Uncertainty in medicine: can it be reduced?

"Nous sommes dans un nuage d'inconnaissance et d'incertitude, et la connaissance a produit ce nuage."

E MORIN

The development of medicine as a science began in the second half of the nineteenth century. The "paradigm of certainty," inherited from the mechanistic model of scientific knowledge, was applied to medical science by Claude Bernard in the 1860s. Conclusions from observation and research admitted as "true" facts were believed to reflect, in medicine as in physical sciences, the true organisation of matter and determination of disease. Modern doctors and the general public have been brought up to believe that knowledge of the mechanisms of disease was sufficient to establish correct diagnoses; provide accurate prognoses; and, through application of medical research, produce cures.

**Diminishing confidence**

But confidence in medicine has faltered. Influential writers have expressed doubts about the effectiveness of medicine. Some medical interventions which were assumed to be effective have proved to be ineffective, and some untreated patients have fared better than treated patients. Diagnoses and opportunities for treatment are missed despite the emphasis on the technical possibilities of early detection and prevention of diseases. Slower progress than anticipated in the development of effective treatments for solid tumours and chronic diseases; the unwanted secondary effects of chemotherapy, radiotherapy, and other treatments; and, more recently, the impotence of therapeutic agents against viral diseases and AIDS have all contributed to a wave of scepticism. Doctors are criticised for failing to inform patients about treatment options and the likely consequences of available treatments.

Moreover, many unexplained variations in the use and appropriateness of medical interventions and variability in medical judgements have been described. Such variations seem to be counter to a discipline which has a scientific basis, and they suggest either important gaps between the results of research and medical practice or a profound uncertainty in the practice of medicine.

We can now begin to sense the problems posed for a journal such as this. Do we continue the conspiracy and play by the (medical audit) rules? Or do we begin to bring in a new set of methodologies, with different rules and different techniques? Is there sufficient respect among members of the health care team for the varied contributions we all make in order to expand the perspective and methodologies of audit. Only if this is possible will the objective of this journal be realised and, more importantly, will assessment and improvement of the quality of care become a truly patient focused experience.

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**Editorial**

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1 Kitson AL, Hyndman SJ, Harvey GL, Yerrell PH. *Quality patient care – the dynamic standard setting system (DYSSSY).* London: Royal College of Nursing, 1990.

All this has occurred despite an expansion in medical information. The volume of medical literature increases by 6% every year and in the course of a medical career will increase tenfold. About 250 000 new articles or books, or both, are registered by the National Library of Medicine in Washington every year. So a general physician wanting to keep up with only the 10 leading journals in internal medicine would need to read 200 articles and 70 editorials a month. And a reader setting out to read one article a day from every subsequently published medical journal would be 55 centuries behind in their reading one year later.

Not only is the quantity of medical information overwhelming but much of it describes work of poor scientific quality. Williamson *et al* analysed 28 articles that each assessed the scientific adequacy of methods (study design, data, statistical inferences, etc.) used in a total of more than 4200 medical research reports. The significance of their conclusion that "serious and widespread problems exist in the clinical literature" is further amplified by the knowledge that many practitioners are not adequately trained to evaluate the quality of the research results with which they are presented.

Further causes for concern are that the use of many current medical interventions is unsupported by adequate evaluation and that there is no clear consensus for their use. Wennberg writes that there is "double standard for truth in medicine," for, in contrast to the careful evaluation mandated for drugs, no system of careful evaluation for safety, efficacy, and appropriate use of other interventions exists. Information is fragmented, inaccessible, and variable in quality. Perhaps it is not surprising that there is uncertainty and variation in medical practice. So, although medicine has developed a considerable theoretical scientific basis, the determinants of its application remain to be better understood. In other words, what may be lacking today is a science of medical practice.

**Focusing on practice**

One response to the need to reduce variation in practice and the need to synthesise the *valid* information from
medical literature into a form easily assimilable by busy practitioners is defining and producing practice guidelines. Many practice guideline programmes exist, both in the United States (for example the NIH Consensus Conference program which has been running since 1977) and in various European countries. But there is little evidence that the diffusion of such guidelines effectively modifies clinical practice.17 As sociologist Ann Greer explains, mere diffusion of written matter is not sufficient to modify practices ingrained in behavioural, social, and local factors.18 Some of the complexities of implementing guidelines in practice are described by Richard Grol in this issue (p 194).19 An approach to resolving uncertainty of medical practice would be to develop and integrate three disciplines—medical decision analysis, clinical epidemiology, and evaluation of the quality of health care—into medicine and thus put scientific principle into everyday clinical practice. Medical decision analysis can be described as “a systematic approach to medical decision making under conditions of uncertainty.”20 It is an aid to reasoning in that it separates the logical structure of a decision into its component parts and quantifies the probabilities of the different possible outcomes. The use of decision analysis forces the decision makers to consider explicitly the reasons and consequences of each choice. This allows each decision to be explained and justified to patients, to other health care workers and to the decision makers themselves.

Clinical epidemiology—the application of the principles and methods of epidemiology to clinical practice—promotes the practice of “a more systematic approach to gathering and interpreting clinical evidence”21 and provides a framework for answering, with scientifically based argument, questions such as, “How accurate are the diagnostic tests or strategies I’ve applied? What will the consequences be of having this disease? How will the treatment I’ve prescribed change its future course and affect the patient?”22 Clinical epidemiology thus drives medical practice away from empiricism and tends to give it the characteristics of a science: it has been described as “the basic science of clinical practice.”21

Finally, through systematic evaluation of the quality of clinical care it is possible to assess the quality of the structure of care, the appropriateness and quality of medical procedures, and the desirability of outcomes for the individual patient.23 For this a methodical, rigorous, problem solving cycle which follows scientific principle is applied.24 By using an explicit and structured approach subjective influences are minimised and problems and their nature can be identified and prioritised; solutions and corrective measures may then be worked out and their implementation is verified to ensure their use and their effectiveness in producing the expected difference.25

Through acknowledging and understanding the presence of the variations and uncertainties in medical practice, practitioners may at least be able to give more open explanations of choices available to their patients. But application of the three disciplines could itself rationalise clinical practice and help diminish some of the uncertainty and variability in the practice of medicine—which must be in the best interest of individual patients. Integration of these disciplines into current clinical culture is likely to be slow. But many health professionals are now developing and using techniques for evaluating the quality of care. It is vital that all three disciplines should be integrated into medical and clinical studies so that clinical interventions can be used rationally and, when little evidence exists to support one approach or another, clinicians can inform patients to enable them to choose.

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18. Greer AL. The two cultures of biomedicine: can there be consensus? JAMA 1987;258:2739-40.

Measuring patient satisfaction for audit in general practice

Patient satisfaction surveys are currently being conducted by many family health services authorities (FHSAss) and medical audit advisory groups (MAAGs) in England and Wales. These are being used in an attempt to determine whether practices are providing a good standard of care as judged by their patients. Unfortunately, the results are likely to be of only limited value because the validity of many of these questionnaires has not been tested and their sensitivity is often so restricted that most patients seem to express high levels of overall satisfaction.

General practitioners are also beginning to conduct