THE UNIVERSITY of York

CENTRE FOR HEALTH ECONOMICS
YORK HEALTH ECONOMICS CONSORTIUM
NHS CENTRE FOR REVIEWS & DISSEMINATION

Medical Technology in General Practice in the UK : Will Fundholding Make a Difference?

Brenda Leese
Michael Drummond
Roger Hawkes

DISCUSSION PAPER 122

MEDICAL TECHNOLOGY IN GENERAL PRACTICE IN THE UK: WILL FUNDHOLDING MAKE A DIFFERENCE?

by

Brenda Leese

Michael Drummond

and

Roger Hawkes

June 1994

The Authors

Brenda Leese is a Research Fellow and Michael Drummond is Professor of Economics at the Centre for Health Economics, University of York. Roger Hawkes is a General Practitioner in Tamworth, Staffordshire.

Acknowledgements

We are grateful to Vanessa Windass for typing the manuscript.

Further Copies

Further copies of this document are available (at price £5.00 to cover the cost of publication, postage and packing) from:

The Publications Office,
Centre for Health Economics,
University of York,
YORK,
YO1 5DD.

Please make cheques payable to University of York. Details of other papers can be obtained from the same address or telephone York (0904) 433648 or 433666.

1. INTRODUCTION

The far reaching changes which have taken place in general practice in the UK are having a major impact both on the ways in which GPs organise their practices, and on the services they provide for patients.

The new contract, which was imposed on all GPs in April 1990, changed the way in which GPs are paid for providing general medical services, with increased emphasis being placed on prevention and health promotion.

Some general practices opted to join the voluntary General Practice Fundholding (GPFH) scheme, whereby they manage their own budget for practice staff expenses and premises, drugs, referrals to hospital outpatient departments, most diagnostic tests and certain surgical procedures. This scheme began in April 1991, when approximately 300 practices with a list size of more than 11,000 patients because "first wave" fundholders. Fundholding was originally restricted to practices having 11,000 or more registered patients, or groups of smaller practices linking to reach this number, but this limit was subsequently relaxed to a minimum of 7,000 patients to enable more practices to join the scheme. By March 1993, a total of 1,235 practices had joined the scheme, representing more than 6,000 GPs, with almost 25% of patients being registered with such practices (NHSME, 1993).

Under fundholding referrals for certain elective procedures such as hysterectomy and cholecystectomy are made by contracts drawn up between the practice and individual hospitals or specialties. During 1992-3 fundholders purchased almost 8% of all elective or planned

admissions to hospitals (NHSME, 1993).

Some pioneering fundholding practices have, however, bought in services directly from hospitals and are holding consultant clinics on their own premises for their own patients e.g. orthopaedics and ophthalmology (Waldegrave, 1991). These new style services have implications for the equipment needed in general practice, and are expected to increase in numbers and scope. For non-fundholding practices the contracts are drawn up by the health authority, which acts as the main purchaser of services. However, in drawing up contracts the health authority is supposed to take note of the referral patterns of the GPs in its area.

From April 1993 (Department of Health, 1992) the GPFH scheme was expanded to include community nurses thereby increasing the link between general practitioners and community services. This has meant that fundholding practices purchase district nursing and health visitor services from the community units of the DHAs or independent NHS trusts which remain the employers of these staff. Dietetics and chiropody services are also included in this scheme.

General practitioners (GPs) have traditionally acted as gatekeepers to the more expensive specialist medical services provided within the hospitals. As a result, they have tended not to invest heavily in medical technology, referring patients to the hospital when they consider this to be appropriate. There has been little financial incentive for GPs in the UK to invest in practice equipment, other than a few basic items, partly because of the lack of direct reimbursement for such purchases. The incentives to do so have come mainly from increased professional satisfaction and the ability to provide a better service to patients,

incentives that some argue are potentially enhanced by the GP fundholding scheme (Drummond, et al., 1990). However, the current position is that general practice is perceived as providing basic care, with anything more advanced being referred on to hospital for specialist opinion. In 1992, hospital services consumed 55.8% of the total NHS expenditure of £35.4 million and general medical services only 8.0% (Office of Health Economics, 1992).

The introduction of the new GP contract in April 1990, (Department of Health, 1989) and of GP fundholding in April 1991 (Department of Health, 1989a) has had the effect of changing a low technology service to one in which technology plays a much greater part, although the full impact has yet to be seen. The emphasis has been placed much more firmly on the provision of health promotion clinics and preventive services by the introduction, for the first time, of payments for the provision of these clinics. This latter was, however, modified in July 1993 to a "banding" system for preventive work on heart disease and stroke (Department of Health, 1993). In addition, there are special payments for the care of patients with asthma and diabetes. Yearly health examinations were introduced for patients over 75 years of age, if not already seen by their GP for other reasons, for those aged 16-75 every 3 years, and for newly registered patients. The costs and benefits of such checks have yet to be measured (Scott and Maynard, 1991). A new payment was also introduced for the surveillance of children under 5 years of age. These additional or expanded services will require increased nursing staff and increased use of technology such as haematological tests.

Minor surgery performed within general practice, also, for the first time, attracted a fee and this has had the effect of greatly increasing the numbers of GPs providing such services to their patients. Minor surgery in general practice was previously undertaken on a

small scale, being frequently dependent upon the skill and interest of an individual doctor within a practice. The introduction of a payment, currently £103.80 for 5 procedures per session up to a maximum of 3 payments per GP per quarter, was intended to remove much minor surgery from hospitals, to provide a more cost-effective service, and to release hospital resources (e.g. staffed beds and theatre time) for services which could not otherwise be provided. All GPs have, since April 1990, been subject to these changes as part of their new contract.

As part of the recent changes, provision has been made, for the first time, for the direct reimbursement of some computer costs for all practices, although provision for fundholders has tended to be more generous. Under the scheme, non-fundholding practices can be reimbursed 50% of net costs for the purchase of equipment, and 70% of associated staff costs. For fundholders, there is 75% reimbursement for computer hardware, and 100% for software and training costs.

Some practices already had computers but this, again, tended to depend upon an enthusiast within the practice encouraging his or her partners. Computers can be used, at the basic level, for age/sex registers, call and recall of patients (especially children for vaccinations), and issuing repeat prescriptions. On a more complex level they can be used for storing patient records, and for exchange of information between GPs, hospitals and health authorities.

Recent advances in dry chemistry technology have led to the development of desk top analysers with the implication that, for the first time, chemical pathology and biochemistry

tests can be performed directly in the GP's office, with the results being immediately available to both the doctor and the patient. Previously these were only available from the hospital laboratory with the consequent delays in the reporting of results. Currently, such technology is only used on a small scale in general practice, but its use will increase, particularly in the new GP health promotion clinics.

This paper will concentrate on use of technology in general practice rather than in primary care as a whole. The following items are discussed in turn: basic medical equipment, minor surgery, diagnostic technology and information technology. The results of a study of the use of fundholding surpluses to purchase equipment are described and, finally, in a discussion section, the major issues for the future are outlined.

2. BASIC MEDICAL EQUIPMENT

Until recently, there was little interest in discussing the range of equipment expected to be routinely available in general practice. It was left to the individual doctor or practice to decide what was necessary or desirable. In 1987, Bosanquet and Leese found that 99% of 260 GP practices had a peak flow meter, 84% had a proctoscope, and 80% a nebuliser, but that such equipment was more likely in practices in affluent rural areas than in inner cities. For example all 40 GP practices in a rural area had a nebuliser, but this was the case for only 71% of 48 GP practices in a Midlands urban area. More recently, Bradley and Watkins (1989) surveyed 265 practices in Devon and Cornwall. The number and percentages of various items and equipment found to be available in this study are set out in Table 1, and are similar to the findings of Bosanquet and Leese.

The potential range of choice among types of equipment is large and is dependent on GP preferences, with some basic items being considered essential. Indeed, there has been no incentive for the purchase of equipment since the cost has not been directly reimbursed (Barrowcliffe, 1988; Bosanquet and Leese, 1989). This is still the case, with the exception of computers, but with the introduction of a payment for clinics and for minor surgery, there is more scope for recouping the cost of necessary equipment. However, in spite of the lack of incentives, a survey carried out in 1987 found that 60% of 260 practices in different parts of the country had an ECG machine, which currently costs approximately £2,000. However, these were more likely to be present in larger practices in affluent areas than elsewhere. For example, 93% of practices in a rural area, but only 32% of practices in a mining area of the North of England had their own ECG machine (Bosanquet and Leese, 1989). The new GP contract and GP fundholding will undoubtedly have the effect of enhancing expenditure on equipment out of necessity, if not for other reasons.

An ECG machine is an expensive item of equipment and its use in general practice demands a degree of organisation, particularly outside normal office hours, to ensure that the GP on duty always has access. A recent survey (Colquhoun, 1989) showed that 62% (190) of GPs in 44 practices had access to an ECG, with 45% recording an ECG during surgery, but only 26% out of hours. Only 25 (13%) routinely carried out the ECG outside normal working hours. Therefore, there are doubts whether this particular piece of equipment is being used as intensively as it would be in a hospital setting.

Moreover, with infrequent use of diagnostic equipment, interpretation of results can become a problem (Macallen et al., 1990). Diagnostic competence among family physicians

has been found to be positively associated with recent qualification, possession of a higher qualification, and frequent use of the ECG. This throws some doubt on the advisability of the usage of ECG machines by GPs. Nevertheless, access to an ECG had increased from 10% of GPs surveyed in 1969, to 34% in 1974 and 57% in 1990. Also, some machines incorporate automatic interpretation facilities and it is also sometimes possible to obtain an interpretation of results from a hospital specialist via a telephone link. In addition, some GPs are now using ambulatory ECGs to monitor transient conditions such as arrhythmias. The results are sent to hospital for interpretation.

Table 1: Items of Equipment Found to be Available in General Practices in Devon and Cornwall (n=265)

Item	No.	%
Stethoscope	265	100
Gloves	265	100
Sphygmomanometer cuff	265	100
Peak flow meter	257	97
Height measure	254	96
Proctoscope	223	84
Baby scales	215	81
ECG	193	73
Resuscitation kit	167	63
Steriliser	122	46
Electro cautery	116	44
Glucometer	95	36
Microscope	82	31
Defibrillator	29	11

Resuscitation equipment is not widely available in general practice (Bradley and Watkins, 1989). Such equipment can cost up to £6000, but is frequently purchased by

charities or patient support groups and donated to practices. The introduction of more advanced technology, in the form of the semi-automatic advisory defibrillator, has greatly simplified resuscitation. This equipment will monitor the ECG at the same time as delivering the shock to the chest (Evans and Colquhoun, 1990). The process is automated and leaves the operator free to perform other tasks. However, the usefulness of this technology has been questioned (Dixon and Wilkes, 1985), as well as that of ECG machines on home visits, where suspected cardiac arrhythmias very rarely yield a suitable occasion for ventricular fibrillation. The opposing viewpoint, that opportunities for resuscitation do occur sufficiently frequently in general practice to warrant training and equipping GPs for this purpose, has also been put forward (Pai et al., 1987). GPs can be as effective in resuscitation as the staff of mobile coronary care units based in hospitals. Rawles (1991) produced data to show that cardiac defibrillation by GPs is cost-effective and that the lives saved could exceed those saved by earlier thrombolytic treatment. However, this view has been countered (Kay, 1991) in that an item of equipment used irregularly is likely to be inadequately maintained and may not be immediately available when required. In rural areas GPs may see many more patients in need of resuscitation than in urban areas, where many patients go directly to hospital. This means that fewer patients are seen per GP, so reducing the cost effectiveness of the GP service.

Another item of equipment which GPs are likely to find increasingly useful, particularly in health promotion clinics, is the haemoglobinometer. In 1987, only 25% of practices were found to possess this item of equipment (Bosanquet and Leese, 1989). Patients presenting with general tiredness and malaise are difficult to diagnose, but anaemia can be excluded by a simple haemoglobin test (Quinn, 1987). Loose et al. (1986) argued that there was little point in sending samples with a normal haemoglobin to the central laboratory, and

advocated more widespread use of haemoglobinometers, to ease pressure on laboratory resources.

As GP fundholders negotiate with hospital specialists to provide clinics on-site in the practice, additional equipment will be required. Some fundholders are already purchasing items like slit lamp microscopes and visual field machines, to monitor a number of eye conditions and microscopes for ear, nose and throat (ENT) clinics (Hawkes, 1992). One possible benefit of specialists holding clinics in general practice is that, over time, the GPs themselves can be trained to deal with minor problems and monitor the patient's progress.

3. MINOR SURGERY

Some GPs have regularly performed minor surgery for patients in their own surgeries, using a wide range of procedures (Wall, 1987). However, the number of operations has doubled with the introduction of a fee for certain defined surgical procedures, mostly related to dermatology (see Table 2). The aim of the fee was to take simple procedures away from the hospitals into general practice where they are thought to be performed more cost-effectively, (O'Cathain et al., 1992) so releasing hospital resources to be used elsewhere. Lowy et al. (1993) however, found that this did not happen. The service provided by GPs is preferred by many patients, who have a shorter wait before receiving treatment (O'Cathain et al., 1992). FHSAs were free to set their own standards for admission of GPs to the minor surgery list and, also to set standards for premises (Wall, 1991).

In the city of Leeds, 110 of 133 practices (83%) applied to undertake minor surgery

(Zoltie and Hoult, 1991). An inspection of premises for suitability found that 62% met all criteria specified by the FHSA, with a further 23 (21%) practices failing for only one reason. The most common reasons for failure were inadequate record keeping, lack of resuscitation equipment and out of date adrenaline. In other areas, far fewer GPs were included on minor surgery lists eg, 57% in Birmingham (Wall, 1991). The technology exists for GPs to perform minor surgery at least as well as the hospital, but provision of adequate sterilisation procedures is of great importance. There has been debate over the best methods of sterilisation, with boiling of instruments being considered by some to be inadequate (Wall, 1991).

A survey of 382 practices (Morgan et al., 1990) found that 49% had autoclaves, 22% had hot water disinfectors, 15% had hot air ovens, 11% used chemical disinfectants, 3% used central sterile supplies and 2 practices had no facilities for sterilisation. In most practices (80%), decontamination was performed by a practice nurse or receptionist. 22% of instruments were considered to have been inadequately sterilised and it was suggested that there should be a code of practice for the control of infection. Other studies have also found inadequate sterilisation procedures in general practices (Hoffman et al., 1988). One option is for GPs to obtain sterile supplies from the local hospital (Sims, 1985), and this service can be cost-effective. If such supplies were made available free of charge to GPs by health authorities, the latter would benefit when fewer patients were referred to the authority's hospitals for minor surgical procedures (Milne, 1990). A practice could perform 80% of its minor operations and suturing and save £1600 per year for an outlay of £800 or less. It has been recommended that the eventual aim would be for an autoclave or other method of heat sterilisation to be available in all general practice premises (Hoffman, 1987). However, this

has not yet been achieved.

Skin biopsies and wart removal can be performed readily and quickly by GPs without referral of patients to hospital outpatient departments or for day surgery. It has been found that GPs are willing to treat cutaneous warts and referred patients only if wart paint failed or because they did not have liquid nitrogen available (Keefe and Dick, 1989; Dick and Keefe, 1988). 62% of GPs wanted a practice-based wart clinic offering cryotherapy, leading to the conclusion that resources should be provided for a community-based service. Many skin biopsies performed by GPs have been found to be inadequate, with the result that national standards and audit have been suggested (Slater, 1991).

Although minor surgery has been taken up enthusiastically by many GPs since the introduction of a fee, care has to be taken that appropriate technology is available in the surgery and that it is used appropriately. This is not always the case. Fundholding will enable practices to have greater control over the services they provide to their patients. Some GPs are employing consultants to see patients at the practice premises, thereby avoiding referral to hospital, and a lengthy wait before seeing the specialist. This is certain to become more widespread as more practices become fundholders, and means that the technology hitherto confined to the hospital sector, will be brought into general practice. However, it will mean that additional equipment will need to be purchased.

Table 2: Minor Surgical Procedures for General Practice

1.	Injections	intra articular pari articular varicose veins haemorrhoids
2.	Aspirations	joints cysts bursae hydrocele
3.	Incisions	abscesses cysts thrombosed piles
4.	Excisions	sebaceous cysts lipoma skin lesions for histology intradermal naevi, papilloma, dematofibroma etc warts removal of toe nails (partial and complete)
5.	Curette Cautery and cryocautery	warts and verrucae other skin lesions eg, molluscum contagiosum
6.	Other	removal of foreign bodies nasal cautery

Source: Chisholm, 1990.

4. DIAGNOSTIC TECHNOLOGY

This section discusses the changes taking place in diagnostic technology which are of particular relevance to general practice. GPs in the UK have not developed the use of diagnostic technology in their surgeries to the same extent as family doctors in many other countries. Although GPs in the UK make frequent use of diagnostic tests, the majority of these are performed in hospital laboratories and not by the GPs themselves.

When the National Health Service was established in 1948, it was envisaged that GPs would practise from health centres, each of which would have its own laboratory facilities. However, the reluctance of many GPs to practise from health centres, and the availability of open access to hospital laboratories, put a stop to this idea, but the recent availability of dry chemistry analysers has made the possibility of GPs doing their own tests a realistic proposition. Desk top analysers have recently been vigorously marketed in the UK, and allow the analysis of a number of blood constituents in the GP surgery (Leese and Hutton, 1990).

With the introduction of fundholding, GPs can either use their budget to purchase diagnostic tests from hospitals or perform some tests in their own premises. It is also likely that some practices might set up their own diagnostic services for nearby practices. Indeed, an advisory group has been set up to help GPs to set up just such services (Dawe, 1990). If hospital laboratories are to compete, they will have to find ways of ensuring that results are dispatched rapidly and efficiently to GPs, to avoid the long delays which often occur (Graham, 1989). A number of methods of speeding up the transfer of results have been proposed, including the installation of fax machines, the use of motor cycle dispatch riders

(Leese and Hutton, 1990) and direct computer links between the laboratory and surgery computers. The prospect of competition, induced by fundholding, may therefore have the effect of improving the service provided by the hospital laboratory so that GPs will be less inclined to purchase their own equipment.

Another recent development, again partly attributed to fundholding, is the provision of radiology services in general practice (Massey, 1992). In the past it has been usual for GPs to send all their patients to hospital for X-rays, unlike family physicians in some European countries. However, now that the component of the GP fund relating to radiology can be easily identified, some hospitals have negotiated with fundholding practices in order to develop satellite radiology sites. In one recent scheme the practice agreed to pledge three years of fundholding radiological money (£51,000) to a local hospital in return for the development of radiology services on site, in the practice. The hospital felt that the development would reduce the numbers of patients attending the hospital and generally improve the service, since 90 per cent of GP X-ray referrals can be done under GP supervision. The unit is staffed by a hospital radiographer on 3 half days per week. It should mean that patients will save many hours travelling time and that the use of the already over-stretched ambulance service will be reduced.

Dry chemistry analysers such as the Boehringer Reflotron, Abbott Vision, Kodak Ectachem and Ames Seralyser enable blood to be analysed rapidly and conveniently for constituents such as glucose, haemoglobin and cholesterol, with the results being available to the GP and the patient within minutes. There is therefore a danger that more tests may be carried out simply because they are available. However, GPs have been able to carry out a

limited number of biochemical and haematological tests in their surgeries using test strips for a number of years, e.g. Dextrostix was introduced in 1965, for blood sugar analysis. The new technology allows more sophistication, however. Alternatively, since GPs will be paying for the tests directly they may consider carefully before ordering a test, although the marginal cost is small (Leese, 1991). Test requests to the centralised hospital laboratory may be reduced, although the impact is likely to be small since it has been shown that only approximately 12% of test requests to a centralised hospital laboratory were from GPs (Leese and Hutton, 1990).

Quality assurance is of considerable importance since results must be accurate. However, it is by no means certain that accuracy and reliability are always achieved when tests are performed in GP surgeries (Leese and Hutton, 1990). There have been numerous studies of the use of tests in cholesterol screening clinics (Jones et al., 1988; Anggard et al., 1986; Broughton et al., 1989) but whether such tests are desirable or cost-effective is open to debate (Scott and Maynard, 1991). Some GPs have taken up lipid screening enthusiastically (Owen, 1989), though others have expressed doubts (Stott, 1989). The most widely used tests are for glucose, cholesterol and haemoglobin, with testing usually being performed by practice nurses (Broughton and Thorpe, 1990). This increase in testing has broader economic effects since more patients, having been tested, are brought into therapy. Then the key issue is whether treatment (e.g. for elevated cholesterol) is cost-effective (O'Brien, 1991).

Before desk top analysers became popular, GPs had numerous devices available to them for carrying out their own diagnostic tests, but even these have been criticised for inaccuracy (Burrin et al., 1985). Broughton and Thorpe (1990) provided a useful list of the

technology then available in general practice. This ranged from the qualitative or semi-quantitative dipsticks for urine and blood, pregnancy testing kits, immunoassays, allergy testing and faecal occult blood, to the more sophisticated technology used in blood measurements such as glucometers, haemoglobinometers, blood cell counters and sedimentation rate systems.

The range of diagnostic technology available to GPs is large, but as yet is not widely used in the UK. Although, as more GPs become fundholders, and as the technology improves even more, its use is set to increase considerably.

Another aspect of technology which will be briefly touched upon, but which is essentially outside the scope of this article, is the development of biotechnology. This is likely to have repercussions not only in hospital medicine, but also in primary care (Weatherall, 1991). Recombinant DNA technology has allowed the production of physiological substances on a large scale eg, calcitonin, erythropoietin and human insulin. Genetic probes will allow screening for genetic diseases, and there will be tests for the early detection of diseases which will lead to ethical problems for some GPs (Hodgkin and Yoxen, 1985). The better understanding of the immune system will lead to more effective vaccines (Weatherall, 1991). Most of this is still in the future but will lead to large changes in the ways in which medicine is practised, as well as raising ethical problems.

5. INFORMATION TECHNOLOGY

The advances in information technology and its uptake in general practice is arguably

one of the most positive developments of the late 1980s, although its full potential has yet to be realised. This is the area of technology which most readily springs to mind in relation to general practice.

In the early 1980s there were numerous reports on the implications for GPs of microcomputers, which had become comparatively inexpensive and accessible (Royal College of General Practitioners, 1980, 1982; Palmer and Rees, 1980). These reports led to the implementation of the "Micros for GPs" scheme in 1982, to which the government contributed funding. The aims of the scheme were to provide evidence on the costs and difficulties of introducing computers, the reliability of the systems once installed, the attitudes of staff, and the benefits to patients. A report on the scheme appeared in 1985 (Department of Health and Social Security, 1985). It was noted that considerable effort was required to computerise a practice, but once the initial problems were overcome, most practices which took part in the scheme were prepared to keep their computers. Computers were found to create more work, but allowed greater efficiency. Nevertheless, in spite of the "Micros for GPs" scheme, progress continued slowly (Jones, 1986).

In 1987, it was found that 38% of 260 practices had a computer, but this ranged from only 27% of practices in a midlands urban area, to 53% in a rural area (Bosanquet and Leese, 1989). Other data have shown that by 1990, 50% of practices were computerised (Pringle, 1990). However, inner city practices face particular problems which need to be addressed if they are to provide the quality and range of services typically provided to patients in the more affluent areas. Specific problems encountered in inner city areas are further compounded by the concentration of single handed practices which have less scope for economies of scale and

may need additional financial help from FHSAs if the full potential of computerisation is to be realised. Inner city practices may suffer from lack of staff and space, as well as experiencing security problems. FHSAs have made some attempt to address these problems with many having staff members responsible for computerisation, although this is frequently on a small scale (i.e. less than one day per week). Other ways in which FHSAs can help are by setting up special courses to acquaint GPs with the potential of computers, or by setting aside funds for this particular purpose.

The new GP contract and the GP fundholding scheme have provided the much needed impetus to computerisation. £24 million was provided by the government for computerisation in general practice in 1989. In addition to the funding mentioned previously, fundholding practices automatically received £16000-32000 for practice management, to enable them to employ staff and maintain computer hardware (Anon, 1991). These additional funds, together with the requirement of the new contract with the need for screening, have had the effect of boosting computerisation. Other government initiatives, such as the introduction of indicative drugs budgets and medical audit, have added further impetus (Pringle, 1990).

The potential for a comprehensive medical database on 58 million people has not been lost on some computer companies. Some have provided free computers in return for anonymised drug prescribing data which can be sold on to pharmaceutical companies, but some schemes have had financial difficulties (Anon, 1991a).

Some problems have not yet been solved, and many practices only use computerisation in a limited way, for repeat prescriptions and patient recall systems. There is the potential

for improving patient records, communication by linking computers, and monitoring quality of care (Pringle, 1990). Clinical recording faced difficulties in finding a universal coding system until the government purchased the rights to the Read classification system which is the most comprehensive. This is a step in the right direction. However, compatibility between systems still remains a problem, making transfer of information from practice to practice, and from practice to hospital, difficult (McWilliams, 1987). The ultimate aim would be for complete compatibility between linked computers for transfer of information between GPs, hospitals, FHSAs, pharmacists etc, but this is some time off. Investment in hospital computers is some way behind that of general practice and will need time to catch up (Anon, 1991).

In parallel with the development taking place in computers, a trial of "smart cards" was set up in Exmouth in 1989. Smart cards are plastic cards similar to credit cards which contain a microprocessor with a memory, which can retain the medical records of a patient (Walsworth-Bell, 1988). They are intended to be carried by the patient and can be read using a special reader unit. Access is by code and is allowed for authorised users only. Access may be restricted. For example, pharmacists may access only drug records. They have great potential in shared care systems eg, maternity, and can store information useful in a medical emergency. They are also more reliable than depending on the recollection of individuals about medical events. The Exmouth trial was funded by the Department of Health, but despite cards costing only £1 each, there are no plans to utilise the scheme nationally. They may, however, be used for specific groups such as those with diabetes, or pregnant women. Greater priority is being given to computer networks in which information can be retrieved from anywhere within the system (Fox and Webb, 1992).

6. THE PURCHASE OF MEDICAL EQUIPMENT BY FUNDHOLDING PRACTICES

Although in the past GPs have tended not to invest in medical equipment, partly because of a lack of financial incentives, the situation has changed recently for two main reasons. The flexibility built into fundholding allows money saved from the budget to be used elsewhere within the practice, and surpluses to be carried forward to be spent on further patient services. For those practices with fund surpluses, one area where the excess funds might be used is in the purchase of medical equipment.

The health promotion requirements of the 1990 contract (Department of Health, 1993) also help to make the purchase of medical equipment a more worthwhile option. A study has therefore been conducted amongst a group of fundholding practices to ascertain whether they intended to purchase medical equipment for their practices with any surplus funds, and the service improvements they hoped the purchase of such equipment would bring.

To this end, a brief questionnaire was distributed to lead partners in a group of fundholding practices in the West Midlands in October 1992, asking about equipment purchase from fund savings, and the reason for such purchases.

26 general practitioners from fundholding (or potential fundholding) practices responded to the request for information, and 19 (73%) indicated either that they had, or would, consider using any savings from their fund for the purchase of equipment. Table 3 shows how these practices were distributed by fundholding status.

Table 3: Distribution of Practices Planning Equipment Purchase by Fundholding Status

Fundholding Wave	Total in Sample	Purchase Planned No.	(%)
1	7	7	(100)
2	6	3	(50)
3	7	5	(71)
4	1	1	(100)
Unknown	5	3	(60)
Total	26	19	(73)

The most popular item of equipment was an ECG machine, chosen by four GPs. A cryoprobe, slit lamp, cautery and cryocautery were each chosen by three GPs. There were a large number of different items of equipment chosen by either one or two GPs (Table 4).

Table 4: Choice of Equipment to be Purchased from Fund Savings

Item of Equipment	No. GP Practices Making Choice
ECG	4
Cryoprobe; slit lamp; cautery; cryocautery	3
Chiropody chair; examination light; nebuliser; ophthalmology tools; physiotherapy equipment; scales; sigmoidoscope; tonometer; desk top analyser	2
Audiometer; auroscope; auxiliary room equipment; carbon dioxide analyser; carbon monoxide machine; chiropody instruments; couch; endoscopy equipment; ENT tools; fax machine; foetal doppler; microscope; on-call phones; peak flow meter; syringe driver; treatment chair; ultrasound scanner; vascular pulse; vitalograph	1

The reason for the choice of equipment are set out in Table 5 under four headings. There were 10 mentions of improvements in clinic-related services, and a further nine instances of improvements in specific services including the expansion of practice-based care. Another aim was the reduction in waiting lists or time taken for referral, mentioned by eight GPs. General improvements included those in diagnosis (3), care or efficiency (5) or in job satisfaction (1).

Table 5: Improvements Expected to be Achieved by Purchasing Additional Equipment

Improvements	No. GPs Expecting Improvements
1. Clinic Related Services	
(a) Facilities for clinics	4
(b) Improved health promotion activity	1
(c) More/improved minor surgery	3
(d) Outreach clinics	2
2. Referrals/Waiting Lists	
(a) Reduced waiting lists	5
(b) Reduced referrals	3
3. Specific Services	
(a) In-house assessment of vascular problems	1
(b) Lower bowel endoscopy services	1
(c) Extend in-house physiotherapy	1
(d) In-house chiropody	1
(e) Wart service	1
(f) Improved diagnosis for CHD	1
(g) Improved asthma service	1
(h) For local hospital eye clinic	1
(i) Reducing smoking in the community	1
4. General	
(a) General improvements in care/efficiency	5
(b) Improved diagnosis	3
(c) Job satisfaction	1

At the time of the survey (October 1992) only the first wave fundholders (started April 1991) would be in a position to have any real surplus. Their choice of equipment and improvements they hoped would result are listed in Table 6. Other practices could only speculate on what they hoped to purchase. However, three second wave practices indicated that they would not be able to make any purchases because they did not anticipate any surplus.

Table 6: Equipment to be Purchased by First Wave Fundholders and Improvements in Services Expected

Practice	Items of Equipment to be Purchased	Improvements in Services Hoped for
1	Nebulisers; treatment chair; ECG; vitalograph; tonometer; microscopes; fax machine; syringe driver	General improvements in care; facilities for satellite clinics
2	Chiropody treatment chair; 3 sets of instruments to facilitate chiropody for diabetics; better weight scales for adults and children	Improve health promotion activity
3	ENT and ophthalmology tools for in-house clinics	Reduce waiting list at hospitals; more efficient role as provider of primary care
4	Cryocautery; electronic scales; mains-powered ophthalmoscopes/auroscopes; possible sigmoidoscope; slit lamp	Reduced referrals; improved diagnosis
5	Cautery; foetal doppler; vascular probe	Increased minor surgery; fewer referrals; increased assessment of vascular problems in-house
6	Chiropody chair; sigmoidoscope	In-house service provision
7	Furnishings to new clinic areas; desk top analyser; on-call phones; carbon dioxide analyser; cryocautery	Improved services to patients

Although third wave practices had not yet taken up their fund, five of the seven respondents had plans to purchase equipment. This was also the case for one potential fourth wave practice.

In summary, all seven of the first wave fundholders, the only ones in a position to know whether they had achieved a surplus, were planning to purchase equipment. The range of equipment chosen by the practices, and the large number of items per practice lends weight to previous lack of incentives inhibiting such purchases.

The availability of surpluses is significant in allowing practices to purchase equipment which will help to improve services to patients. Non-fundholding practices are unable to utilise resources in this manner, so helping to widen the gap further between the two types of practices. Since many fundholding practices are located in the more affluent areas, inner city practices and their patients may be at a disadvantage, a problem which should be addressed.

Only three of the six second wave practices had plans to purchase equipment with any surplus funds, with three not expecting to have any savings. The differences between first and second wave fundholders could simply reflect caution on the part of second wavers who were uncertain of their savings (Newton, 1993).

7. MAJOR LESSONS FOR THE FUTURE

What lessons for the future can be learned from the UK experience? First, the

important role of incentives in determining the diffusion and use of health technologies is illustrated. Family physicians in the UK have probably used less medical equipment and diagnostic technologies than their counterparts in other European countries. This is because, under the National Health Service, patients could be freely referred to hospital specialists with no loss of fee income to the family physician.

Under GP fundholding this position is changing dramatically, as GPs see an advantage, both to themselves and to their patients, of providing more services on-site in the practice.

The second major lesson is that adoption of new medical technologies often requires other changes, beyond purchase of the equipment. Experience from the UK suggests that changes in general practice organization and additional training is required if new technologies are to be used to their full potential. Also, backup from the hospital is often required. However, some of the more sophisticated new technologies, such as dry chemistry analysers, may require little extra change and, if sufficiently accurate, could enable much more diagnosis to take place in general practice.

The third lesson is that it is by no means clear whether technological change in general practice is cost-effective. On the one hand some of the changes discussed above clearly increase the convenience to patients and also deliver the service at lower cost. However, expensive facilities in the hospital, such as pathology laboratories, may then be underused as more services are delivered in general practice. This suggests that some changes need to be carefully managed in order to reduce wastage of resources.

Also, in the UK the general practitioner has played an important 'gatekeeper' role reducing the unnecessary use of expensive specialist services. Some of the technological changes discussed above effectively reduce the access costs to the GP. Will this mean that tests or procedures of marginal value are more likely to be performed? The key to ensuring the cost-effective use of technologies under such circumstances is to make sure that GPs are aware of the costs of increasing use. In the case of fundholding GPs in the UK, the cost will be borne on their budget, thereby encouraging them to consider very carefully whether the expanded use of technologies is justified. In other countries operating under fee for service systems it is important to consider whether the use of certain technologies should be reimbursed and whether the relative level of fees is set appropriately, when compared with other procedures.

The final lesson from the UK is that more evaluation is required of new technologies. This paper has outlined a number of changes in general practice, few of which have been evaluated from an economic perspective. Many of the changes have clearly been beneficial, but if better value for money is to be obtained evaluation needs to be a more integral part of decision making about health technologies in all European countries (Drummond, 1987).

REFERENCES

Anggard, E.A., Land, J.M., Lenihan, C.J. et al. (1986). Prevention of cardiovascular disease in general practice: a proposed model, BMJ, 293, 177-180.

Anon (1991). British lead the medical world in information technology, BMJ, 302, 99.

Anon (1991a). VAMP Health Weathers Crisis, Medical Monitor, 1st March, p 5.

Barrowcliffe, I.M. (1988). Provide for the future, Medeconomics, 9, 77-81.

Bosanquet, N. and Leese, B. (1989). Family Doctors and Economic Incentives, Dartmouth, Gower Publishing Co, Aldershot.

Bradley, N. and Watkins, S. (1989). Survey of equipment in general practice, BMJ, 299, 435-6.

Broughton, P.M.G., Bullock, D.G. and Cramb, R. (1989). Quality of plasma cholesterol measurements in primary care, BMJ, 298, 297-298.

Broughton, P.M.G. and Thorpe, G.H.G. (1990). Laboratory testing in, or for, general practice, Med Lab Sci, 47, 304-311.

Burrin, J.M., Williams, D.R.R. and Price, C.P. (1985). Performance of a quality-assessment scheme for blood glucose meters in general practice, Ann Clin Biochem, 22, 148-151.

Chisholm, J. (1990). Making Sense of the New Contract, Radcliffe Medical Press, Oxford.

Colquhoun, M.C. (1989). General practitioners' use of electrocardiography: relevance to early thrombolytic treatment, BMJ, 299, 433.

Dawe, V. (1990). Group paves way for lab tests in surgery, Doctor, 29 Feb, p 9.

Department of Health and Social Security (1985). Evaluating the Micros for GPs scheme, Final Report, London, HMSO.

Department of Health (1989). General Practice in the NHS. A new contract, Crown Copyright, London, HMSO.

Department of Health (1989a). Practice Budgets for General Medical Practitioners, Working Paper No 3, London, HMSO.

Department of Health (1992). Fundholding scheme to be expanded, Press Release, H92/82, 20th February.

Department of Health (1993). GP contract health promotion package; guidance on implementation. NHS Management Executive, FHSL (93) 3, 12 January.

Dick, D.C. and Keefe, M. (1988). Treatment of cutaneous warts in general practice, J Roy Coll Gen Pract, 38, 425.

Dixon, R.A. and Wilkes, E. (1985). Defibrillators in general practice, BMJ, 290, 242.

Drummond, M.F. (ed.) (1987). Economic appraisal of health technology in the European Community, Oxford, Oxford University Press.

Drummond, M.F., Crump, B.J., Hawkes, R., Marchment, M. (1990). General practice fundholding: balancing the benefits and risks. British Medical Journal; 301(6764): 1228-9.

Evans, T. and Colquhoun, M. (1990). Resuscitation in general practice, The Practitioner, 234, 178-181.

Fox, B. and Webb, J. (1992). Britain declines to play the health card, New Scientist, No 1806, 20-21.

Graham, J. (1989). Future of on the spot lab tests, General Practitioner, 14th April, p 80.

Hawkes, R. (1992). Far-sighted solution will cut down ophthalmology delays. Fundholding, 1(8): 16-17.

Hodgkin, P. and Yoxen, E. (1985). Biotechnology and general practice 2. Beyond the technology - social and ethical problems, J Roy Coll Gen Pract, 35, 527-531.

Hoffman, P.N. (1987). Decontamination of equipment in general practice, The Practitioner, 231, 1411-1415.

Hoffman, P.N., Cooke, E.M., Larkin, D.P., Southgate, L.J., Mayon-White, R.T., Pether, J.V.S., Wright, A.E. and Keenlyside, D. (1988). Control of infection in general practice: a survey and recommendation, BMJ, 297, 34-36.

Jones, R. (1986). The impact of new technology on general practice, J Roy Coll Gen Pract, 36, 98-100.

Jones, A., Davies, D.H., Dove, J.R. et al. (1988). Identification and treatment of risk factors for coronary heart disease in general practice: a possible screening model, BMJ, 296, 1711-1714.

Kay, C. (1991). Cost-effectiveness of cardiac defibrillation by general practitioners, BMJ, 302, 1606-7.

Keefe, M.I. and Dick, D.C. (1989). Routine treatment of cutaneous warts: a questionnaire survey of general practitioners, J Roy Coll Gen Pract, 39, 21-23.

Leese, B. (1991). Is there too much laboratory testing? Discussion Paper No 79, Centre for Health Economics, University of York.

Leese, B. and Hutton, J. (1990). Desk top analysers in general medical practice: how useful are they? Med Lab Sci, 47, 256-262.

Loose, J., Southgate, C., Raper, C.G.L. (1986). Benefits of the portable haemoglobinometer in group practices, J Roy Coll Gen Pract, 36, 574-5.

Lowy, A., Brazier, J., Fall, M. et al. (1993). Minor surgery by general practitioners under the 1990 contract: effects on hospital workload. British Medical Journal, 307, 413-417.

Macallan, D.C., Bell, J.A., Braddick, M., Endersby, K. and Risso-Naudi, J. (1990). The electrocardiogram in general practice: its use and its interpretation, J Roy Soc Med, 83, 559-562.

McWilliams, A. (1987). Information technology in general practice, The Practitioner, 23, 1034-1037.

Massey, T. (1992). GPs move X-rays into the surgery. Fundholding; 1(6): 21-22.

Milne, R. (1990). Minor surgery in general practice, Brit J Gen Pract, 40, 175-177.

Morgan, D.R., Lamont, T.J., Dawson, J.W. and Booth, C. (1990). Decontamination of instruments and control of cross infection in general practice, BMJ, 300, 1379-80.

Newton, P. (1993). Fundholding savings 'fell significantly' in second year. Pulse, 2 October, 26.

NHS Management Executive (1993). Annual Report 1992-3. Crown Copyright, London, Department of Health.

O'Brien, B.J. (1991). Cholesterol and coronary heart disease: consensus or controversy? Office of Health Economics, London.

O'Cathain, A., Brazier, J.E., Milner, P.C. and Fall, M. (1992). Cost effectiveness of minor surgery in general practice: a prospective comparison with hospital practice, Brit J Gen Pract, 42, 13-17.

Office of Health Economics (1992). Compendium of Health Statistics, OHE, London.

Owen, G. (1989). Desk top labs are an instant hit, GP, May 5th, p 68.

Pai, G.R., Haites, N.E. and Rawles, J.M. (1987). One thousand heart attacks in Grampian; the place of cardiopulmonary resusitation in general practice, BMJ, 294, 352-356.

Palmer, P. and Rees, C. (1980). Computing in general practice, A report for the GMSC of the BMA, London, Scicon Consultancy International.

Pringle, M. (1990). The new agenda for general practice computing, BMJ, 301, 827-828.

Quinn, R. (1987). Evaluation of portable haemoglobinometer in general practice, BMJ, 295, 393.

Rawles, J. (1991). Cost effectiveness of cardiac defilbrillation by general practitioners, BMJ, 302, 1606.

Royal College of General Practitioners (1980). Computers in Primary Care, Interim Report, London, RCGP.

Royal College of General Practitioners (1982). Computers in Primary Care, Report of the Computer Working Party, Occasional Paper No 13, London, RCGP.

Scott, T. and Maynard, A.K. (1991). Will the new GP contract lead to cost effective medical practice? Discussion Paper 82, Centre for Health Economics, University of York.

Sims, P.A. (1985). Providing sterilized instrument packs for general practice, J Roy Coll Gen Pract, 35, 398.

Slater, D. (1991). Performance of skin biopsies by general practitioners, BMJ, 303, 1472.

Stott, N.C.H. (1989). Desktop laboratory technology in general practice, BMJ, 299, 579-580.

Waldegrave, W. (1991). Integration of primary and secondary services tops the agenda, Medical Monitor, 26th April, 27.

Wall, D.W. (1987). A review of minor surgery in general practice in the United Kingdom, Fam Pract, 4, 322-329.

Wall, D. (1991). Minor surgery in general practice, Primary Health Care Management, 1, No 10, 10-11.

Walsworth-Bell, J.P. (1988). The use of smart cards in the NHS, Health Trends, 20, 86-88.

Weatherall, D. (1991). Tomorrow's biotechnology, BMJ, 303, 1282-3.

Zoltie, N. and Hoult, G. (1991). Adequacy of general practitioners' premises for minor surgery, BMJ, 302, 941-942.