Practice variations, appropriateness and decision analysis

Few would deny that life is a lottery, but the idea that the outcome of medical treatment is also a lottery is only slowly becoming accepted by doctors and patients. For centuries patients have wanted and respected the omnipotent doctor who would make decisions with total certainty, but rising standards of education have generated a healthy lay scepticism about medical activities. The National Lottery is a valuable paradigm for the difficulties of making clinical decisions: patients can accept the idea that some who buy tickets will certainly win, some certainly will not, but that the outcome in any week for an individual is totally unknown and utterly dependent on chance—and so with medical treatment.

The lay public are probably less aware of the wide variation in medical practice that exists between countries, and indeed within countries where standards might be expected to be uniform. Concern about differences in the use of tonsillectomy between education areas of Kent was first expressed in the 1930s and 1940s and since then variation in all sorts of practices has been described. For example, the cholecystectomy rate in Canada has been reported to be five times that of the UK, and hysterectomies are seven times more common in the USA than in the UK. While cynics could claim that the method of remuneration of practitioners has a lot to do with this, a better explanation is probably that national variations mainly represent cultural attitudes.

Even within countries, and within regions, there are apparently inexplicable variations in the use of procedures. The register of all patients undergoing coronary angiography in the Randomised Intervention Treatment of Angina (RITA) Trial showed that in one centre only 50% of patients undergoing angiography proceeded to coronary artery bypass grafting (CABG) or percutaneous transluminal coronary angioplasty (PTCA), while at another, 85% needed one or other form of intervention. The scientific data on the value of intervention was equally available to all the physicians concerned, but for some reason the physicians participating in the study had widely different views on the proper use of coronary angiography. Even within a single region of the UK, a marked difference in the use of coronary angiography has been demonstrated: in one centre in the Trent Region patients undergoing angiography tended to have mild symptoms, to be on simple treatment, to have treadmill tests that were not strongly positive, and were found to have relatively mild coronary disease, whereas at another the patients had more severe symptoms, were treated with more anti-anginal drugs, were more likely to have positive exercise tests and, not surprisingly, were found to have much more extensively diseased coronary arteries.

When such variations in medical practice are demonstrated the question clearly arises, what is correct? Are the patients treated in different places actually so different that variations in practice are inevitable? Attempts have been made to answer such questions by defining the 'appropriateness' of investigations and operative procedures. ' Appropriateness' has a different meaning when viewed from the perspective of the doctor, the layman (healthy or ill) and of society, which one way or another, has to foot the bill, but here we can confine ourselves to the medical viewpoint. The RAND definition of appropriateness is that a procedure is appropriate if the expected health benefit exceeds the expected negative consequences (risks, morbidity, etc.) by a sufficiently wide margin to make the procedure worth doing. Clearly, this allows for differences in medical opinion, and the RAND group have investigated the appropriateness of various procedures by forming panels of doctors to review case scenarios and make ratings of appropriateness. These ratings have been applied to real patients.

Using such techniques it has been found, for example, that about one third of carotid endarterectomy operations performed in three areas of the USA were 'inappropriate'. However, the appropriateness ratings obviously depend on the panel selected, and when the same theoretical scenarios of patients with symptoms of coronary disease were rated for appropriateness of coronary angiography and CABG by panels from the USA and UK, there were marked differences: the USA panel rated a considerably higher proportion of the scenarios as 'appropriate' for intervention. American and British ratings were applied to a group of 320 patients who had undergone coronary angiography in the Trent Region of the UK, and the US panel rated 71% of the procedures
appropriate, 12% equivocal and 17% inappropriate. When the UK panel ratings were applied to the same patients, 49% were considered to have been investigated appropriately, but 30% were equivocal and 21% were inappropriate.11

Patients obviously want ‘appropriate’ treatment, and purchasers only want to pay for ‘appropriate’ procedures, but clinical decision-making is a very individual affair, and the problem is how to bring an acceptably standard approach to patient management. Appropriateness ratings can be applied prospectively, and consensus panels can suggest guidelines,12 but both of these methods depends heavily on the constitution of the panels of ‘experts’ who are asked to decide what constitutes good practice.

Decision analysis is a technique that aims to quantify the uncertainty of decision making. Once a clinician has to choose between two options—to operate or not to operate, for example—the outcome will be a matter of chance, within the limits imposed by the statistical likelihood of different outcomes actually occurring. Thus an operation such as a CABG might involve a 2% mortality and give an 80% chance of curing the patient’s symptoms, and these probabilities have to be compared with the predicted outcome of any alternative treatment. The advantage of using decision analysis in clinical practice is that it permits (indeed, enforces) a constant approach to clinical choices, and as such it is an ideal tool for audit and comparisons between centres or between different time periods in single hospitals. If necessary it can put some order into the usually chaotic problem of resource rationing. In this issue, Kellett and Graham show that traditional decision-making in the selection of patients for CABG is inconsistent, and that decision analysis techniques would lead to better and more consistent results.13 However, the problem of decision analysis as a tool for clinical decision making is that the information necessary for the calculation of risks and benefits is often either not available, is out of date, or is based on inappropriate patient groups.

The information about the risks and benefits of CABG as compared with medical treatment for angina comes from three relatively small trials14-16 of 20 years ago when CABG was new. Since then the CABG operation has changed considerably, with the use of arterial rather than venous conduits, and with a variety of improvement in perfusion techniques. Operations are now safer and give better results in the short term: knowledge about the long-term outcome of new methods is, inevitably, limited. On the other hand, medical treatment for patients with coronary artery disease has also changed out of all recognition since the CABG trials were performed. The use of prophylactic aspirin and beta blockers is routine, and now we have angiotensin-converting enzyme inhibitors for patients with left ventricular dysfunction. For those patients who suffer a myocardial infarction, thrombolysis will reduce fatality, and we now know that lowering plasma cholesterol can in the long term reduce the effects of arterial disease. Most of these treatments have been studied in the context of medical rather than surgical treatment for patients with coronary disease. Thus decision analysis will inevitably use incomplete and even inaccurate data for its predictions, and while that might be acceptable for comparative audit, it is not useful for making an individual decision.

The study described by Kellett and Graham depends heavily on the supposed predictive value of abnormalities detected at treadmill testing. The study from which these values were obtained17 was relatively small, it involved patients who were probably highly selected, and it did not apparently take into account the various treatments the patients may have received. In the post-myocardial infarction context, exercise testing has not consistently predicted survival18 and to base decision analysis on a single study of patients with chronic angina may be unwise. Worse, in the real world many patients have a coronary angiogram without a prior exercise test, so this particular decision-analysis technique could not be applied.

When advising a patient about choices between treatments, a clinician is in fact always carrying out a simple form of decision analysis. ‘Clinical judgment’ actually means making an estimate of outcome, coupling available evidence with a guess as to how well the individual patient corresponds to the patient groups from which the evidence was derived. It is not usually too difficult to predict the average outcome in a group of patients, but the fate of an individual will inevitably depend on chance. Individual patients rely on individual decisions, and while decision analysis may help base these on the best possible evidence, it is difficult for any statistical technique to allow for the all-important glint in the patient’s eye.

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References


