Why general practitioners use computers and hospital doctors do not–Part 1: incentives

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Almost all British general practitioners use computer based patient records, but most hospital doctors do not. This review (the first of two) focuses on how, over 30 years, incentives led to enthusiastic adoption of computing by general practitioners but widespread alienation of hospital doctors.

Summary points

- Almost all British general practitioners use computers in their consulting rooms, but most hospital doctors do not
- Over 30 years, leaders of the general practitioner profession have worked with government to provide incentives for computerising practices and to remove barriers
- In hospitals computing was treated as a management overhead, and doctors had no incentives to become involved
- The success of the government's plans for "joined up," computer based health services depends on providing appropriate incentives to hospital doctors

Methods

This article has had a long gestation. Much of the evidence comes from my experience over nearly 30 years, first as leader of the computer evaluation unit at the Charing Cross Hospital, London (1974-80), then as a general practice system supplier (1980-90), and as a supplier of clinical information systems for hospital doctors (1990-9). An initial version of the article was written in 1993 and extended for the NHS Executive's integrated clinical workstation project 1995. A later version was presented at the AMIA Symposium, Washington DC, November 2001 (proceedings, pp 42-6).

The state of computerisation in health services

Wanless pointed out Britain's particularly poor record on the use of information technologies in the health service and called for an immediate doubling of expenditure on computing.[1] The Department of Health has responded with a new national strategy to deliver the benefits of working practices supported by information technology and computer based records across the NHS.[2] Concern is not limited to Britain: in 2001 the US Institute of Medicine stated that "IT must play a central role ... if a substantial improvement in quality is to be achieved" while noting that to date "IT has barely touched patient care."[3] It describes the computer based patient record as an essential technology for health care.[4]

Today almost all general practitioners have computers in their consulting rooms and are connected to the NHSnet.[5] Indeed, by 1996, 96% of general practices were computerised,[6] and about 15% now run "paperless" consultations. The situation in hospitals is already changing, albeit from a very low base. Since 2001, access to computers by hospital clinical staff has increased substantially. By May 2002, 76% of consultants had access to NHSnet for email and browsing,[5] although few yet use computer based patient records. The Department of Health target is that all clinicians have access to electronic patient records by 2008.[2]

Large differences in computerisation between general practitioners and hospital doctors are found in countries where general practitioners play a gatekeeper role for controlling access to secondary care, such as in Holland[7] and much of northern Europe.[8] In other countries, where payment is based mainly on item of service, there is little difference in computer use between general practitioners and specialists. For example, there is no difference in the proportion (12%) of Canadian general practitioners and specialists who claim to use electronic medical records for more than just billing and patient scheduling.[9] Implementation of computer based patient records in US hospitals has remained at 12%-13% for the past three years.[10] However, 140 Veterans Administration hospitals now run paperless computerised patient record systems, which shows what can be done.

Origins

The first British general practitioner to use a computer in his consulting room was John Preece at Whipton near Exeter in 1970.[11 12] In 1975 the health centre at Ottery St Mary, also near Exeter, became the world's first paperless general practice.[13] For a few years in the

late 1970s, the Ottery system was fully integrated with the local hospital, allowing general practitioners and hospital staff to share the same information, subject to access controls. This project also developed the computer printed prescription form (see box 1). The practice continues today to use the direct successor of the original software.

Advanced hospital computing projects were sponsored by many governments during the late 1960s and early '70s. In 1965, Donald Lindberg provided the first ward based access to clinical test results.[14] In England a programme of a dozen experimental computer projects was established. Many government-funded projects produced impressive evaluation findings (see box 2). However, by the late 1970s the international fashion for government backed experimental computer projects had passed. In most countries these projects were converted into academic departments of medical informatics and have remained centres of excellence. In Britain they were handed over to the people who looked after the regional payroll computers. Subsequent pressure to support more hospitals without corresponding increases in hardware led to the loss of integration at Exeter and elsewhere. Progress ground to a halt.[15] Today, few English hospitals have integrated patient administration and cumulative clinical laboratory reporting systems accessible from terminals on the wards and in outpatient clinics. As long ago as 1975, such facilities were operational in several English hospitals, including the Charing Cross, the Royal London, and the Queen Elizabeth Medical Centre, Birmingham.[16]

Professional leadership

During the late 1970s several of the leaders of the Royal College of General Practitioners came from around Exeter and were knowledgeable about computing. In 1980 the college organised the first national conference on general practice computing, GP-INFO-80, which included papers on the use of public key infrastructure and decision support in consulting rooms.[17] In his forward to the proceedings, Clifford Kay wrote: "the success of GP-INFO-80 greatly exceeded our expectations. This publication ... cannot convey the extraordinary sense of novelty and excitement experienced by those who were fortunate enough to be present—fortunate indeed because the conference was three times over subscribed. Our handsome headquarters building was packed tight with computers, and festooned with hundreds of yards of electric cables specially installed to provide the additional mains power required."

The same year, the college joined with the BMA to present a united voice to the government and established the RCGP-BMA Joint Computer Group. A series of government led activities in general practice computing have been undertaken in close consultation with this group, starting with the "Micros for GPs" scheme in 1982. In contrast, the initiatives made by hospital consultants have been disparate and ineffective. Many of the royal colleges have their own computer groups, but these have had little impact. The BMA's Joint Consultant's Committee was persuaded to support the resource management initiative in the late 1980s, but this backfired when the initiative was recognised to be an attempt to introduce standard costing into the NHS, providing little benefit to doctors or patients. There is still no direct equivalent of the RCGP-BMA Joint Computer Group for hospital doctors. Similarly, individual practitioners in primary care computing established a unified primary healthcare specialist group (PHCSG) in 1981, unifying three smaller groups. In the hospital sector several information technology groups are still fighting turf wars.

Dr Jeremy Bradshaw Smith at Ottery St Mary health centre, which, in 1975, became the first paperless computerised general practice

Box 1: The computer printed prescription form

The Exeter (Ottery St Mary) project invented the FP10 (Comp) prescription form, which is twice the width of a standard prescription, with a large blank area on the right hand side. The reason for the blank space was that narrow tractor-feed printers were not available in the mid-1970s. The blank right hand side was later used to provide patients with a record of their drugs, which is so useful that no one has seriously considered doing away with it.

In 1981 the Department of Health approved the national use of the computer printed prescription form, in spite of reservations that computers would make it easier to prescribe more. This regulatory change was critical in enabling the development and spread of general practice computing, where computer assisted repeat prescribing saves time and improves safety. In most other countries computer printed prescriptions remained illegal for many more years, slowing the uptake of computing. This is an excellent example of how a modest change to regulations can have beneficial results.

Until 2000, however, general practitioners were in breach of their contract if they failed to keep patient records on paper forms, and paperless practice was technically illegal. Regulations to enable paperless prescribing are still on a pilot basis only.[22]

The government

The NHS is a nationalised business, paid from taxation, and the government has a dominant role as both owner and paymaster. The Public Accounts Committee of the House of Commons is the most powerful parliamentary watchdog and has issued a long series of

Box 2: Evaluation of hospital information systems

Evaluation findings more than 25 years ago showed that hospital information systems were cost effective:

- By 1975 the Charing Cross Hospital, London, had installed a fully integrated patient administration and results reporting system. Evaluation showed reductions in the turnaround times of almost 50% for routine clinical chemistry tests (urea and electrolytes) from 14.8 hours to 7.6 hours, and nearly 90% for a routine haematology (full blood count) from 13.8 hours to 1.6 hours. Time savings in the laboratory amounted to 5.8 minutes per request (specimen). Even at 1970s computer prices, a wide range of hospital applications were fully cost justified[16]
- The pioneering Technicon hospital information system at the El Camino Hospital, California, was subject to rigorous evaluation during the mid-70s. This showed inpatient cost per case as 40% less than the county average of 13 similar community hospitals—including a 10% reduction in length of stay, primarily attributable to reduced turnaround times for tests[23]
- At Leiden in Holland the costs of processing laboratory tests was shown to be 35% less than at other laboratories with similar levels of test automation. The quantified benefits of the hospital information system were greater than the total computing costs, even including the costs of 21 development staff[24]

negative reports about information technology in health care, including the projects at Kings College Hospital, Wessex,[18] Hospital Information Support Systems, and the Read codes. Although the criticisms have usually been valid, the government reaction has tended to be to throw out the good with the bad. The committee reports were used as excuses for closing down the experimental programme in the late 1970s, regional computing initiatives and centrally funded computer projects in the early 1990s, and the NHS Centre for Coding and Classification in 1999.

In 1972 the Department of Health decided to treat information technology as a management and administration cost. One result was to grade hospital information technology staff on administration and clerical scales. Since then, NHS staff have been an underclass of the information technology world, with salaries typically running at 40% less than the going rate for the job outside the NHS. As a result, the health service is chronically short of information technology skills. Increased resources need to be devoted to education and training in health informatics.

A more damaging effect followed the 1992 general election. The Labour party, then in opposition, pointed out that between 1987 and 1991 NHS management costs had doubled. The attack hurt. After unexpectedly winning the election, the Conservatives set out to prevent such an attack working again. They noticed that computing costs had played a large part in the increase in management costs. So, supported by the Public Accounts Committee reports on the Wessex project and Hospital Information Support Systems, they closed down the four large Department of Health initiatives and sold off 14 regional computer centres without ring-fencing their budgets, saving about £400m a year. In addition, they required that all capital expenditure on computer systems be accompanied by a full business plan, be tested for private finance, and be approved by the Department of Health and the Treasury. Only one scheme was approved in five years.

Investment in information technology plummeted, and the healthcare computing business was decimated. Management costs were reduced, but the Conservatives lost the 1997 election. In 2001 the Labour government announced a rise in capital expenditure on computing from £65m in 2000-1 to £317m in 2002-3.[16] After the Wanless report,[1] the total budget for information technology for 2003-4 is to be increased to £2bn, of which more than half is probably capital expenditure. General practice computing was never classified as a management overhead in the NHS accounts, so it escaped this rollercoaster ride.

Free systems

General practitioners act as independent businesses and need to pay for their own computers. Offers of "free lunches" have always been well accepted. The earliest experiments around Exeter were free to the practices. The 1982 Micros for GPs scheme also got general practitioners used to the idea of subsidised computing. For a period (from about 1985 to 1990) general practice computing policy in England (but not Scotland) was definitely "hands off," which encouraged innovation. In May 1987 two general practice suppliers—AAH Meditel (using Abies software) and VAMP—introduced free computer schemes, which eventually covered nearly 2000 practices (20% of all English practices). Each practice was provided with a multiuser computer system at no cost on the condition that the general practitioners agreed to collect and provide comprehensive data about morbidity, drug prescribing, and side effects. This required the doctors to use a computer in their consulting room in order to collect the required level of data. The companies intended to recoup their costs by selling the data to the pharmaceutical industry for postmarketing surveillance, market research, and clinical trials. Both schemes eventually collapsed because the quality of data collected was less consistent and less complete than had been expected.

In 1989 the Department of Health introduced a scheme for direct reimbursement of general practice computer costs tied to a process of software accreditation. Reimbursement (together with the introduction of a new general practitioner contract) led to a further dramatic increase in the number of computerised practices, although the accreditation process used has stifled the rate of innovation.

Remuneration

Small differences in remuneration have had a positive impact on general practice computerisation and a negative impact on hospital doctors. British general practitioners are paid according to a complex set of regulations, with the main variables being list size and the level of preventive medicine activity. It is not practicable to maximise income without using a computer to monitor and control this activity.[19]

In contrast, NHS hospital consultants have a fixed basic income supplemented by merit awards and

private practice. Top merit awards are awarded for national and international standing within the specialty and can more than double a consultant's basic salary. Any time that a hospital doctor devotes to computing does not lead to increased income potential.

Conclusions

Over many years, general practice computing has prospered, whereas hospital clinical computing has not. Differences in leadership and economic incentives partially explain this. In general practice the government and the profession worked together to remove barriers and provide incentives to computerisation. In hospitals the opposite happened. Changes are needed to provide professional leadership and economic incentives in both primary and secondary sectors. An early step would be to establish united stakeholder organisations for clinical users and information technology professionals in health care, covering all aspects of healthcare computing

The NHS is now planning to deploy integrated patient record systems across both primary and secondary care.[20] The examples of Kaiser Permanente and the Veterans Administration suggest that such systems may play a critical part in improving effectiveness and efficiency.[21] However, such a project faces several technical obstacles, mainly associated with scalability. It is much easier to computerise small general practices than large complex hospitals, let alone provide integrated services across an organisation as large as the NHS. These technical issues—which include patient record architecture, terminology, interoperability standards, security, and developments in computer technology—are the subject of my second article.

I thank Jeremy Wyatt for comments on an earlier draft of this article.

Competing interests: I have participated in many of the events described and have provided consultancy services to various NHS organisations

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Corrections and clarifications

UK senior doctors' career destinations, job satisfaction, and future intentions: questionnaire survey

A lapse in concentration as we processed this paper by Jean M Davidson and colleagues (28 September, pp 685-6) led to the omission of an authors' amendment at proof stage. The paragraph that starts, "We asked respondents to score five statements about job satisfaction" was misleading. It should have read: "We asked respondents to score each of five statements about job satisfaction on a five point ordered scale from 'strongly agree' to 'strongly disagree.' The statements were 'I find enjoyment in my current post'; 'I am doing interesting and challenging work'; 'I feel dissatisfied in my current post'; 'Most days I am enthusiastic about my work'; and 'I am often bored with my work.'[1] We calculated a job satisfaction score for each respondent over all five statements, by assigning a value of 1 to 5 for the responses, from the least to most positive answer, and totalling them: 20 or more represented a positive response, on average, to all statements, and we suggest that this shows a high level of satisfaction."

Dietary aflatoxin exposure and impaired growth in young children from Benin and Togo: cross sectional study

An error crept into this paper by Y Y Gong and colleagues (6 July, pp 20-1). Unfortunately, < -2 and < -3 (referring to z scores) were inadvertently replaced with $\leqslant 2$ and $\leqslant 3$ in both the text (methods and results section) and the figure caption. The correct symbols appeared in the figure.

Mental health campaigners cancel march because of fears of backlash

In this news article by Zosia Kmietowicz (14 September, p 562), we wrongly referred to Rampton as a prison. It is of course a high security hospital.