidoscopy. Eleven (10% of those who underwent colonoscopy) were found to have adenomas proximal to the sigmoid colon, 10 of whom had only a single adenoma and one who had three.

Clinical significance of neoplasias detectable by flexible sigmoidoscopy

The data on polyps and cancer of the sigmoid colon and rectum collected at flexible sigmoidoscopy or colonoscopy, or both, were combined. A diagnosis was assigned according to the most prognostically significant lesion in the 197 (91%) subjects with cancer or polyps for whom histological data were available (table 2). Four subjects had carcinoma (three Dukes' stage A, one Dukes' stage B) of the sigmoid colon or rectum, and 76 (35% of those with distal polyps or cancer) had at least one adenoma. Although polyps were detected in one in five subjects, the prevalence rates of neoplasia detected at screening were 0.4% for cancer and 6.8% for adenomas. Of the 76 patients with adenoma, a third were classified as "high risk" (2.4% (1.5% to 3.3%) of all subjects).

Comparison of rates of positive diagnosis

In total 854 patients underwent faecal occult blood testing alone or combined with flexible sigmoidoscopy. Seven (0.8%; 0.2% to 1.4%) had positive results and all underwent colonoscopy. One had a Dukes' stage C rectal carcinoma, one had a 2 cm adenoma, and a third had a 2 mm adenoma. A fourth subject had two diminutive adenomas, one detected at screening and the other at colonoscopy. The three remaining patients did not have neoplasia.

In the combined test group 401 subjects underwent both tests, and a comparison of the performance of the two tests was made. Only one subject in this group in whom a polyp was seen at flexible sigmoidoscopy had a positive result of the faecal blood test. In 81 subjects with negative test results polyps were found at flexible sigmoidoscopy; of these 30 had one or more adenomas (all less than 1 cm diameter) and one had a Dukes' stage A cancer (< 2 cm diameter).

Discussion

Poor uptake of flexible sigmoidoscopy and the generation of excessive numbers of colonoscopies have been cited as important potential obstacles to mass flexible sigmoidoscopy screening.^{14 15} The aim of this study was to evaluate whether these obstacles are surmountable.

The estimated achievable uptake rate of flexible sigmoidoscopy (on the basis of an accurate list of eligi-

ble patients and a telephone reminder to non-compliers) of just over 60% compares favourably with the 29% in subjects offered flexible sigmoidoscopy after negative results of the faecal blood screening test in the United Kingdom.¹⁶ It is, however, lower than the 81% achieved in a population based Norwegian study in which reminders and press releases were used to boost uptake.¹⁷ In an Irish study 68% of volunteers preselected for their eligibility and willingness actually attended for flexible sigmoidoscopy.¹⁸

Certain features of the practice (enthusiasm of the primary care team for screening, social class profile of patients) could be expected to encourage higher uptake rates of screening. Both higher and lower uptake rates than those observed in this study would probably be reported, however, if screening were to be offered under different circumstances. It will be important to ascertain how widely rates differ and their most important determinants.

Comments made by subjects in the combined test group revealed possible reasons for the differential uptake rates for the two tests. These included the perceived immediacy of the flexible sigmoidoscopy screening and its results, less distaste for idea of sigmoidoscopy, the additional perceived benefit of consulting the general practitioner while undergoing sigmoidoscopy, and concern that failure to attend for screening might be noted by the doctor. There is support for the latter two factors from other studies of screening.^{13 19}

Need for colonoscopy

A fundamental prerequisite for the introduction of screening is that there should be sufficient facilities for diagnosis and treatment of any lesions detected.²⁰ Colonoscopy services at present cannot meet diagnostic and follow up needs in many districts.²¹

With data from our study it can be seen that the proportion recalled for diagnostic colonoscopy could be reduced from 20% to about 7% (5.3% to 8.3%) if polyps are biopsied at screening and only patients with adenoma are recalled. The prevalence rates for cancer and adenomas detected by screening in this study were similar to those found in other studies in asymptomatic subjects screened by 60 cm flexible sigmoidoscopy.^{22 23} Recall of only those classified as "high risk" of future colorectal cancer would result in a further halving of the numbers (2.4%; 1.5% to 3.3 %). This is similar to the proportion of subjects who would be recalled for colonoscopy as a result of a positive faecal blood test,²⁴ but in contrast, "histological positivity" has more biological relevance and hence efficiency than "haematin positivity."

The rate of positive results of the faecal occult blood test of 0.8% (0.2% to 1.4%) in this study was at the lower end of the range reported in the literature²⁴ and is probably due to close adherence to the dietary restrictions. This study confirms the greater sensitivity of flexible sigmoidoscopy compared with faecal occult blood testing for distal neoplasia but refutes the hypothesis that neoplasia detection by flexible sigmoidoscopy can be considerably enhanced by the addition of faecal occult blood testing.²⁵ The observation that the test result was negative in many subjects who were found at flexible sigmoidoscopy to have adenomas or cancer was not surprising; all of the adenomas were less than 1 cm in diameter and the

Key messages

- Colorectal cancer is the second highest cause of death from cancer in England
- Detection of premalignant adenomas by screening with flexible sigmoidoscopy offers the chance of reducing incidence as well as mortality
- High uptake of flexible sigmoidoscopy screening is achievable provided accurate call up lists are used
- Flexible sigmoidoscopy detects more adenomas and cancer than screening with a faecal occult blood test
- Haphazard introduction of flexible sigmoidoscopy screening should be discouraged until there is more substantive evidence of its effectiveness

malignant polyp was less than 2 cm. It has been shown that faecal occult blood testing detects only a quarter of polyps greater than 1 cm.²⁶

Conclusions

We found that given an accurate list of eligible subjects and a telephone reminder an uptake rate of over 60% is achievable even without the use of mass media campaigns. We have also shown that if the result of flexible sigmoidoscopy screening is defined as "positive" on the basis of the histological characteristics of polyps removed during the procedure rather than simply their detection, this will result in selection of subjects whose current and future risk of large and villous adenomas or cancer is considerably increased^{15, 27-29} and will also reduce the recall rate for colonoscopy from about 20% to under 5%.

In this study the offer of screening by both faecal occult blood testing and flexible sigmoidoscopy had a detrimental effect on uptake and did not increase detection of neoplasia so we conclude that the synchronous offer of both tests is not worth while. Priority should now be given to completing a randomised trial and discouraging the haphazard introduction of flexible sigmoidoscopy screening without more substantive evidence of its effectiveness.

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Contributors: JECWV had the original idea for the study, formulated the hypothesis, designed the protocol, planned and coordinated the study, and wrote the paper. RA enabled the study to be undertaken in the general practice in which he is a principal; undertook all the flexible sigmoidoscopies and colonoscopies; and contributed from the stage of hypothesis formulation to all aspects of the study design. He contributed suggestions to the paper. SBL provided statistical advice from the stage of formulation of the hypothesis (including initial power calculations) to the study design and performed the randomisation and statistical analyses. She contributed suggestions to the paper. ICT examined all the samples histologically and provided diagnoses; he also contributed suggestions to the paper. JMAN directed the overall programme at the unit on screening for colorectal neoplasia and will act as guarantor. In

this study, he provided guidance and support throughout, particularly in the development of the original idea, hypothesis formulation, protocol design, and writing of the paper.

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Conflict of interest: None.

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Correction

Depression as a risk factor for ischaemic heart disease in men: population based case-control study

Two errors occurred in this article by Julia Hippisley-Cox and colleagues (6 June, pp 1714-9). The fourth sentence of the results in the abstract should have read: "Men with ischaemic heart disease had a higher risk of subsequent depression [not ischaemic heart disease] than men without ischaemic heart disease (adjusted 2.34; 1.34 to 4.10; $P = 0.003$)."

The first line of the footnotes to tables 3 and 4 should have read: "Model adjusted for smoking status, hypertension, diabetes, and deprivation score [not depression score]."

Primary care: core values

Primary care in an imperfect market

John Roberts

This is the fifth in a series of six articles reflecting on the core values that will underpin the development of primary care

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Doctors generally disdain the word “market” when it is applied to the work they do. A market is an encounter controlled by supply and demand.¹ In most markets there is a purchaser, who pays for the specific goods he or she will receive, and a seller, who has the goods and will provide them to the purchaser.

Medicine is an imperfect market. In health care the purchaser is usually not the consumer, and the goods provided by the seller are difficult to define and often contingent on other aspects of care such as results of tests and treatments.² In addition, the medical marketplace does not follow the classic rules of supply and demand. Doctors (to a diminishing extent) set the demand of the care that they will provide and therefore can artificially increase demand for the goods they supply, as highlighted by Roemer’s law: “The supply of beds creates the demand for those beds.”³

Economic theory also assumes that the buyer-consumer will be knowledgeable about the goods to be purchased and can compare sellers’ quality and prices. This is difficult in medicine. Firstly, seller-doctors have until recently controlled all the information about health care. Secondly, consumer-patients tend to avoid using medical services until they need them acutely, and by then, shopping is virtually impossible. Thirdly, even if payer-insurers or consumer-patients try hard to compare seller-doctors and their products, data are expensive to collect and complex to interpret. Finally, in the United Kingdom and in the non-urban and poorer parts of the United States, seller-doctors can set up monopolies or oligopolies in which neither purchasers nor consumer-patients can shop or even easily negotiate services or prices.

Despite these exceptions, it has become increasingly clear over the past 20 years that medicine behaves as a market in many ways. Most obviously, doctors behave according to the rewards they are given. Insurers, whether private or public, can no longer afford unfettered inflation and have become active buyers willing to invest heavily in comparing costs and quality. In the United States, purchasers now have more information on the market than do the doctors who deliver the services. Consumer-patients, too, respond to market incentives. For example, requiring them to pay a small amount (say \$10 at the time of medical service) decreases the use of emergency departments by 10-20%.^{4 5}

The primary care perspective

Where does primary care fit into the discussion? Primary care directly accessible 24 hours a day is usually the patient’s first point of contact with the medical system. The primary care physician should be the friend, philosopher, and guide of his or her patients, an advocate and protector and coordinator of appropriate specialist services. He or she should provide long term, continuing, comprehensive care. The primary

Summary points

Medicine is an imperfect market, and does not follow the classic rules of supply and demand

The primary care physician acts as a health broker

With the rise in managed care has come a parallel rise in the demand for primary care

Four market models—the integrationist, outreach, competitive, and managed market models—operate in the United States, and there is also the single payer model

The marketplace cannot eradicate the tensions between primary care and specialist doctors, nor can an imperfect model ensure highest quality medicine at the lowest costs

care physician also acts as a health broker. Within the community, primary care can improve the health of the population through helping to remedy social pathologies; providing planned health promotion; screening for risk factors; preventing disease; collecting reliable data on the condition of a community; and helping the community to decide on priorities for health.⁶

The term “health broker” describes how critical primary care is to any sane medical market. A short history of medicine in the United States shows why. In 1940, 90% of physicians in the United States declared themselves “generalists.” When the nation went to war, workers’ pay was frozen, so medical insurance quickly became popular as a legal way to make jobs more attractive to workers in short supply. By the war’s end, most workers were covered by indemnity insurance, which paid doctors for services rendered (fee for service). Not only did this new system reward doctors for testing and treating with little regard to costs, it also rewarded patients for seeing the most expensive doctors. These were usually specialists, who were trained to deal with patients whose probability of severe or unusual illness was greater and therefore required greater expenditures. Such unchecked consumerism led to massive cost inflation, the tremendous expansion of specialty medicine, and the near demise of primary care. By the 1980s only about a third of doctors in the United States called themselves generalists.²

From consumerism to managed care

The inflation became so burdensome to employers paying for medical insurance that huge companies

were being crippled. Chrysler, during the 1980s, was paying more for medical insurance than for the steel it used for its cars. One remedy was managed care, which had begun 50 years earlier, during the labour movements of the 1930s. In managed care, insurers (usually called health maintenance organisations) pay doctors a prepaid capitation amount for each patient that the doctor agrees to care for. In essence, payment is for people served, not for services delivered. The incentives are the converse of those of fee for service medicine, and they encourage doctors to spend less and patients to see specialists only rarely.

The rise of capitated care has been slow, but in the past 20 years it has come to surpass the fee for service system in primary care. About 55% of Americans are now in some sort of managed care arrangement, and the number may jump to 75% as the government embraces managed care as the preferred public insurance mechanism for the poor (through the scheme Medicaid) and elderly (through Medicare).

In general, primary care physicians in managed care behave much like general practitioners in Britain: they serve as doctors of first resort for nearly all medical problems and act as gatekeepers for patients' access to specialists. With the rise in managed care has come a parallel rise in the demand for primary care; specialists now find it difficult to find work in a nation oversupplied by doctors, while primary care doctors are still in great (though diminishing) demand.⁷ Doctors in training have recognised this new situation and, for the first time in several decades, have in the past four years been choosing the primary care disciplines (family medicine, internal medicine, and paediatrics) rather than specialty training.

Five market models

America, as its politicians are fond of boasting, is an experiment, and nowhere is this more true than in medical markets. Nothing about American medical systems is true throughout the country. Los Angeles and its managed care system is both ideologically and geographically a continent away from the southeast, where fee for service medicine still predominates. This somewhat chaotic nation of healthcare systems illustrates how primary care affects various medical markets and how they, in turn, affect the practice of primary care. There are at least four models in the United States, and another—the single payer (box).

Integrationist

The integrationist model is the fee for service system that many doctors in America still cling to, particularly in many eastern states. It remains in place, in an attenuated form, for several reasons. Firstly, it is traditional, so doctors and patients (and even insurers, to some extent) are comfortable with it. Secondly, fee for service medicine can draw doctors to rural areas, where recruiting general practitioners is often difficult. Thirdly, managed care does best in urban areas, where people can travel short distances to various competing medical centres.

Fee for service medicine has generally been detrimental for primary care because it rewards oversupply of services and allows patients to bypass the primary care doctor and go directly to the specialist.

Obviously, development of community oriented primary care is impossible in such circumstances.

Outreach

The outreach model has become popular with academic and other tertiary centres, with their surpluses of specialists. The primary care doctor's surgery remains the centre of clinical activity, and specialists regularly attend sessions there. Such systems have become common in smaller cities, where there are relatively fewer specialists, and among overpopulated specialties such as gastroenterology, cardiology, and orthopaedic surgery. In the midwestern states, where distances between cities are great, this system has become popular. Major medical schools, such as those in Chicago and Minneapolis, send their faculty members out by aeroplane virtually every day of the week.

For primary care doctors, this system usually works well. A concern is that the outreach system allows more patients with complicated or chronic diseases to bypass their primary care doctors. This trend has been tempered by those who pay for managed care, who believe that specialty care is costlier but rarely better for such patients.

Competitive

The competitive model is common in cities where competition for patients is high, not only between specialists but also between primary care doctors and specialists, and where there are too many doctors. The specialist might tell the asthmatic patient, "Next time you have an attack come and see me directly." Such behaviour undermines the patient's relationship with the primary care doctor or, when the primary care doctor is meant to be



Model of medical markets, from least to most regulated

	Integrationist	Outreach	Competitive	Managed market	Single payer
Description	Traditional self pay or indemnity insurance in US	Specialists travel to primary care sites to deliver care	Specialists compete with primary care doctors for patients with certain diseases	Insurer generally contracts with primary care and other doctors to provide all care in a prepaid scheme	One massive payer, virtually always government, overseas system
Example	Pre-1980 US Generally fee for service More is better	Much of rural US, where services are provided by big urban tertiary care centres	Many cities that have not moved to 'gatekeeper' or other managed care systems	Health maintenance organisations in most of US	NHS
Level of regulation	Virtually nil	Little	Little to moderate	High	Extremely high
Payers	Public or private Act as funnel for money	Public or private	Public or private	Private > public, but less so	Public
Advantages	Minimal administrative costs	Ultimate payers (usually employers) see increased patient satisfaction Patients not forced to travel far for care, decreasing absenteeism	As doctors adopt open competition, costs theoretically should decrease	Can predict costs, so can develop budgets without risk to present to ultimate payers	Can predict costs, so can develop budgets without risk to present to ultimate payers
Disadvantages	Very difficult to control overall costs Somewhat at mercy of providers' charges and behaviour	Insurers actually may seek costs rise, since they will pay specialists' costs but would not pay patients' travel costs to specialty centres	Such cost decreases have not been shown; in fact, most evidence is that costs rise due to split in medical services and relatively higher costs of specialists	Little disadvantage as long as patients are satisfied and doctors don't revolt en masse	Political leaders must suffer the pains of public opinion when cost cutting is perceived to damage quality of care
Provider-doctors	Fee for service	Fee for service or capitation agreements	Fee for service or capitation agreements	Usually capitated; sometimes discounted fee for service, especially to specialists	Mostly capitated, with some experimentation into various payments from primary care doctors to specialists who provide low cost, high quality, customer oriented care
Advantages	Controls most of spending Great financial and clinical autonomy	Patients served more conveniently	Specialists gain patients	Primary care doctor usually acts as gatekeeper, maintaining close relationships with patients Able to provide community based primary care, since most doctors have panels of patients	Primary care doctor is gatekeeper Community oriented care is virtually required, since primary care doctors are assigned patient panels, whose health is in the doctor's hands
Disadvantages	Subject to major changes when payer decides costs must be trimmed (eg current Medicare cuts in US)	Possible threat to primary care if specialists continue to migrate to rural areas	For primary care: loss of comprehensive care and loss of patients Specialists may eventually tire of having to provide primary care	Primary care doctor usually acts as gatekeeper, which carries the risk of poor referral patterns and animosity from patients used to rapid access to specialists Ability to refer may be onerous due to health maintenance organisations' restriction on specialists Specialists are completely at mercy of primary care providers' referral patterns Managed care organisations often have onerous cost cutting methods (see text)	Overall limits to spending make quality difficult to maintain Primary care doctors may vary in their ability to handle certain illnesses or in their willingness to refer If specialists are salaried, they may be overwhelmed by referrals of relatively few patients
Consumer-patients	Often pay co-insurance (20% of total charges) or deductible (first \$500 of charges)	Payment type varies	Payment type varies	Usually prepaid and often with small co payment (\$10) at each visit to doctor	Prepaid through taxes Usually no copayment or deductible
Advantages	Places some responsibility on patient to keep costs in check		Rapid access to specialty care	Patients get true primary care—perhaps for the first time Patients' satisfaction becomes a major determinant of quality care	Primary care, potentially, is practised at its finest level, with emphasis both on patient and on community Patients often develop lifelong relationships with doctors
Disadvantages	Discriminates against poor people		Loss of continuing, comprehensive, 24 hour primary care	Barriers to referrals as described above	Can be difficult for patient to change doctors if he or she wishes

acting as a gatekeeper to each specialist visit, creates outright animosity between the doctors.

One response has been the creation of various types of multispecialty schemes, where all doctors in a group (including some primary care doctors) share the risk of the costs incurred by the entire practice. If the specialist believes she or he can provide care of equal quality that is cheaper than care offered by the primary care doctor, so much the better, as long as the doctors are working closely together. However, most evidence suggests that specialists are more costly, even when the cost of the sicker patients they see is excluded.⁸ As specialists learn to become more cost effective this model will probably become more common in the United States.

Managed market

The managed market is where America has been heading and is where primary care becomes a true gatekeeper specialty. It is crucial to understand that in the United States at present, managed care is an extremely competitive and risky marketplace, with more than 1000 insurers trying to sell coverage at lower and lower rates while trying to get doctors to accept more financial risk for patients. The trend now is toward mergers among insurers, which, if carried far

enough, will create a landscape that resembles a lot of mini-NHSs.

Two trends are noteworthy. Firstly, the push towards forcing doctors to take on financial risk has caused the demise of the singlehanded primary care practitioner. Doctors are getting together in bigger groups, both formally and informally, to promote economies of scale in purchasing supplies and delivering care. Some are adding specialists, moving toward a variation of the outreach and competitive models.⁹

Secondly, very few managed care organisations have convinced the clinical teams to take on all risks. So far, risk has been limited mainly to primary care doctors, who get about 10% of the premiums paid to the insurer (typically about \$15 per member per month). Specialists and hospitals have continued to use mainly a fee for service system.

Single payer

The single payer system, as exemplified by the British NHS, is used throughout the world—except in the United States. Variations on the model are as numerous as the nations sponsoring these systems.

The advantages and disadvantages of the single payer system are fairly obvious. Firstly, a nation can set

a global budget and decide exactly what it will spend on health care each year. Proponents say that overall medical budgeting is a political issue; critics say this is rationing. Secondly, in systems such as the NHS that rely heavily on primary care, community oriented primary care becomes the norm, with each doctor responsible for maximising the health of all those patients on a defined, registered list. Thirdly, this list system creates some restriction in choice for patients, especially when, under reforms such as fundholding that require doctors to assume risk, there are incentives to underrefer. Fourthly, under global budgeting, some doctors are sure to suffer disproportionately: in Britain, specialists have to deal with long queues of patients awaiting appointments and elective procedures.

Donald Light has congratulated the United Kingdom for its wisdom in creating its system of paying primary care doctors, pointing out that its three part system of paying capitation, operating costs, and bonuses for targets ensures that patients are neither overtreated (as in the American fee for service system) or undertreated (a potential risk of the for-profit managed care schemes in the United States).¹⁰ The single payer system does not, however, foster experimentation and entrepreneurship; if a better idea comes along it has to be implemented through regional or national bureaucracies.

Conclusions

The marketplace cannot solve the problems of medicine, nor eradicate the tensions between primary care and specialist doctors. Nor can an imperfect model ensure highest quality medicine at the lowest costs.

But in considering primary care medicine and the marketplace, it may be helpful to turn to a failed reform of the American system, that of President Clinton in the early 1990s. His task force, while realising that an imperfect market can never be made truly perfect, did list five criteria for an optimal medical market:

- Universal medical insurance coverage
- Costs that are affordable to society and to patients
- Comprehensive medical benefits
- Freedom of patients to choose their own doctors
- Public accountability, both in cost and in quality of care.

Unfortunately, these five statements are probably mutually exclusive in practice. But they remain a goal for all of us to consider as we continue to reform our own medical marketplaces.

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A father remembered Syringomyelia can be treated

My father dedicated his working life to the study of syringomyelia. Early in his career the condition could be diagnosed using a variety of radiological techniques, but this has been made easier by the introduction of magnetic resonance imaging. Initially, there was no satisfactory treatment but, during the course of his work, our understanding of the disease increased greatly. Surgery can now be offered to many patients, which can halt an otherwise inexorable process of pain, paralysis, and paraesthesia. In some cases neurological improvements can occur following operation. For people with this condition the loss of my father, who died in 1995, was a considerable blow.

The classical symptom of syringomyelia is loss of pain and temperature sensation with preservation of the sense of touch. The earliest presenting features may be pain in the neck with pain and sensory disturbance in one of the upper limbs. Neurological impairment in this condition is usually slow and progressive, and can result in tetraplegia. Abnormalities of the craniovertebral junction with associated hindbrain herniation are the commonest cause of syringomyelia. Surgical decompression of the hindbrain will usually benefit the patient. The other common cause is spinal cord injury, where spinal surgery can be helpful.

There was a carpenter in Salford in 1990 who had been diagnosed with syringomyelia 17 years earlier. His doctor had told him that there was no treatment for the condition but wisely added that he should come back in 20 years' time, as things might then be different. When the carpenter found that the weakness in

his arms was making his work difficult he went to see his general practitioner, who declared himself ignorant of the condition, but referred the man to a neurosurgeon. Hindbrain decompression was performed and the carpenter experienced subjective improvement.

When I started work last year as a general practitioner assistant in Birmingham, I knew that I would be sorry not to have my father around to discuss the occasional patient. During my first day of work, I met a man with syringomyelia who had been diagnosed in the early 1970s. He has suffered progressive weakness of his arms and legs over subsequent years. It may now be too late for him to benefit from surgery.

My father described how patients are often fearful of surgery. If patients are not offered treatment or decline surgery without adequate information then we have failed them. Patients should understand the implications of surgery and also of refusing it.

Helen Williams, *general practitioner, Thamesmead, London*

We welcome articles up to 600 words on topics such as *A memorable patient, A paper that changed my practice, My most unfortunate mistake*, or any other piece conveying instruction, pathos, or humour. If possible the article should be supplied on a disk. Permission is needed from the patient or a relative if an identifiable patient is referred to. We also welcome contributions for "Endpieces," consisting of quotations of up to 80 words (but most are considerably shorter) from any source, ancient or modern, which have appealed to the reader.