The impact of new technology on general practice

TECHNOLOGY is a tool which enables us to use knowledge gained by research and scholarship. Yet technological progress possesses a beguiling momentum of its own and technical innovations often develop faster than they can be evaluated. Given the continuing uncertainties about the management of common illnesses, predictions about the utility of technological advances in general practice are, to say the least, hazardous. There can be little doubt, however, that general practice will be changed and enhanced by a variety of developments over the next decade. The three areas most likely to be affected are the organization of practices, the consultation and the relationship with secondary care.

The introduction of practice microcomputers and the development of local and regional networks, interfacing with family practitioner committee systems, is theoretically capable of transforming many traditional activities in general practice. The reality is that despite the 'Micros for GPs' scheme,[1] the motivation from the RCGP[2-4] and the Andersen[5] report, progress in computerization has been relatively slow owing to constraints of money and time and to uncertainties about the most appropriate hardware and software to use. Nevertheless there has been some progress; at regional level, for example, the Wessex Regional Health Authority's Regional Information Systems Plan,[6] based on British Telecom's Merlin Healthnet System, is now operational, with terminals in district offices, hospital departments and health centres. For general practitioners this has meant rapid access to pathology reports, valuable liaison with medical records departments and ambulance services and improved communication with clinical colleagues. Computerization of family practitioner committee (FPC) records is proceeding, and soon about half the population of the county will be covered; most of this progress is due to implementation of the system developed by the Exeter FPC computer unit.[7] This development may have profound implications for the contribution that FPCs could make to performance review in general practice.[8]

At practice level, the last year has seen the publication of a number of important and encouraging reports on the use of microcomputers. The first step in computerizing practice records is the transfer of data from manual records; although the preparation of a mechanical age–sex register is quite straightforward, Hannay and Mitchell pointed out some of the problems encountered in transferring more complex summary data[9] and Difford described how the accuracy of his practice register was maintained.[10] Repeat prescribing using a microcomputer has been evaluated in a number of ways. Aylett described a simple system in a singlehanded, part-dispensing practice and reasserted the utility and flexibility of small systems with software written by the user,[11] and Difford[12] suggested that the use of a computerized system may be associated with reduced prescribing costs. Roland and colleagues[13] found that their computer-assisted repeat prescribing programme saved time for doctors and receptionists, produced prescriptions faster, improved the recording of information in the case notes and reduced queries from chemists. The General Medical Services Committee/RCGP joint computing liaison group published standards for prescriptions issued by computer.[14] Preece and his colleagues from Exeter reported the use of a 'drug intelligence' package used in the writing of all prescriptions[15] which not only allows the general practitioner to build up and maintain a comprehensive medication data base but also supplies information which can be reported to a remote central drug authority on a regular basis.

There have been a number of reports of innovative uses of microcomputers beyond the realm of age–sex registers, repeat prescribing and patient recall. Jarman has introduced a method of providing advice about welfare benefits to patients in a health centre using a microcomputer programme operated by a local social security officer.[16] Difford, in a further paper,[17] described how practice population and morbidity may be mapped and shown graphically, using a microcomputer. Fitter and colleagues analysed the effects of installing a computerized information system in a large group practice and using it for systematic auditing of clinical activities. They found that it also acted as a catalyst for review and revision of administrative and management procedures.[18] Saul described how, using appropriate modems and software, practice microcomputers could be used to access a variety of remote data bases, such as Prestel, the Committee on Safety of Medicines viewdata facility, on-line computerized libraries and the FPC computer.[19] This last report and a number of the others cited, hint at the great potential for data collection and analysis that practice-based computer networks hold. The recent RCGP occasional paper *Classification of diseases, problems and procedures* describes the ways in which morbidity and mortality data can be recorded and analysed.[20] Beyond that, however, an enormous amount of research data about natural history, epidemiology, unwanted effects of drugs, demographic factors, practice and doctor variables and so on will be available if efficiently computerized practices cooperate with each other.

The importance of adequate record-keeping for the effective management of chronic illness and for implementing preventive strategies is well recognized, and the introduction of microcomputers into practices has already made a considerable impact in this area.[21,22] For example, in the well-tried Finnish Finstar system,[23] follow-up reports for chronic diseases such as diabetes, hypertension and asthma may be printed automatically during the consultation, drawing the physician's attention to the need to measure the appropriate disease parameters.

Microcomputers have been used directly, for example in the waiting-room, to obtain screening information from patients[24,25] and this approach is regarded as an acceptable stimulus to doctors and patients. In an important series of studies, Pringle and colleagues have examined the effects of the use of computer terminals in the consultation on consultation dynamics. Using techniques to measure patient stress and arousal[26] and employing topic analysis,[27] they conclude that the effect of the computer on patient stress and arousal, consultation duration and the uptake of preventive medicine was highly satisfactory.[28] Brownbridge and colleagues[29] also found, in their study in Sheffield, that using a computer during the consultation to review and update case notes and data on prescribing is not associated with significant change in the standard of the delivery of care by doctors.

This is an important area of research because of the likelihood that microcomputer terminals will be used not only to replace Lloyd George envelopes but also as routine diagnostic aids in the near future. Lilford and Chard predict that the computer as a 'doctor's aide' will be a practical reality by the end of this decade,[30] a view supported by de Dombal,[31] and also by publishers, who are showing an interest in developing flexible computerized decision-aids for general practitioners.[32] Would the employment of systems of this kind represent a quantum

leap for general practice into an uncharted realm of standardization and rational behaviour? For example, the revenue consequences of referral to hospital for investigations and specialist opinions greatly exceed prescribing costs in general practice and are an appropriate area for the introduction of protocols and guidelines, but, even at the relatively simple level of referral for barium meal or intravenous pyelogram, the evaluation of such protocols has not been attempted. The evaluation of computer-based diagnostic aids in the surgery will be a formidable undertaking.

Other technologies may soon change the nature of consultations. In particular, innovations in solid phase chemistry have already led to the production of small, fast, portable analysers which, for example, can perform chemical analyses on very small samples of whole blood with turnaround times of less than 10 minutes and which are capable of assays for theophylline, salicylate, amylase, acid phosphatase and high density lipoproteins as well as the standard autoanalyser screen.[33] Visual solid phase chemistry systems also extend dip-stick urinalysis to testing for leucocytes (esterase) and bacteria (nitrites)[34] and improve the acceptability of faecal occult blood testing by the use of a chemically treated paper pad placed in the toilet bowl after defaecation.[35] Instruments such as doppler probes and impedance typanometers are now cheap enough to find a place in primary care.

Finally, technological advances in secondary care have also influenced the way general practitioners behave. Most general practitioners now have open access to radiological investigations and there is evidence that these facilities are used effectively,[36] although access remains surprisingly restricted in some parts of the country.[37] Other investigations, such as radionuclide lung and bone scans and upper and lower gastrointestinal endoscopy are less accessible, but their availability to general practitioners might reduce expensive consultant referrals or the use of unnecessary radiological investigations.[38] It is important, however, for general practitioners to recognize that the development of new techniques in hospital medicine creates severe problems where resources are limited. Petch recently commented that many potential coronary artery disease victims are not properly assessed because their general practitioners know that hospital facilities are inadequate and do not refer them.[39]

Technology is likely not only to be increasingly used in general practice but also to exert an influence beyond that of a mere handmaiden of science, because it will change not only the way we behave but the way we think of ourselves and our profession. If some of the predictions about the impact of microcomputer systems are true, we will have to reconsider certain traditional descriptions and attitudes about general practice. The notion of clinical freedom, which Hampton describes as 'a cloak for ignorance',[40] may have to be reviewed if we accept computer-based decision aids and are prepared to employ audit methods in their fullest sense. The new technologies that await us offer access to and exchange of information on a previously unimaginable scale, with enormous implications for research and education as well as day-to-day practice.

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