

# 3rd FY Khoo Memorial Lecture – Education, Professionalism, Outsourcing and the Future of Radiology

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## Introduction

Radiology is undergoing unprecedented changes. Not only is the technology evolving rapidly, providing images of breathtaking anatomical clarity, but functional information has also become a reality. These changes have meant that every worker in clinical medicine is critically dependent on modern imaging. And electronic innovations such as the patient archiving and communication system (PACS)\* have meant that images are instantly available for all. Reports need to be nearly instantaneously available as imaging is replacing the formal clinical examination of old. And some might cynically say that “imaging is too important to be left to radiologists”! Countering this opinion runs the argument that only a team of radiologists fully understands the entire range of imaging techniques, the physics and technical artefacts, the wide range of normal variations and, finally, the diagnostic appearances of a wide range of diseases. Furthermore, radiologists are in a unique position to manage an efficient department, making the best use of scarce equipment and staff to the benefit of patients and all referring clinicians.

The explosion in imaging, with the rapid introduction of magnetic resonance imaging (MRI), mammography, and so forth, caught those involved with manpower planning unawares. The world has been short of fully trained radiologists for some time, although there have been some improvements in the last few years. Some countries (e.g., the UK) have been seriously short for some time, but in the UK there has been very rapid expansion in the training numbers along with the development of “Radiology Academies” in 2005, via an imaginative Radiology Integrated Training Initiative funded by the UK Department of Health ([www.riti.org.uk](http://www.riti.org.uk)). In some countries, there was resistance to expansion because of fears over salaries/jobs/etc. In others, there has been limited funding available to increase the manpower. New models of training will have to concentrate on future subspecialty needs.

With increasing demands on radiologists’ time – multidisciplinary clinico-radiology meetings, on-call, double reading, etc – many healthcare communities have been looking at other methods of delivering imaging services. The development of skills-mix has been varied, but many tasks which were “radiologists only” are now properly delegated to other expert health professionals within the imaging team. Well-developed areas include ultrasonographers performing ultrasound, computed tomography (CT) radiographers or nurses doing venepunctures, and radiographers performing barium enemas. The use of satellite and mobile services remote from main radiology departments has also increased. The advance of teleradiology is perhaps the most controversial of these new developments. The initial concept of remote reporting, especially for out of hours work, seems attractive. And maybe such a service can be provided more cheaply. But what if remote reporting undermines quality and the all-important relations between the team comprising patient, the radiographer, the radiologist, and the clinician, and impairs the communication stream? Fragmentation of this team and of communication poses problems for all in terms of governance, continuing professional development and, especially, the provision of a comprehensive imaging service that is so essential for modern 24/7 care.

Radiology has come a long way in the 110 years since Roentgen discovered his famous “unknown ray” (the X-ray). Imaging now incorporates an amazing range of different technologies, all aimed at identifying and monitoring disease at different stages of the patient’s journey through medical care. The advances in cross-sectional techniques (ultrasound, CT, MRI and various nuclear medicine studies) have been spectacular over the last two decades and, because they provide such an objective record of the patient, they are increasingly replacing the subjective physical examination of old.

In many branches of medicine, radiology is crucial in

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identifying disease, often augmented by image-guided biopsy. For example, screening mammography and ultrasound-guided biopsy provide the means by which most breast cancers are diagnosed; the clinician's role in diagnosis is relatively minor. Imaging has been shown to be a rate-limiting and an economy-limiting factor in modern medical care – the patient with a possible acute abdomen may be discharged if CT is normal, or expedited for surgery depending on certain CT signs

These objective tests are often more reliable than subjective clinical opinions, especially when many young doctors have only limited clinical experience. Because of the increasing complexity of medicine, few doctors retain a wide range of clinical skills; increasingly sophisticated disease treatments require increasingly specialised training.

Another important trend is the increased availability of visual evidence and the increased knowledge of patients. Despite an increasing quality of life, patients have never been so worried! The media has much to answer for here. Thus patients (and their doctors) are seeking more and more expensive tests to provide absolute reassurance of non-disease. Sometimes such reassurance may be false: the absence of coronary artery calcification on CT screening does not mean that the patient has no coronary artery disease.

MRI of the spine is another example that springs to mind. In the past, patients would only be subjected to myelography with the most profound clinical signs. Now a patient might be referred for MRI of the spine with 2 to 3 weeks' minor spinal discomfort in order to exclude a sequestered disc or the very small possibility of spinal infection, or of cancer. The MR image will probably show "degenerative changes", and the patient may well become depressed about normal ageing. Even worse, the MRI may show an incidental intervertebral disc herniation, which is assumed to be responsible for the clinical problem; the patient may then undergo unnecessary surgery and still be left with continuing symptoms. Close co-operation between the radiologist and the surgeon is required to counter such problems. In the UK, most prospective surgery is discussed at clinico-radiological meetings to ensure that the imaging appearances fit the clinical picture, and that each health professional's opinion is discussed by the team.

The increased complexity of imaging poses further problems. Few radiographers (i.e., technologists) and few radiologists can now cover the entire range of imaging. Whilst most radiologists continue to offer many basic skills (chest radiograph reporting, plain film reporting, and perhaps cross-sectional ultrasound and CT of the abdomen and chest), there is a strong drive towards subspecialty reporting. This is necessary because more clinicians are conversant with the new imaging techniques; so that

radiological reports and clinico-radiological discussion are only of value if radiologists can provide added anatomical or technical information which improves patient management. The radiologist is also best placed to consider the likelihood of the radiological abnormality being responsible for the clinical problems posed on the referral form. He knows whether the quality of the image is satisfactory, and should also be aware of a wide range of pitfalls, which can simulate disease. In addition, someone has to be able to recognise the renal cancer at the "corner" of an MR image coned down to the lumbar spine, which might elude a neurosurgeon or a single-specialty trained neuroradiologist.

The radiologist's chief skill is taking responsibility for the whole imaging process for a patient. This includes advising on the optimal investigation or the optimal sequence of investigations for a particular clinical problem in a particular age group. The radiologist and radiological colleagues should also cross-correlate the results of the investigations, particularly if some are positive and some negative, again balancing the different possibilities. The radiologist also has a key role in maintaining the whole infrastructure of an imaging department by maximising the throughput of patients from all disciplines with scarce resources – scarce because of cost and the availability of trained staff.

The PACS provides a remarkable electronic resource which completely overcomes the previous problems of "lost" films. It has revolutionised the way that a hospital and healthcare system operates. However, the PACS enterprise also poses interesting security, confidentiality and socioeconomic problems. Coupled with teleradiology, PACS means that radiologists can essentially report images anywhere. Even within a department, this dislocation can fragment the team responsible for obtaining the images (radiographers) and the reporting team (radiologists). The split can depress standards, with less feedback and continuing education for all parties. If the dislocation extends to reporting practices outside an imaging department, then there is even less integration between the team members within the department. This abuse of PACS can decrease the critical mass and jeopardise care for seriously ill patients within the hospital at night and on weekends, when urgent opinions from recognised colleagues and interventional guided procedures will be required.

### Education

Radiology training is fairly well organised in the developed world. A strong thirst for science and international collaboration means that standards are fairly equivalent in the larger countries within Europe, North America and Australasia. Obviously, the training will reflect the

equipment available. In some of the newer EU countries, there is little MR availability and so training in MRI will be less comprehensive. In the UK, a strong clinical background is considered essential before starting Radiology training. In the UK and Europe, there is a current move towards increasing subspecialty training (2 years), with a reduction in basic training (3 years), rather than the 4 years plus 1 year model of old.

The drive for this lies at the heart of what a radiologist must offer – he or she has to be able to provide added value to the clinical colleague who referred the patient to an Imaging Department. Now that CT and MR can provide such realistic images, the musculoskeletal radiologist has to be able to spot a subtle lesion within the varied normal range of age related degenerative processes, and advise the clinician on the likelihood that the lesion is responsible for the symptoms. He or she also has to be able to identify the unexpected lesion – e.g., the renal tumour visible on an MR image of the lumbar spine discussed above. Such important diagnoses will usually only be spotted by radiologists who are used to seeing hundreds of such images per annum. To quote the golfer Gary Player – “The more you practise, the luckier you get!”

### Professionalism

The definition of professionalism has been sought by many over the years. There is no single good definition but, essentially, a professional in any subject should be someone that the patient (or client) can be referred to with confidence, without having to check credentials and integrity at every step of the process. A recent multidisciplinary group in the UK, organised by the Royal Colleges of Physicians, came up with the following definition:

*Medical professionalism signifies a set of values, behaviours and relationships that underpins the trust the public has in doctors*

Doctors in society. Medical professionalism in a changing world.  
Clin Med 2005;5(6 Suppl 1):S5-S40.

Happily, in many countries, training programmes in radiology and radiography are of high quality and embody many aspects of professionalism – with an accepted requirement for continuing professional development and revalidation. In time, a network of mutual recognition for professional qualifications and practices may be developed across the world.

However, there remain substantial differences in the way in which radiology is practised and in the way in which even something basic, such as a radiological report, is constructed. In the UK, where all radiologists have considerable clinical expertise before starting training, the conclusion of a report should be a clinical opinion, intended to help the referring clinician develop the next step in the

patient’s management. In other countries the report may be factual and highly accurate, but it may end with many differential diagnoses, with little clinical judgement as to which is the most likely diagnosis on the basis of clinical knowledge, experience, and the probability of disease.

### Outsourcing

Because of the need to reduce costs and increase throughput, several healthcare systems have invested in outsourcing of various parts of imaging services. Of course, many aspects of imaging have been “outsourced” for some time. For example, the departmental engineer has long been replaced by service contracts with equipment manufacturers. A more controversial area is the outsourcing of reporting services. The provision of formal reports for isolated communities is an obvious target. So is the provision of prompt reports during the night and weekends if cover is limited.

Many centres are establishing links with units in other parts of the world, so that night reporting can be performed by radiologists in other time zones. However, the benefits are less obvious, and clinical governance is much more complex, when routine work starts to get outsourced. The quality of outsourced reports is just one problem. If a sizeable amount of CT and MR reporting is outsourced, it means that the local radiologists will not be familiar with the acute clinical problems that their local clinicians deal with. The local radiologists will be less familiar with the cases that they review at clinico-radiological meetings, and less able to offer instant treatment procedures which might be of benefit to the patient (e.g., abscess drainage).

There are also considerable problems for those radiologists performing outsourced reporting, who may not possess the full clinical background. Even though it is good practice to review all previous imaging when issuing a report, the outsourced radiologist may not be able to review a plain radiograph of crucial relevance to the MR study that they are reporting. Many clinicians distrust reports from radiologists they do not know, or whom they cannot easily interrogate – some will say that “the most important thing about a radiological report is the name of the radiologist who reported it”.

Finally, the outsourced radiologist will not easily contribute to, or benefit from feedback from, clinico-radiological meetings. All these factors carry considerable clinical governance issues. To counter such problems, more and more departments arrange for their images to be reported by local networks, which means that reporting is carried out in telephone free or interruption proof environments by radiologists that the institution generally has confidence in.

### Good, Cheap, Quick

In conclusion, many health services have experimented with new ways of working. Many years ago, the cost of healthcare was considered to be “spiralling out of control” (it still is!). At that stage, the then President of the Royal College of Physicians, Professor Sir Raymond Hoffenberg, stated that no healthcare system can be good, cheap and quick: inevitably one parameter can be improved, but with a trade-off in one or both of the other two. Thus, although outsourcing may provide a faster and cheaper service, it may be associated with some reduction in quality of the comprehensive radiology service that is so essential for any community in the 21st century.

### The Future

Radiology will continue to develop with ever increasing improvements in speed, anatomical clarity and functional information. The wonders of positron emission tomography (PET) and molecular imaging are only in their infancy. The whole world of personalised genetic imaging has yet to develop. Certain areas of imaging will devolve down to individual specialist groups, in the way that cardiologists now perform coronary angiography. The ultrasound probe will become the new stethoscope. Radiologists should be comfortable with such change, and be content that they have gained much more from supposed “turf wars” than they have given up. Just think what the radiologist does now compared with 20 years ago – most lymph node and solid organ biopsies, nearly all abdominal drainage

procedures, and so on. With increased multidisciplinary working, turf wars are becoming rather an old fashioned concept. Radiologists should be content to be the imaging expert within their particular team.

The certain prediction about the future of Radiology is that imaging will continue to evolve and provide yet more non-invasive insights into the human body and its function. There will be even greater use of imaging to provide objective data about the supposedly healthy, the ill undiagnosed patient, and in the follow-up of patients with known disease. There will also be greatly increased use of image guided treatments. So long as radiologists embrace these new developments, collaborate with their clinical colleagues, and provide effective imaging leadership, the future of our specialty continues to be exciting. Indeed, many clinical colleagues in other disciplines look longingly at the marvellous images that can now be produced, and say wistfully: “I wish I had gone into Radiology – you seem to have all the fun”.

*\*Editor’s note: In 1982, an American radiologist, AJ Duerinckx, published an article describing PACS as a “picture archiving and communication system”. Since then, several other definitions, such as “patient archiving system”, have been used interchangeably by computer software writers and physicians. Recently, however, the medical community appears to have preferred the phrase that Duerinckx devised for the electronic resource.*