

Hospital radiology: today and tomorrow

Of all the medical specialties, radiology has developed most rapidly throughout this century to a point where it is central to the management of the majority of hospital patients. The papers in this issue's symposium illustrate the role of radiology in four diverse fields, but are just a sample which could be expanded right across the spectrum of medical practice.

The flow of new technologies in radiology continues rapidly and it is timely for hospital authorities to reassess their attitudes to the specialty, and its potential for benefiting patients and improving hospital efficiency into the future.

The stringencies of economic rationalism are impacting on hospitals worldwide (Brooks, 1999) and the response of management to savings in radiology, certainly in Australia, often reflects a lack of understanding of the specialty today as practiced in tertiary referral and teaching hospitals. The nexus with laboratory medicine seems entrenched in the minds of those authorities contemplating tendering hospital radiology out to private groups.

RADIOLOGY: A CLINICAL SPECIALTY

In recent decades, radiology, particularly in larger hospitals, has become increasingly clinical with radiologists far more directly involved with patients. Furthermore, these hospital radiology departments not only provide a vital component of health care but are the training centres for future health professionals in the specialty and the focus for mainly clinical research.

As laboratory medicine has become more machine-based, radiology has moved in the opposite direction. Interventional radiology, embracing such techniques as angioplasty, thrombolysis, embolization, creation of

shunts, treatment of aneurysms and stenting of tubular structures, has been significant in promoting this trend and nowadays most percutaneous biopsies and many intubation procedures have become tasks for the radiologist.

Many erstwhile surgical procedures are managed thus in day wards and, in some hospitals, radiologists are allocated beds for the purpose. Additional to this is recognition of the desirability, and sometimes the requirement, of radiologists to be in attendance during a wide range of diagnostic procedures, not only those requiring contrast medium injection, but also for the more complex modalities of nuclear medicine, ultrasound, computed tomography (CT) and magnetic resonance imaging (MRI), in which protocols are best tailored to the individual patient.

The Royal Australian and New Zealand College of Radiologists (RANZCR) for practice accreditation requires this in respect to CT and MRI. The development of virtual endoscopy technology, already available for virtual bronchoscopy and colonoscopy, will further the requirement for radiologists to be involved in the particular problems of individual patients.

The pattern of regular consultation between radiologists and referring clinicians, long established in many hospitals by way of weekly conferences at which diagnoses are reviewed and investigations planned, demands that the radiologists concerned be clinically aware. It is to be expected then that the qualifications and experience of hospital radiologists should match those of the referring doctors who entrust their patients to them and who may be coupled with the radiologist medicolegally. To this end a varying degree of sub-specialization has evolved in most large hospital radiology departments.

ELECTRONICS AND THE FUTURE

Computerization has already improved efficiency in various aspects of hospital management. The so-called electronic transformation of radiology, already begun in certain centres, will gather pace as we enter the next century with implications for radiology departments and radiologists (Williamson, 1998).

Digital technology is already impacting on many aspects of radiology, not only in the acquisition of diagnostic images but, more importantly, on communications. The aim in hospitals is for radiological images and reports to be incorporated, without delay, into the hospital electronic medical record so that diagnostic data and the radiologist's opinion are freely available via the hospital computer network. Picture archiving and communication systems (PACS) have been available for a decade providing immediate image access.

Computer speech technology is now well advanced so that immediate availability of the radiology report and images is becoming feasible. Despite this the goal still seems far away. There is a need for integration of hospital and radiology information systems with PACS and, to date, vendors of these items appear to be developing independently of each other. There is a need for a total hospital communication system.

In the mean time hospitals are faced with the difficult task of step by step purchase of items of electronic equipment in radiology to satisfy specific needs along a pathway already strewn with equipment made redundant by technological advances. In the absence of an ideal total package hospital administrators would be wise to work closely with the radiologists concerned.

The policy of maintaining a centralized radiology department seems wise with the increasing influence of computerization. The established conven-

tion of the radiological report by a suitably trained radiologist on each diagnostic imaging procedure is important not only for quality assurance but also medicolegally for the hospital administration. Digital radiology equipment is expensive and centralization ensures that it is used to the maximum benefit. Duplication of equipment in clinical departments other than radiology, particularly ultrasound which seems to have no injurious effects, can have expensive repercussions when, as invariably happens, there is a need to update. Medicolegally, hospitals are obliged to ensure that adequately trained personnel provide radiological services (Levin et al, 1998).

This rather conservative view of future hospital radiology as we welcome the new millennium flies in the face of what the doyens of the electronic transformation of radiology foresee. Filmless radiology, they claim, is imminent, leading to the virtual radiology department with widely dispersed radiological equipment and radiologists linked only by computers. This signposting of the future direction is best regarded as the probable trend and, for the next decade, even the first part of the journey will extend the resources of most hospitals.

SUPPLY OF HOSPITAL RADIOLOGISTS

The fully integrated hospital communication system will alter the role of the hospital radiologist. Providing immediate images and reports, the radiologist will be virtually on line but will also be able to readily access patient medical records and so be much better informed about each individual patient.

In particular, they will be able to assess the relevance of the current request against the investigations already performed, with the potential to reduce over-investigation; a not uncommon criticism of hospital medicine.

The availability of radiologists in sufficient numbers to staff the departments of the future depends on the availability of such people in the general community and the conditions of employment within hospitals; these factors vary from country to country. The optimal number of radiologists per million population is debatable and depends on several factors, particularly the nature of the national health-care system.

The matter is of current concern in several countries including Australia. Australia has 59 radiologists per million population and is in a group which includes Canada, Holland, Germany and Switzerland. Finland, France and USA have the highest density at 90–100. In the USA, following changes to the health-care system and the emergence of health maintenance organizations and managed care, the number of training posts in radiology was reduced anticipating an oversupply.

The UK has only 31 radiologists per million population and, even making allowances for particular aspects of the health-care system, this seems critically low by world standards to cope with present workloads, leaving aside possible demands of the future. This shortage of radiologists may explain why the Royal College of Radiologists promotes courses for general practitioners in ultrasound, and the concept of radiographers reporting on certain radiological examinations is being explored. Elsewhere these measures

would generally be considered suboptimal, as would the recent report that about one half of barium enema examinations in the UK are performed by radiographers (Law et al, 1999).

The availability of radiologists is primarily dependent upon the number of trainee positions available. Although the UK has 13 trainee positions per million population, compared with Australia at 10 per million, a strong case can be made for significantly increasing this number as a matter of urgency, bearing in mind the relatively long training period required.

In countries where hospital radiologist's salaries have to compete with incomes in private practice, retaining suitably qualified radiologists in hospitals has posed problems for many decades. Recently in Australia, the administrators of larger public hospitals have recognized the need to appoint sufficient adequately qualified radiologists and remuneration has been increased to a level which, although significantly less than in many private practices, is proving sufficiently attractive, particularly for more academically inclined radiologists. This has been achieved, in most cases, through a combination of increased salary packaging and access to private practice income under the national Medicare system.

There is a viewpoint that fewer hospital radiologists will be required in the electronic age of radiology but one should regard that opinion with caution. Computerization promised to the commercial world the 'paper-free' office but history, and those with even a short memory, know that quite the reverse has been the case!

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KEY POINTS

- Hospital radiology has evolved to be more clinical, i.e. directly involved with patients.
- Hospital radiology departments are training centres for health professionals in the specialty and for research.
- Equipment vendors have not yet produced a comprehensive hospital communications system to optimize the role of radiology.
- Centralized radiology departments are recommended for best use of hospital resources in future.
- A severe shortage of radiologists exists in the UK, justifying a major increase in the number of training positions.