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Health Technology Appraisal and Radiology



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Radiologists have become experts in evidence-based medicine. Both they and their clinical colleagues who refer patients for diagnostic tests wish to do their best for patients: to provide them with the diagnostic test or tests perceived or proven to have a high sensitivity and specificity for a particular diagnosis, and to proceed with a treatment plan based on as certain a diagnosis as possible.

Information on diagnostic accuracy is available from the published literature, or from synopses and syntheses of the evidence by organisations such as the Cochrane Library. Similarly, for interventional procedures, no longer is it enough for an individual doctor to decide on a patient's behalf what the most appropriate procedure is. This should now be evidence-based, often decided by a group, such as a multidisciplinary team, with treatment results locally audited and outcomes compared with those from elsewhere.

But is this enough? With the spectre of uncontrolled healthcare inflation, can decisions still just be made on the basis of the maximum certainty of a particular diagnosis, however many tests are done to confirm the original impression? Is a test with a much higher cost but marginally higher accuracy justified? As radiologists, our aim is to do the best for patients. But if the health budget is fixed, or even declining, more resources spent on the patient in front of you means fewer resources for others you cannot see, so called 'opportunity costs'. In other words, the opportunity to use those resources elsewhere is lost.

LEAN PROCESSES

Looking at the efficiency of delivery of services and the development of 'lean' streamlined processes, as pioneered in the automotive industry is the next step, so that we can provide existing services and clinically driven pathways at lower cost. However, this enshrines and reinforces the existing diagnostic pathway and methods of treatment. It does not question the validity of the pathway, it just makes the current approach and processes more efficient and thereby more cost-effective.

To make a real change, the next step is to openly question and challenge the effectiveness and value for money of those clinical pathways and see if they themselves should be changed. This is where health technology assessment comes in.

Health Technology Assessment

Health technology assessment (HTA) is designed to answer four questions:

1. Does the technology (drug, device, medical investigation, medical and surgical procedure) work, and how well?
2. Who will benefit?
3. What is the cost?
4. How does it compare with alternatives?

With the answers to these fundamental questions, it should be possible to use medical resources to get maximum population health benefit from the money spent.

The premise is that expensive tests or treatments must be able to justify their additional cost compared with cheaper alternatives by showing proven better outcomes for patients. If the extra health gain is small, but the additional cost high, the money would be better spent, and potentially buy more 'health' for the population if spent elsewhere.

These calculations are not easy however. Health technology assessment is a rapidly evolving field with more and more sophisticated mathematical modelling being used. It also relies on accurate published evidence of the effectiveness of the investigation or treatment in order to calculate its cost-effectiveness.

HTA in Radiology

In some cases, HTA can be directly used in radiology. One, albeit highly disputed, area is in screening for disease. Breast screening for cancer is routinely carried out in many countries. The cost of the programme and the benefit in terms of additional lives saved can be calculated and compared with no screening.

Of course there will be variation of opinion and the literature on the number of lives saved, and arguments about the additional financial and personal cost of over-investigating or over-treating those who might never die of the disease. Nevertheless, an informed calculation of the cost/benefit can be made to justify starting or continuing a screening programme.

Interventional radiological procedures can be evaluated in the same way. It is surprising that not more has been done in this field, as it is highly likely that many interventional procedures are cost-effective and should probably largely replace conventional surgical treatment. One example which has been looked at is fibroid embolisation compared with hysterectomy.

Both the examples given above look at direct health benefit. But it is not quite as simple as that. Lives saved can be counted, but if only those over 90 were saved, then the number of years of life saved would be less than if the average age of diagnosis was 50.

In the hysterectomy vs. embolisation example, the cost-effectiveness has to be evaluated in the light of the precise health benefit. If that is pain and bleeding avoided, those symptoms should be quantified and assigned a value pre- and post-treatment. Were hysterectomy to provide better symptom control, then it would have to be decided whether it was better enough to be worth the additional cost compared with embolisation. However, if the health benefits were the same or greater with embolisation, then embolisation would be the more cost-effective option. Thus cost-effectiveness depends on what you are trying to achieve in terms of health gain and the monetary cost of that gain.

Quality Related Life Years

The quality related life year or QALY is an attempt to quantify health gain, in order to fairly compare two different health approaches. All diseases or health states are assigned a utility which is a measure of quality of life or health state which can be between 0 (death) and 1 (perfect health). The therapeutic effect of an intervention on the disease will raise the utility as the patient gets better. The rise in utility multiplied by the number of years it lasts gives the QALY gain.

A treatment which gives a small improvement which lasts many years may give an equal gain in QALY terms to a treatment giving a large benefit which disappears quickly. The whole point of the QALY is to provide a uniform unit of health gain which can be costed. This is increasingly used to decide whether new drugs should be purchased in healthcare systems and made available to patients. The National Institute for Health and Clinical Excellence (NICE) in the UK, for example, rarely approves a drug which costs more than £30,000 per additional QALY gained compared with existing treatment.

HTA and Diagnostic Radiology

Diagnostic radiology is at least one step removed from any patient outcome that can be directly measured, and consequently it is a great challenge to calculate any QALY or health gain directly attributable to an individual diagnostic test. Surrogate measures of benefit to patients can however be measured more easily. For example, it is possible to calculate the accuracy and cost of using a technique to make a particular diagnosis. In order to do this, very robust research data is needed, and unlike the gold standard of randomised controlled trials required for the development and licensing of a new drug, radiology research relies on less stringent evidence, usually from observational data or trials, which will be of variable quality.

Critical appraisal of all the evidence available, which takes into account the quality of the data, an essential part of the HTA process, can result in a ranking of the diagnostic accuracy of a test, compared with its cost. This can be used to decide whether the more expensive test is 'worth it', namely how much extra needs to be spent per diagnosis made and what are the disadvantages of using the cheaper one? This is different from a radiologist's perspective which will be driven largely by the desire to do the best for the patient, whilst also minimising the doctor's medico-legal risk.

This comes into even sharper focus when it comes to using a second test to check on or confirm a diagnosis suggested by the first. An example would be a first test with 75% accuracy, and a second much more expensive one with 80% accuracy. The first test delivers 75% of the information, but the second delivers only 5% additional information at full cost, and therefore may not be value for money. The question here is how many patients (if any), and which ones, should have the second test?

Equally discomfoting for radiologists, is the question of whether we actually need the expensive machines with all the various high cost options. Would a cheaper machine be perfectly adequate for the patient population and better value for money?

The Future

The evaluation of new drugs and treatments is the main use of HTA at present, and it is here that the HTA process is best developed and validated. As the cost of healthcare increases, however, more focus is likely to be placed on the 'value' of diagnostic tests. Sooner or later radiology will be required to demonstrate its direct benefit to patients and to justify the costs. This is in part addressed in diagnostic guidelines and referral criteria, but these are currently designed to bring together best evidence of diagnostic accuracy and to reduce unnecessary irradiation, rather than being driven by calculated cost-effectiveness data. The move towards HTA could represent an opportunity for radiology to demonstrate its worth, but it may be a threat to the cautious approach to diagnosis, which has fuelled the rise in diagnostic tests, and is characteristic of modern medical practice.

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