Leading article

Back to the future; or forward to the past?

Technological progress has been defined as sitting in the middle of a traffic jam whilst the in-car stereo system plays *Born Free*; a facile comment which encapsulates the concept that each step along the road towards the high-tech society brings not only benefits but also problems. Information technology in clinical medicine is a good example of this process. In theory, information technology opens to the gastroenterologist a brave new world of enhanced awareness, increased efficiency, and golden opportunity. In practice many systems promise the moon, cost the earth, and achieve nothing. This has, until recently, partly been the fault of computer people. The image of the wild eyed unkempt incomprehensible computer enthusiast defending his jargon with almost the same determination as the clinician, was often true in the 60s. Irreparable harm in many instances resulted from the impact of such individuals on unprepared clinicians – even while other professions were dealing effectively with the challenge of information technology.

In recent years, most information technology workers have observed a profound change in clinicians' attitudes. Whereas 20 years ago clinicians were deeply mistrustful, nowadays many perceive the computer to be a useful (if limited) tool. Others still remain mistrustful, partly because they lack adequate information to answer even the most basic questions about the uses of computers in clinical practice. 'Why now?', and 'what's in it for me?' may not excite great enthusiasm among computer based idealists, but they are perfectly reasonable queries for a clinician to ask. 'Why now?' should be the easiest question to answer; but the answers usually advanced (current financial stringencies, the advent of microcomputers) are wildly simplistic. The real reason why clinicians need computers, now, is more fundamental. In the past few decades, in gastroenterology as in many other areas, the information explosion has been of such magnitude as to render totally inappropriate traditional methods of assimilating information and handling it. The clinical world has simply become so complex that we can no longer expect to retain all of the information necessary to function effectively within it. (Fortunately, we don't have to – because as long as we can *access* the necessary information, we no longer have the tedious chore of retaining it ourselves.)

'What's in it for the gastroenterologist?' is another question which sounds simple, but often produces answers which confuse rather than clarify the situation. Over the last two decades a bewildering array of tasks have been suggested for the computer. Computers can perform effectively two tasks in clinical medicine. First, they can help with the organisation of medical care at an administrative level (paying wages, organising stock control and so on). This computers do very well indeed. Other organisations now find them indispensable. Unfortunately, though understandably, such usage is to most clinicians extremely humdrum.

Computers can also aid the doctor dealing with an individual patient. Here computers are less good, and until recently, very few systems emerged

which showed any potential benefit. The introduction of computers into clinical practice has pursued a rocky path, for two reasons. First, errors matter more; cleaners clearly mind if they don't get their wages because of a computer fault, but not as much as the patient who is harmed by a computer defect. Second, doctors don't feel threatened by a computer which pays the porters – but they do tend to feel threatened by a system which has a higher diagnostic accuracy than they do. Although in a number of ways the computer is useful in storing and retrieving data (exemplified in gastroenterology by the various systems recently designed to aid 'housekeeping' in Endoscopy Units), it is thus in the realms of computer aided decision support that the problems have been most clearly met and explored. They have proved to be serious. Indeed, most such systems would have been consigned to the scrapheap, but for the enviable record of the medical profession for accepting innovation, and an age old interest (dating back to astrology) in predicting the future.

It has thus proved possible to surmount the damage caused by the unwieldy systems of the 1960s (designed to cover the whole of medicine and to replace the clinicians as decision makers – and failing lamentably in both endeavours). After fully two decades of effort the first results of more sensible collaboration between doctors and computer scientists are beginning to appear – systems designed not to replace the clinician, but to assist with decision making in specific clinical areas. The use of such systems has been widely discussed, with two main findings. First, many computer aided decision support systems proved to be around 10–20% more accurate in their diagnostic (or prognostic) predictions than were the doctors who actually saw the patients.¹⁻⁴ Far more important has been a second observation: that during the operation of a computer aided decision support system, the clinicians own (unaided) performance improved so that the (enhanced) diagnostic performance of the clinician matched that of the computer aided system.⁵⁻⁸

It would be comforting to computer buffs if one could assert that the observed improvement in clinical performance was directly because of the computer feedback received by the clinician – but it is quite clear from these trials that such is by no means the case. At least half of the improvement was because of the adoption of preagreed, predefined medical terminology; coupled with discipline in data collection (in other words: a return to the traditional clinical values of careful history taking and thorough physical examination, an object lesson for all those responsible for clinical care, whether or not involving computers). Perhaps equally important in this day and age, clinicians were enabled to provide a high standard of care without early recourse to sophisticated and invasive investigative methods.⁹⁻¹⁰ This 'test reduction' is not just a matter of saving money; there are also benefits to patients. Faced with a choice between shoving data through a computer, or shoving a laparoscope through an abdominal wall, if the end results are comparable, most people would opt for the former.¹¹

So far so good; it does appear that the computer can be used as an adjunct to clinical medicine in a number of well defined areas, by acting as another special test, analysing the patient's symptoms just as one would analyse the patients' red blood cells, or serum electrolytes. But can we go further than this? Should physicians be more 'systematic' in their approach to patients and apply formal decision theory to clinical medical problems? Here we find

several serious and unresolved difficulties for although much can be done to help the physician in arriving at a decision, no amount of formalism can replace the physician's care and concern for the patient.

Perhaps the biggest unsolved problem revolves around the concept of utility. Whatever the doctor does, and whatever the outcome, that outcome will have a certain utility for the patient and for society. The most fundamental obstacles, however, remain in assigning mathematical values to these utilities. For example, consider the problem of assigning a utility value to a negative laparotomy. For a healthy adult male this apparently useless procedure might not matter very much, the risk is not great, and the appendix scar no great handicap. A young girl concerned about her appearance, or an old person with chronic obstructive airways disease, may well have a totally different opinion on how harmful the unnecessary operation was. But how different? What numerical value can we attach to the harm done? Until such questions can be answered to general satisfaction, formalism and decision theory can only wait in the wings, and in the opinion of many it may be a long time before they emerge. And if these problems are difficult, consider the problems of assigning such formal utilities to differing patients' values to society. Such assessment is in its infancy and, *pro tem*, physicians should properly be sceptical about its use.

What then should gastroenterologists be doing? Information technology has progressed so fast in the last 10 years that technical problems (hardware and software) are no longer the constraint on further progress. Put more crudely, it is we who are behind and need to catch up. Fortunately, there is a great deal we can do which in itself will be beneficial – even if never translated into improved computer programs, or information technology systems. This particularly applies to medical terminology. One of the most distressing findings of studies in the 1970s concerned the apparently lost art of conventional history taking and examination. In a number of areas it was clearly shown that doctors did not elicit information at all well from patients. They asked a large number of irrelevant questions¹² often at the expense of questions which would be relevant.¹³ They ignored obvious clues to diagnosis and management¹⁴ and obtained instead large quantities of (relatively useless) biochemical data.^{15 16} Perhaps most worrying of all, studies have shown that scales widely used to assess and record patient symptoms and status (such as the Visick scale for peptic ulcer surgery, the Crohn's Disease Activity Index) are themselves open to such wide variation in interpretation as to render their value highly questionable.¹⁷⁻¹⁹

There is enormous scope for developing widely agreed, reproducible common terminology for various areas of clinical medicine. This would enable us at least to talk to each other (even if we don't wish to talk to computers), more relevant than ever, now that international mobility of doctors and patients has become commonplace. Building on this process, it would be enormously advantageous if we could delineate short lists of features crucial to a particular diagnosis or management problem based on observed fact, rather than (as in many text books) aphorism or anecdote. Once again, such short lists would be useful in routine practice – even if one didn't choose to use a computer aided system for decision support. Moreover, there is an extra benefit, for this type of information is of course an essential prerequisite for any sensible computer based decision support system.

Fortunately, there is now some evidence which suggests that physicians have begun to take a healthy interest in this type of activity. The methodological problems have begun to be addressed in North America by the Society for Medical Decision Making (and by its recently founded sister European Society). Here in the UK, the Royal College of Physicians Computer Workshop has met regularly for 15 years, bringing together physicians, statisticians and others – while the World Organisation of Gastroenterology (through its Research Committee), has worked throughout the last decade to produce common, agreed terminology for such areas as acute abdominal pain,²⁰ upper GI bleeding²¹ and inflammatory bowel disease.²²

This involvement by practising clinicians is both timely and welcome. If information technology is to bring about maximum benefit (and do so without harm) it must be overseen from within the profession. In the last decade gastroenterologists have given a strong lead in this respect, and it is greatly to be hoped that this lead will continue. For it is fact that we no longer can keep up with the explosion of information, it is fact that this has harmful effects and it is fact that most clinicians become tired and forgetful from time to time. Current evidence suggests that simple computer aided systems will prove of practical (albeit limited) benefit in routine clinical practice in the immediate future. Such systems will not replace clinical acumen, much less the concerned caring clinician, but all available evidence suggests that (if we can harness information technology wisely and well) computer/clinician symbiosis will be beneficial to the doctor, the patient and the public purse. Meanwhile how splendidly ironic that the greatest technological development of the latter half of the 20th century should point us not simply forward to an impersonal high-tech future, but also back to a traditional and personal system of medicine which we might otherwise have been in some danger of forgetting. Back to the future? Forward to the past? Actually both.

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