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Guidelines for radiological investigations

Make the best use of your department of radiology

Continuing advances in ultrasonography, computed tomography, and isotope and magnetic resonance imaging have recently accelerated the already rapid pace of development within diagnostic imaging over the past two decades. Initial hopes that newer technologies would replace older techniques have frequently been disappointed, and most departments of medical imaging have experienced a relentless increase in the demand for their services. With these developments in technology has come the responsibility to select investigations and procedures that contribute effectively to clinical management. Many studies have addressed this problem, concentrating either on an overview[1] or on establishing the right clinical context for specific investigations.[2-4] Such initiatives, usually by radiologists, have brought some order into the pattern of radiological referral, but the effect has been patchy—inevitably reflecting local policies, enthusiasms, and personalities. Recently, several factors have concentrated such efforts.

Firstly, resources have become increasingly constrained. Every action has an "opportunity cost" and, in an era of assessment and accountability, expecting funding for health care without knowing more about its successes and failures is no longer reasonable.[5]

Concerned by the increasingly expensive and inefficient use of diagnostic facilities, the Royal College of Radiologists established a working party on the effective use of diagnostic radiology in 1975. The hope was for more efficient management of patients, less exposure to radiation, and a reduction in the cost of the service. The working party reported in 1988,[6] and in 1989 the college published a booklet[7] containing guidelines for 12 types of radiographic examination. These included those of the chest, skull, spine, abdomen, bowel, and biliary and urinary tracts and covered some 70 important clinical situations, estimated to make up 95% of radiological practice in NHS hospitals. Many of the guidelines were based on formal studies. The guidelines were not intended to replace clinical judgment but to enhance it in times of doubt or difficulty.

Secondly, concern has increased that patients may be receiving unnecessary and harmful radiation during radiographic examinations. A joint working party of the Royal College of Radiologists and the National Radiological Protection Board was established in 1988 to study this question. Their much publicised report noted that doses received during diagnostic medical radiography made up almost nine tenths of the total collective dose to the population from all manmade sources of radiation[8] (or half the dose received from natural sources).[9] At least one fifth of radiographic examinations carried out in the United Kingdom (and, by implication, a considerably higher proportion in North America and much of Europe) were thought to be clinically unhelpful, given the extremely low probability of yielding information useful for clinical management. The joint working party endorsed the earlier guidelines produced by the Royal College of Radiologists and recommended the rapid dissemination of its booklet. Increasing the availability of ultrasonography and magnetic resonance to reduce reliance on techniques involving *x* rays was another recommendation.

It is too early to comment on the impact of the guidelines, but two papers in this issue give some idea of the potential savings to be made. The study by the Royal College of Radiologists working party before the guidelines were introduced highlights the wide variation (up to 25-fold) in radiological referral patterns between different centres (p 809).[10] The paper's suggestions to ensure that patients receive no more diagnostic radiation than is clinically necessary[11] neatly encapsulate the "cycle of audit": setting standards (the booklet of guidelines), observing practice (with the need for appropriate information technology emphasised), comparing practice with standard protocols, and changing practice to bring it into line with standards. A second study by Halpin and colleagues, again audit based, notes the possible savings in cost and radiation induced morbidity and mortality for one outpatient investigation (p 813).[12] In their study over half of the lumbar spine radiographs would not have been performed if the guidelines of the Royal College of Radiologists had been followed. They further estimate up to 19 possible deaths each year directly resulting from lumbar spine radiography performed in the UK. Of some concern was the finding that three quarters of their patients had been examined only partially and one fifth not at all before the radiological examination was requested. Such an omission is unlikely to be unique. Under Ionising Radiation Regulations (1988)[11] litigation will almost certainly arise from the inappropriate use of diagnostic radiation in the future.

Good clinical practice, a recognition of the dangers of ionising radiation, and economic reality have all combined to provide an impetus for change—away from the traditional "diagnostic work up" and towards the more selective investi-

gation of patients. Guidelines have the potential for helping translate intention into reality.[13]

ROGER CHISHOLM

Consultant Radiologist,
Hope Hospital,
University of Manchester School of Medicine,
Salford M6 8HD

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Where is the wisdom . . . ?

The poverty of medical evidence

"Where is the wisdom we have lost in knowledge, and where," asked T S Eliot, "is the knowledge we have lost in information?" There are perhaps 30 000 biomedical journals in the world, and they have grown steadily by 7% a year since the seventeenth century.[1,2] Yet only about 15% of medical interventions are supported by solid scientific evidence, David Eddy, professor of health policy and management at Duke University, North Carolina, told a conference in Manchester last week. This is partly because only 1% of the articles in medical journals are scientifically sound[2,3] and partly because many treatments have never been assessed at all. "If," said Professor Eddy, "it is true, as the total quality management gurus tell us, that 'every defect is a treasure' then we are sitting on King Solomon's mine."

What are the implications for those purchasing health care if the scientific base of medicine really is so fragile? Because, as Professor Eddy said, "it is not enough to do the thing right; it is also necessary to do the right thing." The implications for purchasers of the poverty of medical evidence were considered at the Manchester meeting, which was organised jointly by the British Association of Medical Managers and the resource management unit of the NHS Management Executive.

Professor Eddy began his medical life as a cardiothoracic surgeon in Stanford in California but became progressively concerned about the evidence to support what he and other doctors were doing. He decided to select an example of a common condition with well established treatments and assess in detail the evidence supporting those treatments. Beginning with glaucoma, he searched published medical reports back to 1906 and could find not one randomised controlled trial of the standard treatment. Later he traced back the confident statements in textbooks and medical journals on treating glaucoma and found that they had simply been handed down from generation to generation. The same analysis was done for other treatments, including the treatment of blockages of the femoral and popliteal arteries; the findings were similar. That experience "changed his life," and after taking a degree in mathematics at Stanford University he became a professor at Duke University and one of the consultants most in demand in the United States.

Regularly he advises those producing consensus statements, and he is suspicious of the process. The best statements are based on scientifically sound evidence, but even when it is lacking (which is usual) the statements should make clear what evidence is available. Agreement of the experienced without evidence is a poor basis for producing advice, and as an illustration he told the story of the consensus reached by an international group that was expert in screening for colorectal cancer. The group, including Professor Eddy, met all over the world for three days a year for five years. At the end the group recommended a protocol based on regular faecal occult blood tests and sigmoidoscopy. Professor Eddy asked each member of the group then to make a private estimate of how much mortality would be reduced by such a policy: the answers ranged from 0 to almost 100% and were randomly distributed within that range. Yet the consensus had been unanimous. As Hippocrates said, experience is fallacious.

Professor Eddy now runs courses for expert groups trying to achieve consensus. Each time he asks the members to list the outcomes they are seeking and to rank the scientific evidence for each outcome from excellent to none and then describe the best available evidence. For 21 problems tackled so far the evidence has been judged—by the experts—to be between poor and none for 17, and usually the best available evidence was something less than a randomised controlled trial. Often the evidence that was available contradicted current practice: thus of 17 randomised trials on giving lidocaine prophylactically in patients with chest pain, 16 showed no effect and one showed a positive result—yet practice in the United States was to give lidocaine.

The weakness of the scientific evidence underlying medical practice is one of the causes of the wide variations that are well recognised in medical practice. Dr Hugh Sanderson, director of the Wessex Cancer Intelligence Unit, illustrated the wide variations among observers and in referral rates, admission rates, investigations, and treatment. For example, among a sample of 172 radiotherapists 48% offered palliative treatment to patients with metastasised lung cancer only if they had symptoms whereas 52% always offered treatment. Professor Eddy used this example to illustrate how doctors could be made not just to understand intellectually the variation in practice but also to feel it: radiotherapists could be asked to write down in secret what they would do for a particular patient and the results could then be pooled and discussed. The same process can be used with any specialty.

The evidence on effectiveness is poor, but the information needed—by purchasers, for instance—to choose among different treatments is almost never available. To choose, for example, among screening programmes you need, said Professor Eddy, data on how many people would need to be screened, how many deaths might be prevented, the cost of