Computers in British General Practice

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General practice in Britain has taken significant strides in the last three years in the application of computers to patient care and practice organization. This growth has developed in conjunction with the explosive rise of microprocessor technology. Many of the British developments, both technical and organizational, are of considerable interest to American physicians, who are confronted with similar problems in combining information technology with the practice of patient care. However, because of the nature of practice in Britain, until recently computers have been used on a very limited scale in general practice, and usually in large mainframe systems to link practices with hospitals.

In the 1960s two major schemes were implemented in Britain. First, the Exeter Community Health Services Computer Project was set up in 1976 to integrate the medical information from health centers (general practice) with the hospital outpatient and inpatient records and nursing and service departments. Immediate access to the information was possible in a variety of sites through individual video display units (VDU). All clinical notes, as well as demographic and technical data, were unified into a single integrated patient record. Over the years, however, the hospital part of the computerized record system was reduced and finally suspended, mainly because of high costs. However, general practitioners at the health centers still use the system, although there continue to be concerns regarding the value and impact of real-time medical records.[1,2]

Second, the Oxford Community Health Project similarly involved several general practices in a mainframe-computer–based linkup with the local hospital, using an integrated approach,[3] which involved batch patient registration data and a medical summary system.

Both of the projects described demonstrated the feasibility of a computer-based medical record system between primary care practice and the hospital using mainframe machines. There appeared to be three major problems that would prevent widespread acceptance and dissemination of this system: cost, confidentiality, and difficulties of data entry. During the time that the government-backed schemes were in operation, a few other general practitioners were working with large computer and industrial companies to develop systems for individual practices.

With the advent of inexpensive microcomputers the feasibility of "stand-alone" systems in general practice became obvious, and some enthusiastic practitioners bought their own machines, found a local programmer in their practice population, and began developing software. These systems offered

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economy, increased confidentiality of records, flexible programming, and personal control by the physician. Small computer companies also saw the prospect of a considerable commercial market opening up among the 9,000 general practices in Britain and began developing systems with cooperative general practitioners. This varied activity stimulated the British Medical Association General Medical Services Committee to commission a report, "Computing in General Practice,"[4] from a scientific consulting organization. The aim was to investigate the ways and extent to which computing was used by general practitioners and develop a set of guidelines and recommendations to achieve a concerted approach to the problem of automation in practice. The consultants worked closely with the Computer Working Party of the Royal College of General Practitioners and visited approximately 30 practices.[5] Their main recommendations were as follows:

1. A computer policy group should be set up by the British Medical Association for General Practice Computing.
2. A pilot scheme, involving 100 practices, should be set up for three years.
3. A consulting mechanism should be established to give advice to general practitioners who wished to purchase or use computers.
4. Certain criteria should be established regarding computer systems in practice (ie, software and hardware specifications).
5. Implementation in any one practice should be undertaken through a phased approach.
6. The main use in practice would be for clinical summaries, patient screening, and repeat prescribing.
7. The government should provide financial assistance for the purchase of computer equipment. In return certain statistics would be provided by the general practitioners on a regular basis: morbidity patterns, child health screening, drug utilization, etc.
8. Access to other computer information systems should be developed.
9. A single multipurpose fee-for-service claims form should be developed.

Since the publication of the report, it has been established that approximately 70 systems are in place in general practices, representing about 1 percent of all the practices in Britain. Some of these systems, however, consist only of a microcomputer with software to support repeat prescribing and therefore cannot be regarded as having been seriously established. A Royal College of General Practitioners Working Party on Computers indicated in their 1980 report that a compatible computer system should be in widespread use in general practice by 1985 and almost universally adopted by 1990 throughout the nation.[6]

What Information to Collect and How to Collect It

Those general practitioners who have been in the vanguard of the current computer fashion tend to be either highly enthusiastic information gatherers or gadget-lovers; thus, the range of data that they have proposed to be collected in practice has varied enormously, usually in the direction of information overload. Overall, however, reason has prevailed, and there has been continued feedback to the computer companies, who have been cooperative and sensitive to the physicians' comments regarding information needs from users in practice. (Indeed the suppliers of general practice computer systems have formed an association to work more closely with users, professional organizations, and the government.) The feedback has been concerned mainly with the relative importance of various aspects of practice information and the costs of undertaking computerization.

The software that is currently available to most systems can provide the following features: (1) *administration*—master index of registered patients, printing of address labels, practice statistics or profiles, and age and sex indices and accounts; (2) *recall*—recall and surveillance for patients at risk, cervical smear, chronic disease (hypertension, diabetes, etc), medication, vaccination, and invitation letters to patients; (3) *repeat prescription control*—automated prescription printing, repeat prescription audit, automated patient medication card, stock control for dispensing physicians, drug group interactions, and drug table (approximately 900-item capacity); (4) *clinical record*—problem list maintenance (approximately eight per patient), audit for selected groups (morbidity), and encounter data (ie, clinical notes); and (5) *word processing*—recall or referral letters and patient fact sheets.

It is evident, however, that most general practitioners do not wish to avail themselves of all the

items noted above. This reasoning is based on the key fact that the National Health Service pays 70 percent of office staff salaries, so that the use of personnel is very cost effective for physicians. The computer systems must be able to do things that office staff and physicians either cannot do, have insufficient time to do, or do inefficiently. The main motivation for using the machines is to ensure that there is a significant improvement in patient care and administration combined with economy and trouble-free maintenance.

Recent surveys of general practitioners have shown that the needs described in Table 1 were perceived as valuable and necessary in a computer system.[7] A majority of physicians were uninterested in automated history taking and diagnosis, audit, and appointment systems. Many did not wish to record clinical notes, preferring to have only a patient summary.

There is currently considerable discussion about the best method for entering data into a general practice computer system. Again, considerations are modified by the fact that the National Health Service supports office staff salaries, so that data entry by receptionists or secretaries becomes quite economic. However, data entry takes time: it is estimated that in Britain it takes an average of three minutes to update each patient's record (ie, problem list and medication list), while one to two minutes is added to the consultation if there is a video display unit in the consulting room for instant physician (real-time) data entry and recall. In the National Health Service (NHS), real-time computing (unless used by the physician for making clinical notes at the time of consultation) is not important except for the immediate identification of drug interactions in a particular patient; therefore, most of the information generated at a consultation is not required to be entered or accessed at the time at which the patient leaves the office. This limited demand for information storage or access contrasts with the needs of practices in the United States, where not only do patients expect and receive the results of their simple laboratory studies while still in the physician's office, but they are asked to pay for the visit and other items of service as they check out at reception. As a result, data entry requires more financial and staff resources in the American setting, and often a more complex computer configuration than in Britain. It has been estimated that for British general practice registration data, simple encounter data and repeat prescription recording require a minimum of one megabyte of memory per 100 patients. To this must be added some flexibility in developing new applications so that a practice of 10,000 patients will require a memory storage capacity of at least 250 megabytes.[8]

Table 1. Needs of a Computer System

Records

Should hold details of immunizations, allergies, long-term medication, medical history summary, set out in easy-to-read format

Chronic disease surveillance in a special format (diabetes, hypertension, prenatal care, geriatric care, obesity)

If using encounter text, latest consultation should be most prominent

Recall

Compilation of patient lists, recall letters, address labels

Repeat prescriptions and drug interactions

Payroll, accounts

Costs

Generally, computer hardware is as expensive in Britain as in the United States and initial costs of installing a system are relatively high. Costs include the efforts made by physicians and office staff to adjust to the system and discipline themselves to more uniform methods of record handling, to support staff morale in the face of machine and software problems, to pay for extra staff when setting up the system, and to make actual cash payments for the hardware, software, and maintenance as well as annual expense.[9] The major hurdle to implementing a system is the conversion of records, taking a full-time staff member about five months to convert 8,000 records (registration, prescribing, and clinical summary data). Costs in a small practice of 5,000 patients for a minimum hardware configuration that includes a central processor, a video display unit, twin floppy-disk drives, and a printer are currently in the range of $6,000, which added to installation,

training, software, and premises modification would raise the figure to approximately $11,000. Costs for a larger practice (three to four physicians) would include a hard disk for increased data storage and would amount to approximately $20,000. Annual running expenses are said to be approximately 30 percent of the basic hardware cost. Because there is no need for large storage capacity to record billing and insurance data, the British systems, on the whole, cost less than systems used in the United States. In Britain there is no regular financial support from the National Health Service for purchasing and implementing systems at present, although there are developments under way to consider some experimental funding. The only source of extra funds for general practitioners is increased efficiency in claiming fees for items of service that are reimbursed by the health service (immunizations, Pap smears, etc). It has been demonstrated that a practice can offset the cost of a computer system to a considerable degree by using it to run an effective immunization recall program for which fees can be claimed.[10]

Support and Development

In spite of the early uncoordinated efforts of individual practitioners to introduce microcomputer systems into their practices, the approach to computer use in general practice in the last two years has been relatively logical and well defined. The major aim has been to produce rational and uniform guidelines to ensure system compatibility at a national level. It is evident that in general practice computer use supported at all levels by the National Health Service is developing rapidly at the individual practice level. Computer use in the administrative and organizational aspects of the National Health Service using mainframe systems has been well established at the national and regional level for some years. Although the general policy from the health administration viewpoint has been to develop standard mainframe systems, in fact, many regions have gone their own way. There are currently seven National Health Service computer systems in existence, ranging from a child health register to manpower planning programs. It is now generally agreed that an organization as vast as the National Health Service (the largest employer in Great Britain) cannot run on completely uniform and integrated data systems. The future pattern of a national health computing organization will include a central computer policy committee, regional bureaus with links to areas and districts carrying out primary care and hospital care applications, and individual general practice systems.[11,12]

The various computer committee advisory and educational groups currently active in Britain have both planning and advisory functions. Support for computer use in general practice comes from the following sources:

1. *Royal College of General Practitioners Computer Working Party.* This group, comprising general practitioners and university computer science specialists, has produced a monograph laying out the major computational needs and philosophies in general practice for the future.[5] The committee also indicates educational and practical guidelines for practitioners expressing interest in computers.[6]

2. *Imperial Chemical Industries Computer Fellowship.* The Royal College of General Practitioners with support from industry has created a computer fellowship in which a general practitioner would be appointed on a part-time basis. The fellow would have the task of becoming fully informed on developments in the computer field and of providing advice to others on the introduction of systems into practice.[13]

3. *General Medical Services Committee Computer Policy Group (British Medical Association).* This group commissioned a report on computing in general practice from Scicon Consultancy International.[4] The report is the result of a detailed survey of computers in practice and provides both a careful analysis of all aspects of implementation and precise recommendations for implementation. The group is developing a coordinated approach to the introduction of computer systems with the Royal College of General Practitioners.

4. *The Primary Care Specialist Group.* This group has recently formed under the auspices of the British Computer Society and consists of an interdisciplinary group of users with a wide range of expertise that can be tapped by individuals or organizations. The group maintains over 20 pages of data on Prestel, the national viewdata network, covering events and meetings on general practice, computing advice on purchasing computer systems, and what to look for in software packages.

5. *Health Information Working Party: Na-*

tional Health Service. This is a national body concerned with overall health computing policy and financing.

6. *"Micros for GP's Scheme" (Department of Industry Initiative)*. In conjunction with Information Technology Year (1982), the Department of Industry and the Department of Health and Social Security have made available just over $4 million to support the introduction of microcomputers into 160 general practices. Each practice selected for this program would pay one half of the cost of implementing the system; the government would pay the other half. Unfortunately, the scheme was developed and announced without adequate consultation with the various parties concerned. Furthermore, only two suppliers were identified (on the basis that their hardware and software were British). In fact, the ability of these two companies to provide adequate training, maintenance, and problem solving for 160 systems is suspect, and this scheme has caused other companies who were also well along in systems development to either suspend or discontinue their involvement. It has been suggested that system selection has been premature and will inhibit innovation.[14] However, over 1,000 physicians applied to participate in the scheme, and since they represent physician groups, a considerable interest on the part of the profession is implied.

7. *National Computing Center*. This organization, based in London and supported by the computer industry, offers an advisory service and objective evaluations of systems and runs courses in microcomputing. At least two general practice systems are available for inspection by visiting general practitioners. Unfortunately, these systems are often "down," and in any event inspection of systems is best undertaken in the practice setting, if at all possible. The center, although theoretically of considerable value, has not been effective for general practitioners.

8. *Prestel*. Recently the National Telecommunications Organization (British Telecom) has developed a data base system linked by telephone to domestic television sets. The original idea was to provide domestic and business users with up-to-the-minute shopping, social services, banking, travel, business, and leisure information, and the data base now comprises 250,000 pages. A limited medical information service supported by the pharmaceutical industry is currently available offering details of medical meetings and seminars, a locum and practice location service, data regarding fees under the National Health Service, and summaries of selected medical journals as well as a few continuing medical education programs. The medical data base contains over 5,000 pages of information. New plans from Prestel include the provision of national networking facilities for microcomputer users. These facilities will allow home computer users access to large national data bases and to call down a vast array of computer programs.[15] A Prestel adapter with alphanumeric keyboard costs $350 and regular subscription costs $35 per year on a residential line or $100 for a business line. For the average three-person practice the total cost is expected to be $180 a year. Currently 1,500 general practitioners have Prestel sets in their practices, and similar equipment is generally available in postgraduate centers, hospitals, and medical schools.[16] However, at present, most practitioners cannot conveniently interact with Prestel.

Work at the University of Surrey by the general practice research unit has concentrated on communicating with the Prestel using a new "black box" technology to provide a cheap, interactive entry into the Prestel system for practitioners without purchasing a microcomputer. This system, which uses a printer, a small monitor, and a tape recorder for storing programs, costs approximately $600. The link to the Prestel network costs $30 for installation with additional cost for telephone use. The Prestel network also communicates with a central mainframe computer for collating data. The practitioner can use the black box (which has typewriter keys) to call down programs or to send information to other users or the data center. The system is already being used by about 300 physicians and hospitals for the following tasks: market surveys by pharmaceutical companies, clinical trials and protocol data entry by physicians, postmarketing surveillance of new drugs (side effects), epidemiological studies (participating physicians enter daily morbidity data), mailbox to practitioners from pharmaceutical companies and other agencies, education (practitioners call down medical education programs), research, and data base access (drug interactions, poison index).

The Prestel program, already established on a national scale, has enormous implications and po-

tential for the management of medical information in general practice if the medical linkup can be successfully implemented.

Computer Journals

International Technology Year has seen the publication of two new journals confined solely to the subject of computers in general practice. *Practice Computing*,* supported by a large industrial company, provides practical advice to users and potential purchasers and reviews systems currently being installed by practitioners. *Computer Update*** comes from an established medical publishing company with the reputation for innovation and high-quality journalism. The Update group is also developing its own computer system for general practice, thus providing an interesting and valuable combination of hardware, software, and continuing support from the journal.

Conclusions

It could be said that the National Health Service has been waiting for over 40 years for the computer to arrive. This highly systematized national health program with relative uniformity in recording methods and prescribing and medication monitoring, as well as general administration, is an ideal candidate for computerization, particularly in the field of general practice. With the addition of the grid structure of the National Telecommunications System, there is potential for large-scale networking of medical practice. Thus, there is the real possibility that major epidemiological studies and interventions will be undertaken collaboratively among practicing physicians, epidemiologists, and health planners.[17] In spite of various political and financial difficulties, at present there appears to be a solid approach to the implementation of computers in general practice supported by medical and government organizations and facilitated by journal communication. In the United States, although the hardware and software may be technically in advance of that of Britain, there has been little evidence of a systematic approach to computer applications in family practice or indeed primary care as a whole, perhaps because the implementation of computer systems has been based on the primary need for an efficient billing-insurance component rather than on patient care and management. A national system of health care creates an effective structure for the implementation of economic and effective computer systems in practice, including networking. Although a nationwide system is not feasible in the United States, health maintenance organizations have considerable experience in this field and could provide expertise and advice to family physicians. It seems also that the American professional organizations representing primary care practice have been slow to give both direction and support for the practicing physician, who is often confused by the array of hardware and peripherals, unaware of the pitfalls of inadequate software, and at the mercy of intensive advertising by the commercial sector.

**Practice Computing,* edited by Stacey Tanner. Paradox Publications, 3941 North Road, London, Great Britain, N79DP.

***Computer Update,* edited by David Holmes, Update Publications Limited, 3334 Alfred Place, London, Great Britain, WC1E7DP.

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