Linking health technology assessment to practice

Rebecca Rosen, John Gabbay
King's Fund, London W1M 0AN
Rebecca Rosen fellow in primary care
Wessex Institute for Health Research and Development, Community Clinical Sciences Research Division, School of Medicine, Mailpoint 728, University of Southampton, Southampton
John Gabbay professor of public health
Correspondence to R Rosen rrosen@kehf.org.uk
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To make best use of scarce healthcare resources the diffusion and adoption of new technologies should be linked to evidence of their clinical and cost effectiveness.[1 2] Yet despite major recent developments in the conduct and dissemination of health technology assessment,[3 4] the diffusion of technologies continues with little reference to research. So why does health technology assessment still have so little impact in the political world of healthcare organisations?

Summary points

Reasons for the limited influence of health technology assessment on the use of new technologies include failure to assess the effect of new technologies on the organisations which adopt them, the complex nature of knowledge about new technologies, and the personal and social values through which results are interpreted

The current focus on clinical and cost effectiveness produces work of limited relevance to managerial decision makers, who must assess the effect of new technologies on the whole organisation

Research knowledge about new technologies should not be considered as a fixed entity as technologies change and develop after they are launched

Prevailing personal, social, and professional values, along with economic and organisational constraints, affect the interpretation and application of health technology assessment.

Recent developments in NHS research and development policy are likely to improve the uptake of health technology assessment findings

The answer lies partly in the complexity of the forces (such as clinician enthusiasm, media campaigns, public opinion, manufacturers' inducements, hospital developments, and government regulations) that determine the diffusion of new technologies and the way that health technology assessment interacts with them. For example, government regulations delayed the introduction of lithotripsy in France until French made machines were available, even after its effectiveness was proved in selected patients.[5] In contrast, laparoscopic cholecystectomy was in widespread use by 1994 despite there having been only three peer reviewed randomised trials. The reason for this rapid uptake has not been studied in depth, but Hatlie argues that in the United States "a rapid response to the market's demand for new treatment modalities that involve less pain or a shorter recovery period may be wholly appropriate."[6] He admits concern, however, about the additional influences of the revenue interests of surgical centres, surgeons' desires to expand their markets, and manufacturers' desires for equipment sales.

In addition to these interacting forces there are three further limitations on the uptake of health technology assessment. The first is organisational—the complexity of the milieu in which technology assessments are to be used and consequently their relevance to the decision makers at whom they are targeted. The second limitation is epistemological and reflects a general naivety about the production and interpretation of scientific evidence. The third relates to value conflicts created by the introduction of new technologies, which affect the use of health technology assessment. A clearer understanding of these limitations and their mutual interaction will be needed if technologies are to be optimally managed into the system.

Organisational context

In their studies of clinical innovations in the NHS, Fitzgerald and colleagues emphasise the importance of understanding organisational context in relation to the diffusion of healthcare innovations and the application of research evidence.[7] They list factors such as the presence of a change agent, supportive financial and managerial climates, and effective human resource management as characteristics of a receptive organisational context for change. Organisational context is particularly relevant in the NHS given the major changes in recent years in the organisation of the NHS as a whole and of the hospitals and primary care teams where new technologies are actually adopted. When the NHS internal market was operating, introduction of new technologies was largely left to health authorities, which often lacked the capacity to use results of health technology assessment. Scarce resources constrained the desire of hospitals to acquire new technologies, but perceived competition with rival institutions, and perhaps fear of being accused of failing to provide up to date care, have encouraged acquisition of technology. (Differences in technology uptake by private and publicly funded health services exemplify the role of such concerns.) Now, however, the newly formed National Institute for Clinical Excellence will produce national guidance on selected new technologies which NHS hospitals and practitioners will be expected to implement.[8] In addition, the development of clinical governance should encourage the use of research evidence when deciding about new technologies. The growing proportion of clinicians trained in evidence based health care may also create a sympathetic climate in which to apply health technology assessment.

The organisational context shapes the level of openness and interest in health technology assessment findings among those making decisions about new technologies. But other factors are also important, including the decision making process itself. Typically, decisions about "big ticket" technologies (such as scanners and lasers, which are expensive and visible) are made by hospital committees of clinicians and managers.[9] The use of lower cost, non-embodied technologies such as drugs and surgical procedures is more likely to be decided by individual clinicians in consultation with patients, albeit constrained by hospital formularies and guidelines.[10]

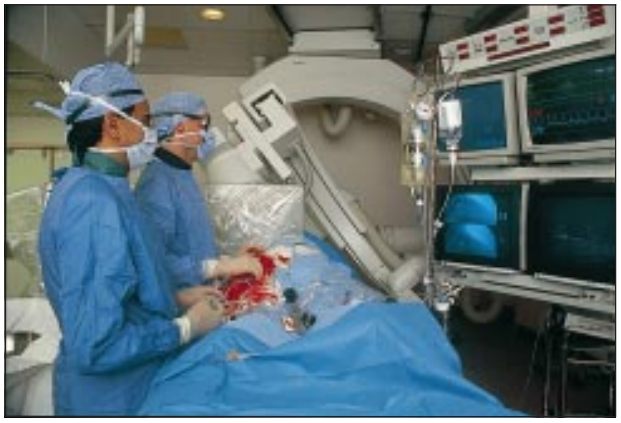
Greer's study of adoption of technology in US community hospitals concluded that while clinicians' decisions focused largely on patient outcomes, collective decisions about costly equipment tended to be based on a multiprofessional group's assessment of the technology's impact on the smooth running of the hospital, its reputation, and its strategic development.[11] Luce and Brown reported similar findings, arguing that hospital based decision makers were particularly interested in financial information whereas decision makers in payer and health maintenance organisations focused more on evidence of clinical and cost effectiveness.[12]

Whole system assessment

The introduction of magnetic resonance imaging illustrates the problems of achieving evidence based decisions about use of technology within multifaceted organisations. Most health technology assessments of magnetic resonance imaging compare its effectiveness in specific clinical situations with alternative imaging techniques. They do not assess the effect of introducing a scanner on the whole institution. Case studies of technology acquisition in NHS hospitals identified reasons why hospital clinicians and managers might support purchasing a magnetic resonance imaging scanner.[13] These included attracting good staff, saving junior doctors the time needed to negotiate emergency transfers of patients for magnetic resonance imaging, convenience of patients, and the probability of generating income by providing scans for other institutions. For managerial decision makers, the aims of technology adoption concern both improving patient health and the smooth running and strategic development of the whole hospital. The last aims could be said to reflect professional self interest and be irrelevant to patients. But it could also be argued that the organisation-wide effects of a new technology—such as attracting good staff—confer indirect benefits to all patients and should be included in a technology assessment for which the unit of analysis is the hospital rather than specific groups of patients.

The impact of health technology assessment depends partly on how relevant and useful the information is at the time decisions are being made. Even in well researched areas, such as stroke units,[14] close examination of the available evidence shows lamentable gaps in the detail that doctors need to know in order to implement the technology.[15] Moreover, some people have argued that health technology assessment should combine technical assessments of effect with a review of wider social issues such as ethical and legal implications.[10 16] However, few have so far suggested including assessments of effect on whole organisations. Yet knowledge of "whole system" effects might alert managers and clinicians to potential pressures and opportunities created by the technology and better prepare them to manage their introduction.

Any shift to such a broad approach to health technology assessment would entail complex methodological problems. The organisational impact of new technologies will be shaped by local circumstances and therefore be hard to generalise. Variables such as alternative uses of staff time are complex to define and measure, and there may be concerns about diluting the crisp methods of trials with the more diffuse study of organisational systems. However, health economists have long had to decide whether their evaluations should be conducted from the perspective of health services, patients, or society as a whole and how to assess opportunity costs. Similarly, technology assessors may need to branch out from their current focus on clinical outcomes and study outcomes such as staffing implications, impact on related services, and set up costs. This may make their evidence more directly relevant to the decision makers at whom it is aimed and thus more likely to be used.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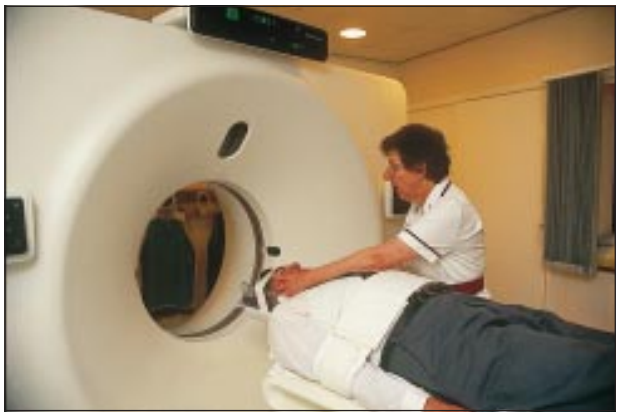
Surgeons work in a cardiac catheter laboratory

Nature of research

The second set of reasons for the limited impact of health technology assessment relates to the nature and interpretation of research evidence. Research evidence on new technologies is usually not fixed but fast changing and open to varied interpretation. Gelijns and Rosenberg differentiate formed technologies (such as drugs) from dynamic technologies (such as endoscopes) which continue to develop in the early stages of their use through an iterative interaction between users and manufacturers.[17] These changes often help to improve outcomes and reduce costs and may invalidate the results of technology assessment started at the earliest stages of diffusion. Even with formed drug technologies, modifications of the dose and target population in response to early experience may improve the outcomes obtained in later evaluations.

This constant and dynamic process of development and revision highlights the complexity of assessing new technologies.[3] Mowatt et al concluded that the methods used to evaluate new technologies should vary depending on the type of technology and its stage of development.[18] Multiple early case series about new interventions which are published but often condemned for their methodological weakness are as much part of the development process as they are part of the technology assessment. This makes the ideal of conducting early, definitive, randomised controlled trials hard to achieve for many interventions. Moreover, early negative trials (for example, poor results in the early days of liver transplantation) may stifle a potentially useful technology.

Such methodological problems are not the only stumbling blocks that prevent health technology assessments from being fixed bodies of evidence in need of simple implementation. In case studies of technology adoption in acute and primary care, the interpretation and use of research has been shown to be shaped by a range of social and methodological factors.[7 13] Agencies that carry out health technology assessment may regard methodological rigour as a key characteristic, but clinicians and managers who use the results do not necessarily share that view. Randomised trials are methodologically powerful but often impractical to conduct, slow to complete, and limited in the scope of information they provide. Therefore other characteristics of the research inevitably help determine its usability. These include the credibility of the researchers[7 19]; the type of outcomes associated with the intervention (clinicians will wait for



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MRI scanner at work

methodologically strong research if there is a risk of a serious side effect but will act on small studies if the risks and side effects are judged to be trivial)[19]; and the extent to which the findings fit with previous beliefs and attitudes. Clinicians' own experience is often a greater influence on their practice than research published in journals.[7 19] The influential unseen allegiances and shared values that exist between groups of laboratory scientists have been described as "invisible colleges, and similar allegiances may well influence clinicians' acceptance of evidence."[20]

Attitudes of decision makers

The third problem with applying health technology assessments relates to the differing values of the decision makers at whom they are targeted. Technology assessments typically are designed to inform decision makers, who are assumed ultimately to take a population based, utilitarian perspective where the primary objective is to maximise the overall health benefits obtained from scarce resources. But many of the key players, and in particular most doctors, take the opposite perspective—the primary aim for which they are trained is to maximise the benefit for the patient in their care.

The example of interferon beta illustrates how these tensions affect the application of recommendations from health technology assessments to practice. Interferon beta was licensed in the United Kingdom for the treatment of multiple sclerosis in 1994 after a highly publicised clinical trial showed marginal benefits to selected patients. The benefits were obtained at very high cost, and these findings, coupled with advanced publicity about the drug, stimulated the Department of Health to issue guidance on selecting patients who should receive the drug, which was to be prescribed only by specialists.[21] The guidance triggered protests from patients with multiple sclerosis, neurologists, and lobby groups, who argued that the NHS should respect individual rights to have the chance to benefit from the drug.[22] As health authorities around the country worked to convert national guidance into local policies the tensions between utilitarian ethics and individual rights were exposed repeatedly. Since the available evidence showed only marginal benefits, the balance achieved between these values at a local level reflected varying interpretations of the evidence and thus resulted in different policies in different areas with subsequent allegations of postcode rationing.

The future

These three sets of limitations—organisational, epistemological, and value related—go some way towards explaining why even the most carefully targeted dissemination of research evidence often has limited impact. For many technologies, the design, interpretation, and dissemination of the scientific evidence will need to take account of organisational, social, and psychological processes if the evidence is to have the desired effect. Put another way, one cannot simply force feed meaty technology assessments to vegetarian decision makers.

There have been several recent policy developments that should now improve the influence of health technology assessment. These include developments in clinical governance, the establishment of the National Institute of Clinical Excellence and the forthcoming appraisal process to develop national guidance on new technologies. It remains to be seen how the guidance will be interpreted and applied at a local level, where the constraints described above are most evident and still poorly understood. The new emphasis on research into organisational aspects of health care and the implementation of research within the NHS research and development programme is welcome.[23] Nevertheless, much health technology assessment still relies on a linear model in which the aim is to identify technology, evaluate it in a timely way to produce definitive results to be disseminated to the target audience who, if properly primed, will implement them. Ironically, the evidence—long accepted by social scientists—is that such a simple linear model does not accurately describe what happens in practice. Perhaps the biggest challenge for health technology assessment is to refine our understanding of the limitations of the model so that it can developed into an exercise that is more in tune with the social, political, and organisational world it serves.

Competing interests: JG is executive director of the NHS National Coordinating Centre for Health Technology Assessment.

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