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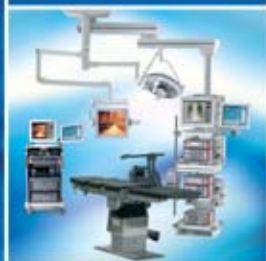


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# Editorial

## The New Virtual Radiology Department: Managing a Multisite Network

Dear readers,

Teleradiology is now well-established as an integral part of the working of many radiology departments throughout the world. It has a number of advantages, including the provision of reporting services to sparsely populated areas, out-of-hours teleradiology reporting services, which is used by most radiological practices in the USA, obtaining subspecialist advice and reports, consultation of cases and ease of referral to tertiary centres. However, there are also disadvantages, including the creation of radiological examinations as a commodity to be traded around the world for the cheapest reporting service, separating the radiologist from the patient and disrupting the close working relationships between radiologists and clinicians.

It is important for the patient that their care is optimal, properly coordinated and that they have control over their own care. The European Society of Radiologists (ESR) has recognised the potential problems that may develop in an unregulated worldwide teleradiology explosion and have issued guidelines for the practice of teleradiology that highlight the importance of the involvement of the local radiologist in the coordination and use of the systems. In particular, the reporting radiologists must be subject to the same regulations as the radiologists in the country of origin of the examination, for the patients' safety and to ensure the quality of the reports and that adequate means of communication are in place

between the reporting radiologist and the local radiologists and clinicians.

These guidelines have been circulated widely, and it is hoped that they will be taken into account in the formulation of the proposed EU medical services directive. This edition of IMAGING Management contains articles written by experts in the field of teleradiology, who have developed local networks successfully for the benefit of their patients and to increase the efficiency of the service provided. The pitfalls of a hastily-imposed service on the provision of radiological care are also discussed, as are the solutions that have been found to work in practice.

Teleradiology is ensuring radical re-engineering of radiological services which will greatly affect both managers and radiologists. It is important for the safety and quality of care of our patients that it is introduced in an evolutionary manner with full discussion of all key participants.

ESR teleradiology guidelines are available on the ESR website <http://www.esr.org>

We welcome your thoughts and feedback on any or all of the articles within the journal. Please send your responses to myself or to Managing Editor Dervla Gleeson at [editorial@imagingmanagement.org](mailto:editorial@imagingmanagement.org).

*Prof. Iain McCall*



**Prof. Iain McCall**

Editor-in-Chief

[EIC@imagingmanagement.org](mailto:EIC@imagingmanagement.org)

## HAVE YOUR SAY!

Letters to the Editor at [editorial@imagingmanagement.org](mailto:editorial@imagingmanagement.org)



### 10th Annual Management in Radiology (MIR) Congress 2007

Register online at [www.mir-online.org](http://www.mir-online.org) to join an international pool of experts sharing management knowledge and experience!

The 10th annual edition of the Management In Radiology (MIR) congress will be held this year in Oxford, UK from October 10 - 13, 2007, led by new Chairperson Dr Nicola Strickland.

This unique platform, initiated to address significant managerial issues that affect the medical imaging community from a scientific point of view, offers a wealth of opportunities to stimulate greater involvement and leadership of imaging specialists in the management of medical imaging departments.



Dr Nicola Strickland

### Letter from MIR Chairperson, Dr Nicola Strickland

Dear readers,

It is my pleasure to introduce you to the annual Management in Radiology (MIR) 2007 conference, which will be held in the beautiful university town of Oxford, England this year from the afternoon of Wednesday 10th October until 13:30 on Saturday 13th October. We look forward to seeing as many radiologists, other clinical imagers, managers, radiographers, IT specialists, engineers and other interested parties as possible. Many exciting and controversial management issues in imaging will be covered. There will be plenty of time for discussion, and possibly heated debate!

Please let me briefly provide you with some highlights of the planned sessions. Wednesday afternoon will be combined with the Special Interest Group (SIG) for PACS and Teleradiology of the Royal College of Radiologists (RCR) and will concentrate on management issues pertinent to the ambitious English national programme for introducing PACS and associated IT into every hospital in the country by the end of 2007. This will be followed by a session on radiological coding, and dilemmas arising from this.

On Thursday a whole variety of topics will be covered, including a hopefully amusing session entitled "**The 10 Commandments of Imaging Management**" where various international speakers will briefly present their top ten priorities in imaging management. These will be "scored" and a summary session will explore the priorities in more detail. Further presentations include quality assurance and productivity, and ancillary IT technologies including speech recognition.

Friday will be devoted to the emotive topic of teleradiology and outsourcing in all its

various guises. Real life experiences of the threats and gains from teleradiology services will be presented from "both sides of the fence": the outsourcers and the providers.

Saturday morning will be devoted to the importance of best practice in the management of imaging research and teaching, and consideration of the evolution or extinction of imaging as an independent discipline!

See you there!

Dr Nicola Strickland

### Provisional Programme Topics

Highlights from the provisional programme for the MIR 2007 congress include the following subjects, but please note that this is a provisional programme and the speakers and the times of their lectures are subject to change. Final programme details will become available on the [www.mir-online.org](http://www.mir-online.org) website.

Topics include:

- What can the ESR do about the complete lack of imaging training standards throughout Europe?, **Peter Pattayama**
- Managing future challenges in imaging, **Michel Claudon**
- Why cardiologists don't need radiologists, **Petros Nihoyannopoulos**
- Interventional radiology should remain a key part of imaging training, **Giles Maskill**
- How can an imaging department encourage both research and clinical productivity: management models, **Georg Bongartz**
- Why is imaging research important to managing the future of our specialty? **Hans Blickman**
- Management guidelines for teleradiology outsourcing in the UK, **Laurence Sutton**
- Managing problems created by PACS, **Nicholas Hollings**
- Developing a UK-wide radiology accreditation programme, **Conall Garvey**



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### **PACS Congress Promises Wealth of New Information**

This year's 25th Annual International EuroPACS Meeting will be held in conjunction with the CARS congress, from June 27 – 30, 2007, in Berlin, Germany. EuroPACS is Europe's most intensive PACS congress, cov-

ering all the important subjects that are useful not just for healthcare IT personnel, but for all those concerned with efficient workflow management and the latest IT developments involving radiology. Sessions will be chaired by expert topic leaders, including Dr Jarmo Reponen, Prof. Peter Mildenerger, Prof. Davide Caramella and Prof. Berthold Wein.

The latest programme reveals a variety of interesting topics including:

- PACS – Beyond Radiology
- Regional PACS and Teleradiology
- Planning
- Architecture, Workstation, Archiving
- Image Distribution and Integration Strategies

For registration or further programme details, please visit the EuroPACS website.

[www.europacs.org](http://www.europacs.org)



### **7th IHE Europe Connectathon a Great Success**

THE Europe held its seventh interoperability testing event known as the IHE Connectathon on 15 - 20 April in Berlin. The event was organised in parallel with the German EU Presidency's eHealth conference and the ITeG Congress.

Over three hundred engineers from seventy companies gathered in the Berlin Messe for six days, testing the interoperability of their healthcare IT systems. More than 1500 tests were carried out, verified by a team of over thirty monitors led by Eric Poiseau, IHE Europe Technical Project Manager.

Most European countries were represented this year with vendors originating from over ten European countries as well from Canada, Israel, Japan and the USA.

Many new vendors joined the Connectathon process for the first time, interested by the five domains covered there, including infrastructure, radiology, cardiology, patient care coordination and laboratory.

Among the hot topics at the Connectathon were document-sharing, security, identity management and workflow. The event was run in parallel to the ITeG and eHealth week, with tours in Dutch, English, French, German and Italian offered throughout the week.

The Connectathon provides a unique opportunity for application interoperability

testing. Vendors identified and solved many bugs during the event. According to one vendor "The cost of identifying and solving a bug during a Connectathon is about ten times less than the cost of a bug identified on site".

The results of the event will be published in the Connectathon results table on the IHE-Europe website at [www.ihe-europe.org](http://www.ihe-europe.org). Vendors may use IHE integration statements to show their products' compliance with the IHE integration profiles. This is a clear advantage for vendors when responding to requests for proposals from user sites

In 2008, IHE Europe is planning to hold the first UK Connectathon in Oxford.

[www.ihe-europe.org](http://www.ihe-europe.org)



### **Preliminary Programme Announced**

*Exciting List of Topics and Speakers Already Confirmed*

Incorporating the CARS 21st International Conference and Exhibition, ISCAS 11th Annual Conference, EuroPACS 25th International Meeting, the 9th International

Workshop on CAD and the 13th Computed Maxillofacial Imaging Congress, those with an interest in developments in radiology will find a wealth of topics covered and information presented from June 27 – 30, 2007.

The main themes this year follow on from last year's and include: Medical Imaging, Cardiovascular Imaging, Computer Maxillofacial Imaging, Image Processing and Display, PACS & IHE, Telemedicine and e-Health, Computer-Aided Diagnosis and a very topi-

cal theme which is Computer-Assisted Radiation Therapy amongst others.

During the CARS congress, a variety of international expert speakers will come together to present the latest technological advances and developments to their audience. Attendees will benefit from sessions such as:

- **Workstations and e-Health:** "Distributing 3D Tools across the enterprise with PACS Integration"; "New Display Solutions for the Image-Centric Era of Healthcare". ▶▶



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• **Image Processing and Visualisation:** "Development and Validation of a Physics-based Brain Atlas", "Ultrasound for the Human Spine – Imaging and Analysis".

• **Medical Imaging:** "Real-time Endoscopic

Image Enhancement", "Volumetric CPR as an Enhancement to Virtual Colonoscopy Systems".

These are just a small taste of the rich variety of topics that will be covered during

the congress. The full preliminary programme is available for download on the CARS website.

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[www.cars-int.org](http://www.cars-int.org)

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### **ECRI Institute Provides Guidance on Reducing Cancers Caused by CT Scans**

Despite being a life-saving diagnostic tool, CT scanners are estimated to cause around 6,000 cancers each year in the United States, roughly half of them fatal. Several surveys show that medical professionals and patients lack a clear understanding of the risks inherent with CT doses. In a recent report, ECRI Institute, a non-profit healthcare research organisation, recom-

mends more attention be paid to reduce the number of deaths and injuries caused by radiation doses.

ECRI Institute's guidance article explains the radiation risks of CT and discusses how they compare with other risks in and out of healthcare. ECRI Institute also outlines ways in which doses can be kept to the necessary minimum. According to ECRI Institute, the potential of CT to increase the number of cancers is a public health concern, especially in younger patients and everyone involved in referring patients for CT scans, as well as those responsible for the studies, should understand the risks and how to moderate them.

ECRI Institute recommends several steps that healthcare facilities should take in order to address the problem. They include eliminating unnecessary CT use, raising referring physicians' awareness of the issues, considering alternative diagnostic tools when appropriate, optimising imaging protocols, and monitoring x-ray doses. Exams are justifiable says ECRI Institute, as long as the radiation risks are appropriate for the diagnosis. But, if healthcare professionals are not educated about the dose risks, the appropriate precautions may not be taken.

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[www.ecri.org.uk](http://www.ecri.org.uk)

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### **Annual Event a Must for Interventional Radiologists**

At CIRSE 2007 world-renowned experts will lecture on hot topics including cardiac and peripheral vascular imaging, arterial, venous and non-vascular interventions, bone interventions, and interventions in oncology. The foundation courses will provide a great educational experience for the younger attendees of the meeting, while numerous workshops will offer interactive education in all aspects of interventional radiology. The scientific sessions and electronic posters will give us the opportunity to look into the future of the discipline. For CIRSE 2007, the programme format has been changed; all

lectures are divided into five main themes to allow delegates to follow one of these themes with little overlap.

#### **Five Main Themes**

##### **Vascular Interventions**

Covering this important area with a foundation course on intermittent claudication and special sessions from imaging of the peripheral arteries and the heart to management of intermittent claudication and critical limb ischemia.

##### **Transcatheter Embolisation**

Including a number of foundation courses on embolisation, seven special sessions on embolotherapy and three basic workshops.

##### **Non-Vascular Interventions**

A number of special sessions and workshops will be devoted to interventions, from nee-

dle biopsy to abscess drainage, to biliary drainage or percutaneous nephrostomy, with a particular look at abscess drainage and nephrostomy in an on-call setting.

##### **Interventional Oncology**

Radiofrequency ablation of tumours, transarterial chemoembolisation and targeted delivery of therapeutic payloads. New treatment modalities such as high intensity focused ultrasound, laparoscopically guided radiofrequency ablation, microwave ablation and cryoablation will all be featured at CIRSE 2007.

##### **Clinical Practice**

A number of special sessions and workshops are devoted to clinical practice development.

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[www.cirse.org](http://www.cirse.org)

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# ALLIANCE FOR MRI

## The European Commission Responds



**Dervla Gleeson**  
 Managing Editor  
 IMAGING Management  
 editorial@imagingmanagement.org

The 'Alliance for MRI', a coalition of European Parliamentarians, patient groups, leading European scientists and the medical community was launched during the ECR 2007, to avert the threat posed by EU health and safety legislation to the clinical and research uses of MRI.

### Background of the Directive

In 2004, the EU adopted the EU Physical Agents 2004/40/EC (EMF) Directive to reduce adverse health effects on workers linked to short-term exposure to electromagnetic fields. The deadline for implementing the Directive is April 2008. The European Commission's original impact assessment, which was ten years old, did not cover the social and economic consequences of legislating in this area. As a result, the impact on the use of MRI, while unintended, has serious consequences for healthcare provision and patient welfare, such as:

- It will curtail clinical and research implications of MRI;
- It will make it more difficult for healthcare staff to care for high-risk patients, who may be thereby obligated to use alternate technologies with proven risks, (e.g, x-ray or CT);
- It will arrest the use of MRI for interventional and surgical procedures; and,
- It will inhibit research in the field of MRI, denying patients innovative treatments in the future.

### Goal of the Alliance for MRI

The Alliance for MRI requests that the European Commission:

1. Inform Member States, notably Ministries of Health as well as implementing ministries and agencies, of the unintended consequences of the Directive;
2. Inform Member States of the Commis-

sion's expert study currently being undertaken into the impact of the Directive on MRI, and request a delay in implementing the legislation until the results of the study are known (expected in October 2007);

3. Propose an amendment to the legislation, introducing an EU-wide derogation for MRI.

### Recent Update: The Commission Responds

In response to the concerns raised by the Alliance for MRI, the following letter was sent jointly from Directors General Mr. Van der Pas (DG Employment) and Mr. Madelin (DG Health and Consumer Affairs).

"The European Commission is aware of the concerns expressed by the European Society of Radiology regarding the possible impact of Directive 2004/40/EC on the medical use of Magnetic Resonance Imagery. We are taking those concerns seriously. The Commission has already taken a number of initiatives, in full transparency and cooperation with interested parties, including the ESR. Firstly, the European Commission will shortly be writing to national authorities alerting them to the issue and asking them about any difficulties they may have faced during the process of transposing Directive 2004/40/EC.

Secondly, we have brought the issue to the attention of Member States and the social partners in the framework of the EU Advisory Committee for Safety and Health at Work. The Advisory Committee has mandated a working group to assist the Commission in finding a resolution to issues regarding unintended effects of the Directive on the use of Magnetic Resonance Imaging. This will include analysing research emerging from various member states and the Commission, formulating potential solutions, and providing a draft opinion for adoption by the Advisory Committee.

Thirdly, we are following closely, relevant studies undertaken on this issue, and in particular the forthcoming report from the study launched in the UK by the Health and Safety Executive (HSE). The HSE will be invit-

ed to share the results of this study, which should become available in April 2007, with the Commission and the Advisory Committee.

Fourthly, the Commission has published a tender for an independent study in order to assess the implications for MRI of the exposure limit values imposed by the Directive and to identify problems, if any, in a quantitative and comprehensive way. This study will be undertaken in close cooperation with the users and manufacturers of MRI equipment. We are pleased that the Alliance has agreed to be associated with this study. The first results should be available by October of this year and will be submitted to the Advisory Committee as soon as possible. Finally, the Commission is in regular contact with the International Commission on Non-Ionising Radiation Protection and other relevant international bodies to collect information on the latest technical and scientific evolutions. If, at any of the above stages, substantial evidence becomes available that the exposure limits laid down in the Directive would unduly affect medical procedures, we will be prepared to address the problem, not excluding a proposal to amend the Directive."

### Growing Support for the Alliance for MRI

The Alliance is supported by twenty leading MEPs, eight European and national patient groups and four representative groups of scientists. In addition, a number of individual scientists and patient group representatives have signed up to the Alliance NEXT STEPS European Parliament Lunch to be held Wednesday 13th June to inform members of the European Parliament of the scientific basis for the concerns regarding the impact of the EMF Directive. Information regarding the Alliance for MRI will be posted on the ESR website [www.myESR.org](http://www.myESR.org) and further information is available from Ms. Monika Hierath at the Alliance for MRI Secretariat European Society of Radiology (ESR), Neutorgasse 9, AT-1010 Vienna Telephone: (+43) 1 533 40 64 20 Email: [monika.hierath@myesr.org](mailto:monika.hierath@myesr.org).



# RESOLUTION ON CROSS-BORDER HEALTHCARE

## Future Legal Framework of Healthcare Must Include Patients' Rights



**Helicia Herman**  
Correspondent

In a resolution on cross-border healthcare adopted on March 15 2007, the European Parliament insisted on the obligation to guarantee absolute protection of health in the EU. The plenary assembly solicited amongst other things, a reinforcement of patient rights and the creation of a legal framework for cross-border arrangements in healthcare matters. In response to several cases of the European Court of Justice, MEPs cited juridical security, especially in regard to pan-European reimbursement of costs, as a priority of the legal framework proposed by the Commission for cross-border healthcare.

To secure the mobility desired by patients, families, concerned professions and healthcare providers, MEPs wanted clear directives to be laid down within the framework of cross-border healthcare measures, with particular note of the definitions for division of tasks of different stages (or eventually in different countries) of a treatment.

### Reinforcement of Patient Rights

The improvement of communication channels, the creation of a European network of reference centres and exchanges on 'the accreditation and the specialist status of cross-border health professionals' must also be accelerated. The reinforcement of patient information must result in a common charter of patients' rights in the future community framework, and a central contact point for patient complaints.

The addition of a charter of patient rights is the result of a call by European Liberals and Democrats. Later, March 29 was proclaimed 'European Patient Rights Day' and a first conference organised in Brussels. Numerous patients' rights representatives participated, as well as many European MEPs and well-known members of the healthcare sector. The European charter of patient rights, which the Active Citizen Network laid out in

2002 was presented. Article 8 of the charter which proclaims the right to high-quality healthcare, is of particular note.

The Commission has not yet adopted a position, as it is not yet certain that a charter of patient rights will be included in its future proposition for the legal framework for healthcare services.

### Project for Legal Framework Gives Rise to Criticism

The project of a legal framework for social services of general interest gave rise to certain criticisms. According to the Members of the European Parliament, a legal framework is welcome, within the context of the way in which this kind of service constitutes one of the pillars of the European social model, in relation to which, at a European level, all erroneous interpretations by the law must be avoided. Otherwise the concept of the Commission, which depends on the difference between competition, state aid and the market on one hand, and public service, general interest and social cohesion on the other will be distorted. The lack of definition of services in the proposition is also criticised, such as the fact that health services are excluded, despite the fact that they should be considered as social services of general interest.

MPs propose the creation of public-private partnerships, leaving it up to each state authority to decide if the social services should be insured by public health insurance or by private enterprise. Obviously, it is necessary to guarantee that the common interest is taken into account. In addition, state authorities must check if the social services providers respect the principles and values of the social services of general interest, as well as the specified requirements.

MEPs finally requested the Commission, member states and social services providers to elaborate measures for professional training, so that the professionals of the sector

can adapt to conditions of stress, shift-work or working nights, and to dangerous or exhausting activities. The governing bodies must guarantee a high standard of professional training to social workers, in order to assure the future needs in social services.

### A Harmonisation of Health Systems in Europe?

In a study recently published by patient association 'Health First Europe', (HFE) and health professionals including doctors, scientists and industrialists, numerous experts came out in favour of a harmonisation, in the long-term, of European health systems. Amongst the people surveyed, were representatives of the European institutions, of the member states of the EU, and from industry and non-governmental organisations. 41% preferred a general harmonisation in the long-term, as opposed to the pursuit of different national systems. The majority of people questioned (58%) were, however, against a unique European health system.

The principle reasons for a harmonisation would be the free mobility of the patient covered, equal rights for patients as well as comparable working conditions for members of the health professions. These objectives could only be guaranteed in a harmonised system, according to advocates.

89% asked for more investment in innovative technology, 86% the creation of a programme of prevention, for example for the prevention of cancer, and 82% the introduction of diagnostics, treatment, and options for electronic documentation, as well as reducing healthcare spending in the EU. Finally, 69% think that the European Commission should publish comparison data on the qualification of healthcare providers.



# Industry News

## **Agfa HealthCare** *Agfa HealthCare Selected by Heilig Hartziekenhuis Mol in Belgium*

Agfa HealthCare has announced that the Heilig Hartziekenhuis Mol hospital in Belgium has awarded it a significant contract to unify its medical workflow through the company's ORBIS(TM) solution. ORBIS is Agfa HealthCare's integrated Hospital and Clinical Information System (HIS/CIS), specifically designed to manage the entire patient-centric information flow through all hospital departments.

Agfa HealthCare's ORBIS solution will provide the Heilig Hartziekenhuis Mol hospital with a comprehensive view of clinical information processes, including medical and nursing records, scheduling, order management, results reporting and medication workflow. The hospital has worked with Agfa HealthCare since 2003, using its PACS/RIS solution.

## **Kodak** *Kodak Launches New Imaging Agent Product Line*

Eastman Kodak Company's Molecular Imaging Systems group announced the introduction of KODAK X-Sight imaging agents, a novel line of imaging agents for in vivo molecular imaging applications.

In vivo molecular imaging allows non-invasive measurement of biological processes within a living organism. In contrast to conventional diagnostic imaging that highlights conditions caused by disease, molecular imaging identifies molecular abnormalities that are the origin of disease at a very early

stage, which can expedite the development of treatment options that could help cure that disease. X-Sight imaging agents are non-toxic, making them safe for research studies in areas such as oncology, cardiology, diabetes, and inflammation.

## **Siemens** *Siemens Offer New Colour Display*

Siemens Automation and Drives (A&D) has added a 1 Megapixel colour display to its portfolio of monitors in the medical field. The SCD 19110 offers high luminance of up to 300 cd/m<sup>2</sup> (candelas per square meter) and a contrast ratio of 1000:1.

The 19" display is suitable for hospital information systems (HIS) and radiology information systems (RIS) as well as for review of medical images. The MVA (multi-domain vertical alignment) panel technology used on the SCD 19110 ensures a fast response time for gray-scale images and a wide viewing angle. This allows several persons to view the contents of the display simultaneously.

## **Philips** *Philips Medical Systems to Supply Sixteen Radiotherapy Workstations to Royal Preston Hospital*

The workstations, which are a mixture of eight Philips' Pinnacle3 radiation therapy planning systems and eight Philips Pinnacle3 PC-based workstations (P3PC), will replace existing systems at the Rosemere Cancer Foundation, part of Lancashire Teaching Hospitals Foundation Trust. With Philips' P3PC emulation soft-

ware, the Window's-based computer becomes a Philips' Pinnacle3 workstation with access to all Pinnacle3 functionality. The P3PC workstation uses the same intuitive interface as Pinnacle3, facilitating the transition from the standard Pinnacle3.

Also selected was the Pukka-j solution, which offers a 'niche' solution for the integration of radiotherapy into radiology-designed PACS systems. The Pukka-j Radiotherapy Archive collates and distributes all DICOM data related to radiotherapy patients who are currently undergoing treatment planning and treatment delivery processes. The data is acquired and stored in a combination of DICOM studies and DICOM series that preserves any logical relationship between them. In addition, the system fully supports and maintains the RT cross references required for treatment planning for the following DICOM RT classes objects; Image – CT, DR, RT Structure Set, RT Plan, RT Dose, RT Image.

## **Shimadzu** *Shimadzu Launches Sarano Ultrasound System*

Shimadzu has launched a new ultrasound system. Sarano incorporates a next-generation digital beam former that offers ten times greater processing speed and uses Digital Balanced Transfer technology for noiseless digital data processing. It allows superior digital transfer and accurate display of acquired large-scale image information. The high frame rate, accurate focusing, high dynamic range, and high-frequency support provide highly reliable, high-definition diagnostic images.



## Hologic

### Hologic Launches Suros Celero™ for the Breast Ultrasound Market

Suros Surgical Systems, Inc., a subsidiary of Hologic, Inc. has announced the commercial launch of the Suros Celero™ - the first U.S. FDA-cleared spring loaded, vacuum assisted core biopsy device for the breast ultrasound market. With the option of firing inside or outside the breast, the device is designed to access hard-to-reach lesions in the axilla, near the chest wall, near implants or behind the nipple.

The lightweight design of the handheld Celero and its highly echogenic needle provide smooth penetration to lesions while reducing deflection and offer a clearly visible aperture location for target verification under ultrasound imaging prior to tissue acquisition. Celero securely holds the tissue sample in place while acquiring large cores.

"Early Celero clinical findings show that only two to three samples are needed for a diagnosis and DCIS [ductal carcinoma in situ] staging with only two samples," said Paige Huber MD, a radiologist with AnMed Health, a healthcare provider in Anderson, South Carolina. "While many physicians are accustomed to 6 - 10 needle insertions for spring loaded core biopsies, Celero needs only 2 - 3 insertions to gain the same results.

## Stryker

### Stryker Imaging to Sell Swissray DR Systems

Swissray International, Inc. has announced a 5-year agreement with the imaging division of Stryker Corporation, a leader in the worldwide orthopaedic market and one of the world's largest medical device companies. Stryker direct sales force will sell the Swissray DR systems into the US orthopaedic private practice market under the Stryker brand name HDDR. Swissray will utilise

their US service and support organisation for the installation, application, training and maintenance of the Stryker High Definition Digital Radiography (HDDR) systems.

## Medtronic

### Medtronic to Buy Breakaway Imaging

Medtronic has exercised its option to acquire the O-arm Imaging System assets of Breakaway Imaging LLC. The acquisition brings the O-arm Imaging System which received FDA clearance in 2005, into a broad portfolio of image-guided surgical solutions within the navigation business at Medtronic. The financial terms of the agreement, which is expected to close in June, are not being disclosed.

The O-arm Imaging System, with a breakable gantry and flat screen detector, provides multi-dimensional surgical imaging. It provides surgeons with 3D images, as well as multi-plane 2D, and fluoroscopic imaging. It is intended for use in orthopaedic surgical procedures in use in more than twenty locations worldwide.

## Hologic

### Hologic & Cytyc to Merge

Hologic, Inc. and Cytyc Corporation have announced a definitive agreement to combine their two companies in a cash and stock transaction to create a \$10 billion global leader in women's healthcare. The transaction is expected to be completed in the third calendar quarter of 2007.

The new company will be called Hologic and upon closing, Cytyc will become a wholly-owned subsidiary. Hologic will be one of the largest companies in the world focused exclusively on advanced technology in women's health and will have direct operations in over twenty countries with more than 3,300 employees.

## Planar

### Planar, NVIDIA Partner on Advanced Visualisation

Planar Systems Inc. has partnered with NVIDIA Corporation, to bundle the NVIDIA Quadro professional graphics solutions with Planar's Dome diagnostic and clinical medical displays. Planar said its new dual-link Dome displays can be utilised with NVIDIA's Quadro technology to provide high-end 3D rendering performance and to maximise refresh rates. Planar's line of diagnostic displays will be offered with NVIDIA Quadro professional graphics tools as an option to boost visual detail and resolution.

Planar and NVIDIA also said they plan to synchronise their product development cycles, providing customers with the latest in NVIDIA Quadro professional graphics technology through the Planar Dome display line. Additionally, because NVIDIA provides extended life cycles on the Quadro line, users with both qualified configurations will have access beyond the typical availability in addition to enhanced technical support.

## GE

### GE Files Suit Against SonoSite Over Ultrasound Patents

General Electric Company has hit SonoSite with a patent infringement lawsuit over a dispute involving five different patents. The suit was filed in U.S. District Court for the Western District of Wisconsin, and alleges that SonoSite's MicroMaxx and Titan products willfully infringe GE's U.S. patents (Nos. 4,932,415; 5,584,294; 6,120,447; 6,210,327; and 6,418,225), each relating to ultrasound technology.

In the suit, GE is seeking an unspecified amount in monetary damages as well as an injunction against SonoSite to keep the company from utilising the technology.

# 10<sup>th</sup> Annual Management in Radiology (MIR) Congress

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**The 10<sup>th</sup> Annual MIR (Management In Radiology) meeting will be held this year in Oxford, UK from October 10 - 13, 2007.**

This unique platform, initiated to address significant managerial issues that affect the medical imaging community from a scientific point of view, offers a wealth of opportunities to exchange experience, introduce new tools and concepts and draw together a wide range of leading professionals, both speakers and delegates. The main topics are as follows:

- ▶ The use of information technology: PACS, the electronic patient record, electronic requesting and feedback of results, speech recognition, etc.
- ▶ Teleradiology & outsourcing of imaging and reporting
- ▶ Payment by results
- ▶ Management improvement strategies
- ▶ Value-added imaging
- ▶ Topics related to all aspects of management in imaging today

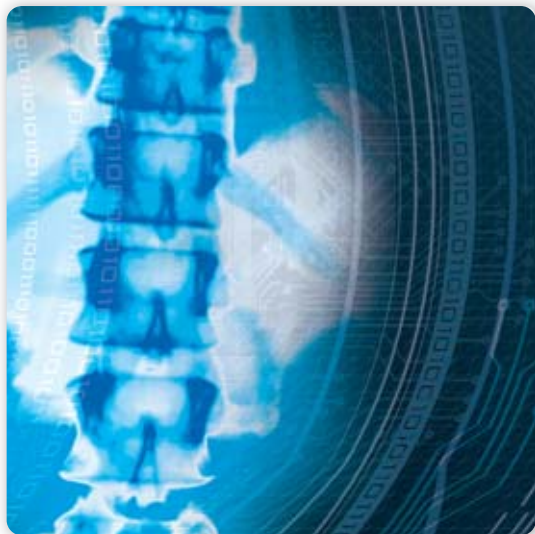
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# USING INDEPENDENT SERVICE PROVIDERS

## Challenges and Solutions



In 2004, the Department of Health (DH) in the UK announced a large increase in the numbers of diagnostic imaging examinations (mainly MRI) to be performed within the National Health Service (NHS). Despite recent increases in the numbers of radiographers and radiologists undergoing training, radiology is still perceived as a 'shortage specialty'. For this reason, the DH introduced twelve additional mobile MR units and their images were outsourced to groups of radiologists outside the NHS for reporting that had the capacity to handle what was originally 120,000 MR examinations per annum but is now rising to over 450,000 per annum. This paper highlights some of the challenges faced and solutions found during the first two-and-a-half years of operation, during which over 200,000 NHS examinations have been performed and reported by an Independent Sector Provider (ISP).

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### Service Delivery Challenge

It proved complex to identify appropriate patients for such outsourced imaging. Because mobile MR systems were used, the patients had to be ambulant. Outsourcing often involves high volume simple procedures; this inevitably results in a more complex (and more expensive) case mix at static units. The identification of patients from within an existing waiting list took time and occasionally led to scheduling problems.

### Solution

A centralised online booking system, with inbuilt checks/guidelines on the appropriateness of referrals, would be ideal. Such a system should embrace HIS, RIS and PACS and is currently being developed in the UK under the national programme called 'Connecting for Health'. Access to previous images and reports is essential for all those involved in providing imaging services, whether outsourced or not; this will become easier as PACS stores and electronic links develop.

### Reporting Challenge

The referring clinician did not 'know' the radiologist who provided the report and the report was often not in a familiar style. This led to numerous examinations being re-reported locally. Some complicated reports

were received by general practitioners who could not determine whether the findings were serious/important or 'normal for age'.

### Solution

Through improved communication, quality control and feedback to the outsourced radiologists, the reports became more acceptable to the referring clinicians. This necessitated extensive audit both within the ISP and also through independent audits. It is likely that such processes have been instrumental in developing more robust audits of all imaging examinations throughout the NHS.

### Clinical Liaison Challenge

The reporting radiologist did not meet the referring clinician to discuss urgent/interesting cases and obtain feedback. For practical reasons it was impossible for them to attend the all-important clinico-radiological and multidisciplinary meetings. Again this led to examinations being reviewed and re-reported by local radiologists.

### Solution

A robust method was developed whereby the radiographer and the reporting radiologist were instructed to contact the referring clinician or organisation about



urgent or clinically unexpected findings. However, geographic constraints prevent the attendance of the reporting radiologist at multidisciplinary meetings. This may be addressed in the future by teleconferencing. The essential clinical interaction between local radiologists and referring clinicians has been recognised, with some funding being devolved to the local units for additional administration and secondary reporting.

## Statutory Requirements

### Challenge

Such a new venture raised many questions and issues regarding confidentiality and legislation.

### Solution

In many ways these have been simpler to address for teleradiology within the EU than beyond. Some of the solutions can be found within the constructive joint statement prepared by the European Society of Radiology and UEMS (Radiology Section) statement on teleradiology, which contains many of the points raised in a UK Royal College of Radiologists publication. Reporting radiologists should be registered (and be on specialist register for radiology) with the appropriate medical regulatory body of the country of residence of all patients for which he/she provides reports; they must also have a proper knowledge of the language(s) of each member state of residence of all patients for which he/she provides reports (as required by the EU Qualifications Directive 2005). Likewise they should be subject to the same requirements regarding CME, EU Working Time Directive, revalidation, recertification and appraisal as local radiologists.

## Results

Of the 250,000 MR examinations that have been performed under the UK NHS 'First Wave', relatively few life-threatening errors have come to light. Each has been subject to an intense inquiry and valuable lessons learnt. However there are no grounds for complacency and disagreements still occur. The technical quality of reports is judged on 5-point scale, along with the language/terminology within the report and the overall clinical opinion offered. The same methodology is used as in the original RCR/DH audits - a 1-5 scale where 5 is perfect. This is in line with methodology used by the GMC for assessing the quality of radiological examinations.

- Technical quality of the examination; including anatomical coverage, the presence or absence of movement artefact, infolding artefacts, coil artefacts, etc.
- Language of the report; common use of terms, grammar, confusing spelling, etc.

- The clinical opinion of the report; 1 - major disagreement, 2 - moderate disagreement, 3 - minor disagreement, 4 - trivial difference of opinion, 5 - complete agreement.

This assessment should not only include the precise "accuracy" of the report but should also consider whether the clinical question has been properly handled/addressed. It is perfectly possible for an entirely 'accurate' report to be misleading for the referring clinician. Examinations receiving clinical scores of 1 - 3, which imply a disagreement that may warrant an addendum to the original report, will need to be referred back to the original reporter.

## Conclusions

Outsourcing is likely to increase in the future with more and more simple procedures being reported by large radiology groups capable of providing a timely high-volume service. Although there are perceived threats from such a service, ranging from training issues to potential downgrading of hospital-based radiology, outsourcing may allow highly-specialised radiologists more time to perform cutting-edge complex radiology and consultation with clinicians at multidisciplinary meetings. It can also free up machine time so that seriously ill patients can gain prompt access to MR. ❧

## Further Reading

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# THE NEW "NETWORKED APPROACH" TO DIAGNOSTIC IMAGING

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## Where is Teleradiology at Today?

**Teleradiology is probably the most extensively developed area of telemedicine. There are no doubts about its added value to healthcare, particularly in reference to imaging services. Teleradiology can help ensure access to secondary consultation, speed up image interpretation and improve continuing medical education. When used appropriately, teleradiology can significantly improve access to quality radiological services. The implementation of teleradiology benefits patients directly, ensuring better care and minimising the need to travel for consultation. In this environment, new opportunities arise, making it possible to share specialised care and optimise the use of technological and human resources.**

This new scenario requires novel organisational approaches to define and coordinate relations among radiologists, between radiologists and clinicians, and

ical distance. The real challenge in teleradiology today is in integrating a variety of information (not just images) into the workflow of different professionals working at at least two different institutions. Although the technical difficulties related to transferring information have been overcome, these aspects are none the less important today. However, it has become clear that it is even more challenging and important to establish guidelines to ensure smooth and efficient workflow and to reach a consensus regarding the criteria to determine the roles of the different professionals involved.

Questions have arisen, such as "What clinical information do radiologists need to have so that their contribution to the diagnostic process has the greatest added-value?", and "What kind of information needs to be exchanged between the different

## "Teleradiology is more than just a generator of radiological reports"

ultimately between patients and radiologists. First and foremost, teleradiology is a means of providing the radiological image interpretation and consultation by professionals located some distance from the site where the images are acquired, due either to a lack of human resources or specialised knowledge at the institution requiring the services. In this scenario, the patient's images and relative clinical information are sent to a radiologist at a remote site, who interprets them and assumes the responsibility for the diagnosis.

### Challenges in Teleradiology Today

Although much emphasis was formerly placed on the technological aspects involved in establishing reliable and secure connections between the different sites, a teleradiology project involves much more than overcoming phys-

professionals involved?". While it is obvious that these are ever-present questions in the field of diagnostic imaging rather than newly emerging ones specific to the context of teleradiology, the new scenario brings them to the forefront.

### The New "Networked Approach" to Diagnostic Imaging

As the new "networked approach to diagnostic imaging" is implemented, significant changes can be expected. This new concept of teleradiology is centered on the management of medical information, rather than the simple transmission of diagnostic images from one site to another. Teleradiology must be capable of contributing to the integration of radiological services into a digital environment in which medical information is



distributed throughout the hospital and beyond. This will generate added-value services for patients, professionals, institutions and therefore also for the healthcare system on a regional, national or even international level. Radiologists and other professionals need to assume new responsibilities to manage these new technologies and organisational changes to preserve the confidentiality and integrity of patients' data.

Teleradiology can only succeed if it is implemented with the approval and cooperation of the radiologists

- Shared areas of specialisation;
- Reviewing and consultation of cases;
- Virtual training; and,
- Cooperative research networks.

“Virtual radiology department” is probably the term that best describes the new paradigm: the integrated management of a multisite department with knowledge and expertise distributed to the professionals at the different institutions. In this way the elimination of technical barriers enables us to strengthen and rein-

## **“Attitudes among professionals toward teleradiology range from effusive to decidedly pessimistic”**

working at all of the institutions connected. It is important for these professionals to understand that the teleradiology service is not peripheral to their activity but rather one of the central pillars that support the department. Therefore, it is very important to dedicate sufficient time and resources to reviewing the new situations proposed and their relations to healthcare processes.

### **Organising Workflow**

It is extremely helpful to have written protocols to govern the complex relations between different institutions and departments during and after the implementation of the teleradiology service. The different parties need to decide on the way to standardise all procedures. Protocols must include the indications for different clinical situations. Other issues that need to be settled include the manner to inform the recipient of the need for an urgent study, who will be responsible for reviewing the work routines established, how studies will be reported, as well as to whom the results will be communicated and the time lapse from the time a patient's images and information are sent to when professionals at the referring institution receive the report. Having a study in digital format that can be accessed from any given place at any given time makes it possible to develop new ways of working and new ways of collaboration and cooperation among professionals:

- Emergency examinations can be performed without the need for the physical presence of a radiologist at the place where the examination is being performed;
- Remote reporting of scheduled examinations;
- Access to specialised expert assistance;

force relations between diagnostic imaging departments at different institutions. It is more feasible to open lines of collaboration among professionals for the evaluation and monitoring of certain pathologies, establishing criteria of suitability, continuing medical education and refresher courses, etc. than to mark off territories and try to work in isolation.

### **Teleradiology a Central Support**

Teleradiology should never attempt to function as an isolated service to support clinical practice. It is essential to have access to and make use of all the relevant information in order to define the most efficient diagnostic strategies to elucidate each patient's clinical problems. This is the principal value that should be promoted in the practice of radiology and it can only be accomplished through interdisciplinary collaboration with other professionals at each centre.

Attitudes among professionals toward teleradiology range from the effusively enthusiastic to the decidedly pessimistic. While some see the potential for new technologies to expand the specialty and improve the position of radiologists, others view them as expensive, bringing only marginal benefits and eventually worsening the radiologist's position through excessive competition. We must ask ourselves whether teleradiology should be considered a comprehensive solution for a community to which the providers have no other commitments or responsibilities. The physical presence of radiologists that take part in the local healthcare system has an added-value that should not be sacrificed. ■

# THE CANADA HEALTH INFOWAY PROGRAMME

## How Europe can Learn

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**Canada is currently implementing a national, interoperable Electronic Health Record (EHR) solution supporting seamless sharing of diagnostic imaging results to authorised healthcare providers. Through this programme, Canada will realise significant quality of care and financial benefits, with 95% of its exam volume accessible through the EHR by 2010. This will allow healthcare providers and patients electronic access to a secure and private lifetime health record. Integrating imaging records into an interoperable EHR solution is a key requirement for successful adoption. However, how does one achieve this integration? What clinical and financial benefits can one expect? The Canadian experience offers some insights into these questions.**

When Canada embarked on the EHR in 2002, about 35% of DI procedures were captured electronically. It was determined that deploying PACS into every facility would cost about CDN\$1B and would require an unattainable level of resources to complete the project within 10 years. Also, as Canada does not have a national person identifier, every hospital and healthcare facility uses a different patient numbering scheme.

60% of Canadian healthcare facilities are rurally located and have less than 100 beds. Though these facilities offer diagnostic imaging (DI) services, most do not have radiologists on-site and specialty services are concentrated in regional and tertiary healthcare facilities located in urban centres. Canada performs approximately 40 million radiology procedures per annum, with an expected growth rate of 5% annually. Currently Canada has 1,967 certified radiologists implying an average workload of ~20,000 exams annually per radiologist. With an average age of fifty, many radiologists are expected to retire within the next ten years, placing a significant pressure on the healthcare system.

Also, because physicians do not have ready access to DI records in other facilities, patient referral and transfer often results in repeated DI procedures at an estimated \$170M - \$480M annually. Thus the motivation for integrating imaging into the EHR is to provide timely report turnaround time and radiologist coverage to 60% of healthcare facilities, balance workloads across regional settings to maximise limited resources, and to eliminate unnecessary repeat procedures and reduce costs.

### Challenges in Integrating DI Results

The goal is to share all data seamlessly, so that healthcare providers can access any study, report, key image note and supporting document from any PACS or other clinical systems within five seconds. Achieving these requirements in a cost-effective manner brought a number of challenges.

Another challenge is to facilitate access to all DI results available for a patient. Canada has many RIS and PACS from a multitude of vendors. Performance aside, there is no common standard for clinical systems to query a RIS or PACS. DICOM is a clear candidate, but only PACS are DICOM-capable. Also, not all systems support DICOM. This presents a challenge for displaying DICOM images. Finally, whereas clinical systems may have internal mechanisms to satisfy privacy requirements, configuring all systems to be aware of all consumer and patient consent directives is impractical.

### Context for Sharing DI Data

The Canadian EHR is based on an enterprise architecture that defines “the enterprise” as the entire healthcare delivery system in Canada. It addresses the problem of consolidating disparate data by integrating information in a set of shared data repositories, namely:

- Public health service delivery and surveillance repository;
- Lab services repository;
- Diagnostic imaging repository;
- Drug utilisation and e-prescribing repository; and,
- Clinical notes and other health record information repository.

In order to organise the information in these repositories, a series of identifier registries are used to identify and manage the characteristics of ‘clients’ of the health system, ‘providers’ of health services, and the locations where services are provided. Clinical “point of service”



(PoS) applications publish appropriate subsets of data to the shared data repositories in near real-time. A sequential list of all EHR data related to a patient is maintained in an EHR index. Publishing, discovery and retrieval of clinical data are performed through an Enterprise Service Bus (ESB) and a common set of standards-based interfaces. The collection of common and reusable components that support these repositories is called an EHR “Infostructure” (EHRI).

### The Technical Solution for Sharing DI Data within Canada

The technical solution for seamless sharing of results across Canada is a network of Diagnostic Imaging repositories (DI-r) that consolidate results data as well as provide shared PACS application for hospitals that do not have a PACS.

These DI-r leverage common components of the EHRI through standard interfaces based on the Integrating Healthcare Enterprise (IHE) Cross-Enterprise Document Sharing for Imaging (XDS-I) integration profile. In practice a DI-r is a centralised storage and server infrastructure that supports:

- Long-term storage of DI results for the lifetime of a patient;
- Integration with existing RIS and PACS via DICOM and HL7;
- Interoperability with EHR components through IHE XDS-I transactions;
- Information access to EHR consumers via IHE XDS-I transactions, DICOM and WADO.

A total of 21 DI-r are planned for Canada with 5 already deployed, 12 in implementation and the remaining 4 in planning, as shown in Fig. 1.

### Solving Key Challenges

As of the end of 2006, 60% of DI procedures are captured and shared electronically, connecting 120 hospitals, 250 radiologists and 55 systems in a three-year period with a limited pool of resources. The challenge of identifying patients within an EHRI across Canada is solved through the use of an Enterprise Master Patient Index (EMPI) solution in each EHRI. In particular, Canada has negotiated an agreement with Initiate Systems that favours the use of the Initiate Hub™ as the defacto EMPI across the country.

With respect to privacy and security, Canada has developed a ‘Privacy and Security Conceptual Architecture’ that allows PoS to access a set of common services within the EHRI. Leveraging common services ensures consistency across all domain systems and reduces the cost of implementation and operation.

To ensure information access and display within five seconds, jurisdictions have embraced a combination of solutions. Each DI-r has an image distribution capability that leverages Internet friendly protocols and streaming technology. This allows any user to access the full patient history directly from the centralised storage infrastructure. Currently, the solutions deployed are all proprietary in nature and, thereby, do not allow cross-vendor access. The DICOM JPIP stan-

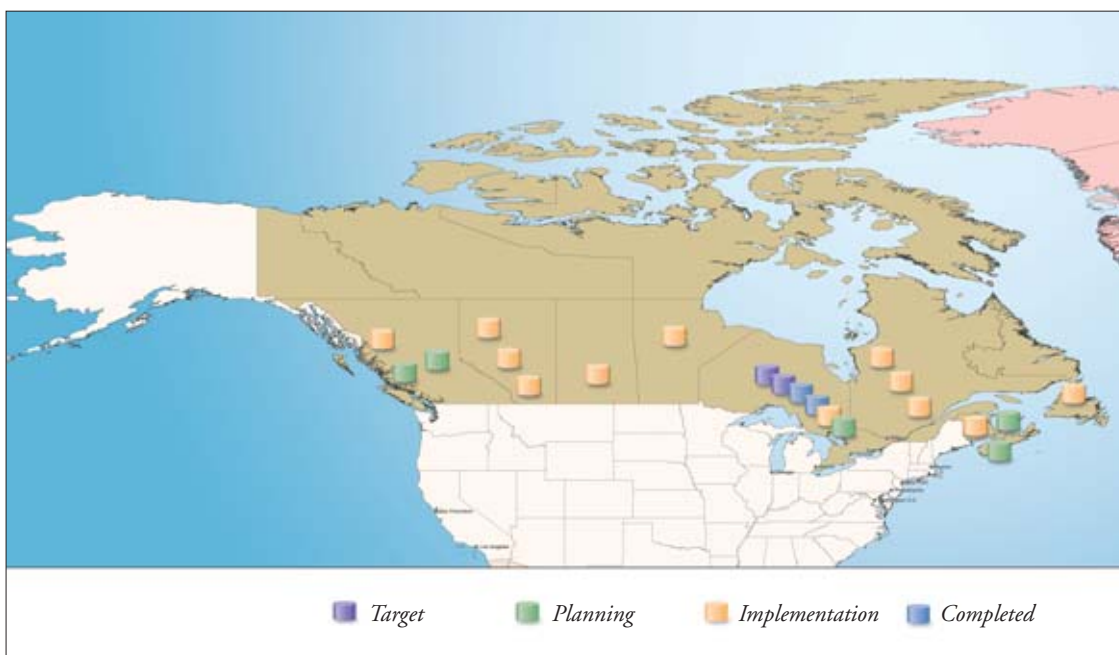


Fig. 1: DI-r Deployment across Canada

ard is being considered as a pan-Canadian standard to solve this issue.

Also, network constraints such as peering problems and backbone delays make on-demand access to multiple image sets challenging using internet friendly protocols and streaming technology. To overcome this challenge, jurisdictions are evaluating content delivery concepts where application services and data are distributed across the network and “closer” to the end user viewing clients. Essentially, these solutions leverage “edge appliances” to host cached data and provide image distribution services. Workflow engines manage the staging of relevant data at the edge appliance using a variety of triggers such as ADT and Order messages.

### Financial Considerations

The first DI-r implementations were initiated in 2003. At that time, the capital cost for PACS hardware, software and professional services equated to approximately CDN\$30 for every exam completed in the year of purchase. For example, a DI-r and shared PACS that supported 1 million exams annually cost CDN\$30 million. In 2006, a similar project, including EHR interoperability and standards compliance, cost approximately CDN\$10 million. This dramatic shift in price is the result of leveraging economy of scale and aggressive negotiation.

The cost of “useable” spinning disk storage dropped by

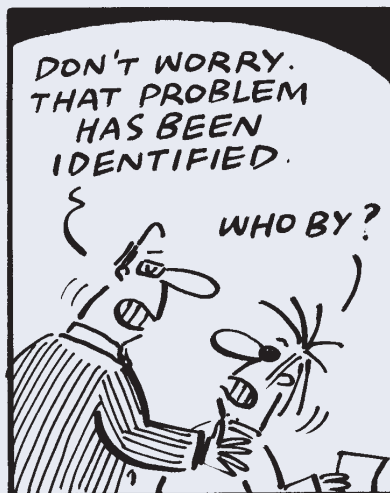
a factor of four, partly due to time and technology, but predominantly through large-scale purchasing and negotiating multi-year contracts. Software costs dropped by a factor of five. This was partly due to “web pricing expectations”, but predominantly through large scale purchasing, aggressive negotiation and a shift from concurrent to enterprise licensing.

### Sharing Health Data

The sharing of DI data in the context of an EHR has demonstrated many clinical and financial benefits. Qualitative surveys have shown improvements in access to radiologist coverage and specialist consultation has resulted in better medical management and quality of care. Projects across Canada has seen productivity gains for radiologists (-30%), technologists (-25%) and physicians. The latter is interesting in that physicians are able to regain 1.75 hours a week lost due to lost or inaccessible films. Although not fully proven out, preliminary estimates indicate that regional systems will reduce unnecessary patient transfer and generate a saving of CDN\$0.87/exam.

Data gathering is still underway to quantify the number of avoidable retakes that can be eliminated. However, preliminary research in Ontario indicates an annual saving of approximately CDN\$120 million. To summarise the financial benefits, an investment strategy report determined that Canada would deliver CDN\$9.1 billion in healthcare benefits over 10 years as a result of sharing DI results in the context of the EHR. ■

## Ray X



## Dredge & Rigg



# Case Study - Codonics Horizon Helps Sports-minded Lisbon Clinic Stay Ahead of the Competition

Written by: Steven Wagner, Freelancer

In a bustling clinic where hundreds of patients are treated each day, medical challenges abound. Clinica de Radiologia e Especialidades Autonomas Relacionadas (CREAR), a thriving practice in Lisbon, Portugal, is no exception.

Each day, an estimated 400 patients are treated at CREAR. Most are imaged using one of 10 medical imaging devices: four ultrasound (with color Doppler), three fluoroscopy, one CT, one MRI and one bone densitometry unit. With a range of imaging devices that broad, a secondary challenge is producing high-quality clinical images fast enough to keep pace with the patient flow.

Until 2004, CREAR used a wet imaging system to print all of the images produced by the various modalities. This required considerable space, could not print 3D reconstructions in color, and was expensive to maintain. Additionally, water and power consumption were substantial, and when service was required, the system was generally down for days at a time. Something had to be done.

After meeting with Codonics representatives, watching the imager in action, and comparing its images with those produced by the clinic's existing system, CREAR was convinced.

"I was very surprised, very joyful at the quality of images I saw," said Luis Fouto, M.D., a senior radiologist, adding, "I wanted a system that could produce diagnostic-quality images from five imaging devices that were all connected and capable of sending data at the same time. The Codonics Horizon did all of this with unparalleled efficiency, and I'm very pleased."

With the high-end Horizons, outstanding images are presented on clear and blue film, grayscale paper, and color paper in a variety of sizes. Horizon imagers generate 35 x 43 cm, 28 x 43 cm and 20 x 25 cm blue and clear film plus grayscale paper prints in 35 x 43 cm, 28 x 43 cm, A and A4 letter sizes, and color in A and A4. The Horizon product line offers models to suit every need and budget.

When it came time to choose imagers around the department, the decision was surprisingly easy. After all, not only did Dr. Fouto find that Horizon prints unmatched color output with quality and vividness that matches a workstation monitor, but its exclusive grayscale paper capability brought about several benefits as well.

He's strengthening his relationships with referring physicians, who appreciate the ability to view images on DirectVista Grayscale Paper in room light. With this exclusive grayscale paper, no view box is necessary. And there's a huge time saving addition. Dr. Fouto and his staff no longer must traverse the clinic throughout the day to visit their centralized system.

"With Horizon we have a package that is much more reliable for

our needs," he said. "We get diagnostic-quality images on film, paper and color paper, the systems are reliable, and we save time and space. We chose Horizon for all of those reasons."

"Codonics gives me peace of mind," he said. "It's very important to me knowing I have three systems operating with equal reliability."

With that concern behind him, Dr. Fouto and the 10 or so other radiologists who serve CREAR can concentrate on what they do best: diagnosing patients. While the clinic serves a general population, between 10% and 15% of his business involves sports. In addition to treating Olympic athletes, the clinic treats Portugal's primary soccer and other sports teams, including SLB - Sport Lisboa Benfica - a leading European soccer team and the European champion several times over.

Where that and other teams are concerned, Horizon's value has been immeasurable for one overriding reason: coaches, players and team personnel can view images in room light on their own schedule, evaluating daily what steps must be taken while an injury heals and how soon an athlete might return to action - without the need for a view box.

In the realm of sports, Dr. Fouto and his team of radiologists find the consistent image reproduction of the Horizon particularly useful in enabling physicians to evaluate tears of the labrum, a ring of fibrocartilage around the edge of the shoulder socket; torn meniscus (knee cartilage); tendonitis; and torn rotator cuffs (shoulder). Other sports injuries in which Horizon's output of the diagnostic images have been found useful include metatarsal stress fractures, Achilles tendon tears, lumbar spine inflammation, and anterior/posterior cruciate ligament tears. Image quality is so superior that Horizon enables physicians to plan the long-term treatment of - and recovery for - high-end athletes without high-cost image processing or special viewing equipment.

Its clinical capabilities aside, Horizon has proved beneficial in numerous other ways. It fits on a desktop, weighs less than 32 kilograms, holds up to 300 sheets of film or paper, and offers the fastest time-to-first print. Additionally, it's the only imager that delivers diagnostic film, color paper, and grayscale paper from the same device. Finally, CREAR's relationships with referring physicians have been enhanced due to Horizon's outstanding image quality and its ability to deliver that quality in the physician's preferred format.

"We're much more efficient because of Horizon," Dr. Fouto said. "And, Horizon rests my mind. Instead of having a somewhat unreliable system that staff had to access from throughout the clinic, I have three reliable imagers that are placed for easy access. And, the images are of the highest quality. Without a doubt, Horizon was the best solution we could have found."



# MARKETING AND COMMUNICATIONS IN RADIOLOGY

Why it is Necessary and How to Do it



**INTERVIEWEE**  
**Prof. Henrik Thomsen**  
 Chairman  
 Department of Diagnostic Radiology  
 Copenhagen University Hospital Herlev  
 Copenhagen, Denmark

**Do you provide the best clinical expertise, the most cutting-edge technology, or the shortest waiting times for patients? Do you have quality and patient safety programmes that make you stand out amongst your rivals? Then this is something that, if conveyed to industry partners, referring physicians and patients, can reap concrete benefits, increasing patient referrals and drawing consumers to prefer your centre. By promoting your services, you give the impression of transparency in your organisation's activities and signal that you are a reliable healthcare partner. In this article, we highlight how imaging departments can use these tools to make it work for them too.**



**INTERVIEWEE**  
**Prof. Gabriel Krestin**  
 Chairman  
 Department of Radiology  
 Erasmus MC  
 The Netherlands

*Whether on a large or small scale, marketing is slowly growing in importance to many radiology departments in Europe. Prof. Henrik Thomsen, Head of the Department of Diagnostic Radiology at Copenhagen University Hospital Herlev in Denmark, relates his experience with a marketing project that has had satisfactory outcomes for his service.*

**DG:** *Why did you decide to develop a marketing strategy?*  
**HT:** We decided to create an annual report to raise awareness to our target groups that we actually existed! Other departments in our hospital were doing this already so we wanted to ensure we didn't lose visibility and to give the radiology department a platform to show how certain other events in the hospital were impacting our department. One reason was to recruit radiologists, as we did not have a very strong profile with young trainees at the University.

**DG:** *Are there any special members of your target group?*  
**HT:** Our target group also included politicians and patients, as we are operating in a socialised system rather than a private one and it allowed us to show where funding was being allocated. The report is distributed to around 700 national and international key contacts on a mailing list that is slowly growing. It is also distributed in our waiting room to reassure and inform patients and displayed at European events.

**DG:** *How is the report produced?*  
**HT:** The report is a joint effort of all members of the

department in suggesting stories, ideas and contributing to raising awareness of our activities. There are around five or six key people involved in the editorial and graphic side; it allows us to unify the department and give an overview of the efforts and achievements of all imaging services. The report is targeted

at patients, colleagues, politicians, referring physicians and other key non-radiological staff. We therefore have to keep it in an easy-to-read format that is not too technical. The total print and distribution costs of developing the report are peanuts compared to other more significant budgets in the department – between 5 – 6,000 EUR in total is spent creating and distributing the report.

*Another advocate of sound communications strategies is Prof. Gabriel Krestin, Chairman of the radiology department at Erasmus MC in the Netherlands. Here he gives us some insight into his own efforts to raise awareness of the activities of his department.*

**DG:** *Why did you develop your marketing strategy?*  
**GK:** We think of our activities in this area as a holistic communications strategy, to promote the image of our department by raising awareness of our activities. We do this to attract the best staff and researchers to our department and to develop our image with cooperation partners and industry and scientific collaborators.

**DG:** *What kind of activities are part of your communications strategy?*  
**GK:** We have a variety of different activities under this scope divided into internal, semi-external and external categories. On an internal level, we produce two bi-weekly newsletters, the first an informal one for our internal staff that includes more personal information and the second which is more formal and includes

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 IMAGING Management  
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information such as management decisions that will affect staff, and other departmental developments. The second internal tool is a bi-monthly journal called “Beeldspraak” or “Image Story”, which is produced six times per annum and includes information such as new staff in the department, new research developments and reports from national and international meetings attended by staff.

Our semi-external communication, for referring physicians in the hospital and the region, is part of a glossy hospital journal, called ‘Monitor’, produced every two months and including articles on activities in the radiology department.

Our external communications strategy consists of a scientific report booklet with all the highlights of the awards, grants and scientific output such as dissertations. The primary motive of this endeavour is that it allows us to demonstrate our appreciation for the hard work of our scientists and of industry support for our various projects. Around 800 – 1,000 copies are distributed of each edition to internal department heads, our Board of Trustees, our Board of Directors, all radiological employees, industry partners and around 150 colleagues who are involved with us in our international relations.

We also produce a booklet based on abstracts of our scientific presentations from the annual RSNA congress. We are one of Europe’s most active participants at the RSNA, with around 25 – 40 contributions from our department. We distribute around 150 copies of this both to presenters, to important industry partners and other relations.

**DG:** *What kind of budget and internal resources are allocated?*

**GK:** We have an internal communications expert that works for us two days per week, and a graphic design unit consisting of two full-time employees who produce all scientific posters, electronic ones, do the layout of the different booklets, newsletters and journals and dissertation/thesis booklets each year. Including their salary and the relatively minor printing and distribution costs necessary to realise these projects, the average annual spend is in the region of EUR 150,000 per year.

### How Can You Create a Strategy?

When drafting your marketing and communications plan, the following options give you some cost-effective ways to inform and attract your consumers.

#### Direct Marketing


Develop a clear and information-rich website with

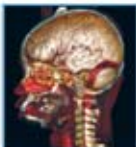

links to electronic versions of brochures and newsletters. In addition, contact information and physician names, offices, and locations should be clearly visible. It helps to include information about physician specialty areas, and photos, to create the impression of warmth and transparency.

Also, consider printing brochures that include pictures and descriptions of procedures available in your department, or highlight quality and safety measures. Newsletters, whether internal or external provide a platform where current events that impact your department can be distributed to relevant colleagues or internally on staff intranets. Finally, an annual report highlights the achievements of your department will coordinate all this information. This should have the widest possible distribution list, including to the media and to relevant national and international associations.

#### Advertising & Public Relations

Advertising can be an excellent way to build brand awareness. Advertising in consumer newspapers and magazines allows you to target consumers in specific specialty areas. If your department works within the community in sponsoring related events or you have




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recently acquired new technology or started a screening programme, these types of “feel-good” stories are attractive to the media. Developing good contacts with media on an international, national or even local level gives you a better chance of disseminating your message.

### Conclusion

Most medical institutions these days already have a website that ensures that the basic information is avail-

able to patients such as how many beds you have, a list of internal staff, and a list of services available. However, imaging services can get “lost” amidst a maze of information about other departments and it won't ensure that consumers will actually receive this information. Despite an increasingly web-literate culture, you may need to take a few extra steps to ensure that radiology is as well-represented to its peers in the field of medicine as other departments. ❏

## FAILURE TO COMMUNICATE

### What is the Radiologist's Responsibility?



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**Whereas failure to diagnose is the commonest cause of medical malpractice litigation involving radiologists, failure to communicate is a close second. It is a causative factor, if not the primary one, in 80% of medical malpractice lawsuits. A survey of American radiologists showed that from 1999 through 2003, 25% of all radiologists were involved in at least one medical malpractice lawsuit claiming failure to communicate. The number of such lawsuits in the US averages nine per year, with payment to the plaintiffs averaging \$1.9 million per case.**

Jersey stated, “Communication of an unusual finding in an x-ray is as important as the finding itself. In certain situations direct contact with the treating physician is necessary beyond communication through administrative personnel.” Two years later the Arkansas Supreme Court echoed a similar sentiment: “When a patient is in peril of his life, it does him little good if the radiologist has discovered his condition, unless that radi-

ologist informs the patient, or those responsible for his care, of that fact.”

### ACR Practice Guidelines

For the past twenty years the American College of Radiology has published Practice Guidelines (previously called Standards). Updated periodically, the current ACR Practice Guideline on Communication divides all radiologic communications into two categories: routine and non-routine. Routine communication of imaging findings is accomplished through usual administrative channels. “In non-routine clinical situations,” states the ACR Practice Guideline, “the delivery of a diagnostic imaging report should be expedited in a manner that reasonably ensures timely receipt of the findings.”

According to the practice guideline, examples requiring non-routine communication include those situations where there is a need for immediate or urgent intervention, where the findings are discrepant from a

Some examples of recently-resolved communication cases include:

- A \$900,000 settlement paid to a woman whose CT revealed a 2mm nodule in her right lung, the report of which was never communicated by the interpreting radiologist to the referring physician. A three-year delay in diagnosis resulted.
- A \$1.7 million settlement paid to a patient whose lymphoma, correctly identified on a chest radiograph, was never communicated to the referring physician by the interpreting radiologist. Diagnosis was delayed for 15 months.
- A \$4.7 million jury verdict awarded to a 44 year-old male whose CT showed a probable carcinoma of the pancreas, but whose diagnosis was delayed two years because of failure of communication by the radiologist to the referring physician.

American courts have repeatedly emphasised their position regarding radiologic communication. Twenty years ago, the Supreme Court in the State of New

preceding interpretation, and where findings that may seriously be adverse to the patient's health and the radiologist reasonably believes are unexpected by the physician. It should be pointed out that policies regarding radiologic communication issued by the Royal College of Radiologists, and the European Association of Radiology, are quite similar to the ACR Guideline.

Other portions of the ACR Practice Guideline on Communication should be emphasised: "As soon as possible, a change between the preliminary and the final interpretation should be reported in a manner that reliably ensures receipt by the referring or treating physician when such changes may impact patient care. Documentation of communication of any discrepancy should be incorporated into the final report." Furthermore: "Regardless of the source of the referral, the diagnostic imager has an ethical responsibility to ensure communication of unexpected or serious findings to the patient. Therefore, in certain situations the radiologist may feel it is appropriate to communicate the findings directly to the patient."

### Shared Responsibility

Communication is, of course, a two-way street, with the radiologist on one end, and the referring physician on the other. Responsibility of communication is thus a shared one. Indeed, the Communication Guideline states that "Referring physicians also share in the

responsibility of obtaining results of studies that they have ordered." Nonetheless, radiologists must realise that irrespective of whether a referring physician has or has not breached the standard of care of his or her specialty, the radiologist is obligated to comply with the standard of care of radiology. Twenty-five years ago an Ohio Appeals Court ruled, "When a radiologist's conduct is negligent and the patient's injury is the probable consequence of that conduct, the fact that the negligence of another physician unites with the negligence of the radiologist who caused the injury, does not relieve the radiologist of liability." In other words, the fact that the referring physician breached the duty to attempt to retrieve the radiologic result of an examination ordered by the physician, does not lessen the duty of the radiologist to effect appropriate communication.

Clearly, from the perspective of the law, radiologists are required to communicate important unexpected findings to referring physicians in a manner that reasonably insures receipt, or alternatively, to the patients themselves. From the perspective of a moral imperative, radiologists should want to effect such communication. ▶

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*Part one of this series, covering the rise of medical malpractice and its causes, is available on request to the Managing Editor, Dervla Gleeson, at [editorial@imaging-management.org](mailto:editorial@imaging-management.org).*

## MRI CONTRAST AGENTS AND NEPHROGENIC SYSTEMIC FIBROSIS IN PATIENTS WITH IMPAIRED RENAL FUNCTION

### The Evolving Story

#### What is Nephrogenic Systemic Fibrosis?

This condition was first described by Dr Shawn Cowper in a paper published in 2000 in *The Lancet* as a disease with 'scleromyxoedema-like skin thickening' affecting the limbs and trunk but typically sparing the face, the first case having been observed in 1997. This new dermatological disease was seen in patients on dialysis and the term nephrogenic fibrosing dermopathy coined to reflect this. Though many systemic diseases that have renal failure as part of their manifestation have dermatological components, no underlying renal disorder linked these patients.

The condition was later renamed nephrogenic systemic fibrosis once it was determined that the fibrosing condition also affects internal organs such as muscles, heart, liver, pleura etc. Some patients only manifest localised non-progressive skin thickening/induration though this can be quite problematic if it interferes with dialysis shunt access. In other patients a progressive disease can be fatal, with contractures due to skin thickening adjacent to joints and terminal illness through the development of a hypostatic pneumonia, particularly when there is diaphragmatic involvement.

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### The Use of Gadolinium Contrast Agents in Renal Failure

Gadolinium contrast agents (Gd-CA) have been designed to bind the potentially toxic Gd<sup>+++</sup> cation with a chelate in a stable non-toxic compound for human MR imaging and the rate of recorded adverse reactions has been extremely low. These agents are predominantly excreted in the urine by glomerular filtration except for gadobenate dimelumine (Multihance) which in small part undergoes 4% hepatobiliary excretion.

Despite this, it was thought that gadolinium contrast agents for MRI were safe in patients with renal impairment given their high stability and there are studies supporting this. The advent of contrast enhanced MRA (CE-MRA) techniques expanded the use of gadolinium contrast in patients with chronic kidney disease, to investigate the cause of renal failure using CE-MRA to evaluate for renal arterial disease. Furthermore, patients with renal failure are prone to vascular complications and are particularly at risk for complications of arteriography. Lastly, contrast enhanced MR venography (MRV) techniques are extremely useful for assessment of the venous stenoses and thromboses that complicate central venous access for haemodialysis.

### The Gadolinium Contrast Agent Link to NSF

A report published (April, 2006) by Thomas Grobner from Austria linked five cases of NSF in dialysis patients over a period of two years to the use of gadolinium contrast agents for MRA in the 2 – 4 weeks preceding the onset of the disease. There was initially some confusion as this paper indicated the agent used to be gadolinium DTPA, however, an erratum was quickly published when it turned out that it was in fact gadolinium DTPA-BMA, otherwise known as gadodiamide (Omniscan, GE Healthcare). A second publication by Marckmann & Thomsen with colleagues from Denmark described thirteen cases of NSF (confirmed on biopsy) and again temporally related the cases to gadodiamide administration between 2 and 75 days prior to disease development.

On the basis of these cases, the FDA in the US issued an advisory in June 2006 urging caution in the use of gadolinium contrast agents in patients with severe renal impairment, i.e. a glomerular filtration rate of less than 15 ml/minute which is classed as chronic kidney disease (CKD) stage 5. This triggered our group to independently study the renal dialysis population in the west of Scotland as a retrospective case control series. For this, we cross-referenced the electronic

patient record database for all dialysis patients with the radiology information system to determine NSF incidence and all exposures of these patients to MRI contrast agents.

### Findings of our Study

We found the incidence of NSF to be 0.77% of all patients on dialysis and 3.1% of the subgroup of these patients who had undergone gadolinium contrast-enhanced MRI. One of the patients with NSF had not had any gadolinium contrast. We also found a positive correlation between the total cumulative dose of Gd-CA administered and the development of NSF – indicating a form of dose-response relationship, i.e. those patients exposed to higher doses or repeat examinations were more likely to develop NSF.

All the NSF patients in our group who had been exposed to Gd-CA had had gadodiamide, though this was the predominant agent used in the centres at which these patients were imaged and the numbers receiving other agents was too small to draw definite conclusions regarding this. Neither were we able to confirm any other relationships such as with acid-base balance, serum iron etc. within our cohort.

Importantly we note that the majority of our patients in renal failure who have had Gd-CA administered have not developed NSF. Furthermore, we are struck by the very prolonged time between exposure and NSF manifestation in a few of our patients, for example in three patients this was greater than one year which along with our patient with no Gd-CA exposure reinforces our belief that additional factors as yet unknown must play a part in triggering this condition.

### How Could Gadolinium Contrast Agents be Implicated?

The finding of gadolinium in bone biopsy specimens of patients previously administered Gd CA and other work detecting Gd in skin biopsy specimens from NSF patients even many months after exposure, has led to the hypothesis that transmetallation is occurring with Gd<sup>+++</sup> being exchanged from the chelate for other cations (e.g. zinc), promoted by the very prolonged time that these agents remain in the body with their primary route of elimination blocked. Toxic-free gadolinium is thought then to stimulate circulating fibrocytes to migrate to the extravascular space and deposit collagen inappropriately resulting in the clinically manifest disease process.

### How can we Prevent NSF?

Since renal failure is a prerequisite for the manifestation of this condition it superficially seems simple to



just avoid implicated Gd-CA in these patients. However, at what level of renal dysfunction does the risk become a clinical problem? The vast majority of cases of NSF occurred in patients with stage 5 chronic kidney disease (CKD) – i.e. effectively those at the stage of requiring dialysis or established on dialysis. (an estimated glomerular filtration rate (eGFR) of less than 15 ml/min). These patients are easily recognised and can be screened for by the addition of simple questions to pre-MRI checklists. However, if a cut-off of an eGFR of 30 ml/min is required then we need to definitively know the renal function of all our patients prior to MRI examinations and this requires a wholesale change in the way patients are referred for MRI.

The second question is whether it is all contrast MRI studies or only those with high dose administration (0.2 mmol/kg to 0.3 mmol/kg range) that are problematic. Currently it appears that it is high dose studies though unfortunately there are reports of a very few cases after just single dose administration. Hence any policy change currently does not just affect CE-MRA but potentially any MRI examination where Gd-CA may require administration.

The initial and still the majority of reports of NSF are related to gadodiamide administration, but is this the only agent that should be avoided? Are other Gd-CA more or less likely to predispose this condition? Again there is little to be certain about here, with few cases related to gadoversetamide and gadopentate dimeglumine. There are none confirmed following sole administration of gadobenate dimeglumine and none to date with gadoteridol, gadoterate meglumine, gadobutrol or gadofosveset. However, it is rightly pointed out that these agents have not been as extensively used for high dosage examinations such as CE-MRA.

Some authors feel that transmetallation is an important step in the pathogenesis of NSF and hence there are theoretical reasons why some of these agents would be safer as they are more stable potentially resistant to this process. Cyclic chelates are thought more stable than linear and similarly ionic chelates more stable than non-ionic. The non-ionic linear chelates (such as gadodiamide) are hence thought to be less stable. The potential for hepatobiliary excretion of gadobenate dimeglumine may be a theoretical advantage in renal failure and the protein binding of some agents that aids retention in the intravascular space may also be of theoretical benefit though as yet there is no clinical evidence to support these hypotheses.

Dialysis immediately after contrast administration for MRI is theoretically attractive but the role of immediate post-MRI dialysis is uncertain. There is no positive evidence that dialysis can help avert NSF but the current ACR guidelines recommend its use, though this really does need to be immediate post-scan as NSF has occurred in patients despite same day dialysis post-MRI. Clearly dialysis to remove Gd-CA is only practicable where patients already have dialysis access in place prior to MRI.

### Other Factors

What other factors are likely to contribute? The studies so far evaluating patients have of necessity been retrospective and therefore uncontrolled. Investigators have searched for other linking factors in these groups such as the nature of the underlying renal disorder, degree of acidosis at time of contrast administration, type of dialysis, erythropoietin treatment, iron levels etc. but so far without any other features being confirmed. The converse of this question as to what factors may protect against the development of NSF has also yet to be answered but could be equally important if ascertained.

### Conclusions

The overall implications of the evolving NSF story is that we need to know more about our patients prior to MRI scanning than previously. Renal functional status at the time of scan request for all patients prior to scheduling, particularly for examinations mandating Gd-CA. Additional questions as part of the safety questionnaire prior to MRI scanning.

Where patients with renal failure are considered for MRI with contrast we need to make a judgment as to whether the risks of Gd-CA use as currently perceived outweigh the risks of alternative imaging techniques such as conventional arteriography with arterial puncture, ionising radiation and large volumes of iodinated contrast media.

Where Gd-CA are to be used then the lowest dose feasible is currently advocated (such as half usual dose) and here Gd-CA with increased specific relaxivity could be advantageous. When a scan is planned in a patient with renal failure then clearly close liaison with their renal physician will be required in order to schedule dialysis if this is practicable.

Notwithstanding the evolving NSF story, Gd-CAs remain extremely safe. The finding of a potential connection between Gd-CAs and NSF is a reminder that we must remain vigilant to the safety of all the procedures that we perform, particularly in vulnerable patient groups. ■

# Nephrogenic Systemic Fibrosis and Gadolinium-containing Contrast Agents

## A Summary of Current Evidence

Dr Andrea Loewe, Global Medical Affairs Diagnostic Imaging, Bayer Schering Pharma AG

### Background

Nephrogenic Systemic Fibrosis (NSF) is a rare disease, which was first described in medical literature in 2000 with the first case report going back to 1997. It is primarily characterised by thickening, induration and hardening of the skin. Systemic involvement of other organs such as the lung and the heart may also occur. In ca. 5% of patients the course of the disease is rapidly progressing and may potentially lead to a fatal outcome. NSF has so far been only observed in patients with renal impairment. The precise pathogenesis of the disease is unknown, but likely to be multifactorial. Approximately 215 patients with NSF are registered according to a registry maintained at the International Centre for Nephrogenic Fibrosing Dermopathy Research at Yale University.

### Which Contrast Agents are Implicated?

A possible relationship between the occurrence of NSF and the administration of Gd-containing contrast agents was first suggested in the medical community in early 2006. Since then, numerous cases of NSF in association with the administration of different Gd-containing contrast agents have been published in scientific literature and have been spontaneously reported to contrast agent manufacturers and regulatory authorities.

The majority of NSF reports relate to the administration of Omniscan®, but reports are also associated with the administration of Magnevist®, OptiMARK®, and MultiHance®. No reports of NSF are available for the other marketed Gd-chelates, including all macrocyclic extracellular contrast agents Gadovist®, Dotarem®, and ProHance®.

### How Does NSF Occur?

Prevailing theory regarding gadolinium and NSF is that gadolinium (Gd<sup>3+</sup>) ions are

released from the Gd-chelate complex and accumulate in tissue (predominantly skin), thereby initiating a “toxic” reaction for which the precise pathomechanism is not yet known.

The likelihood of a particular Gd-chelate to release Gd<sup>3+</sup> ions depends strongly on that particular chelate’s complex stability. Based on the chemical structure there are two classes of Gd-CAs, i.e. **linear, open-chain chelates** and **macrocyclic chelates**, which are characterised by different parameters.

The stability of **linear chelates** is adequately described by the thermodynamic stability constant log K, valid at pH 14, and the conditional stability constant log K<sub>cond</sub>, calculated for pH 7.4 on the basis of log K and the protonation constants of the ligand.

There are distinct differences in stability within this linear, open-chain group: the two non-ionic compounds Omniscan® (Gadodiamide) and OptiMARK® (Gadoversetamide) are considerably less stable than ionic compounds such as Magnevist® (Gd-DTPA) and MultiHance® (Gd-BOPTA), which is also reflected in the much higher level of excess free ligand in the formulation of the former agents

The stability of the marketed **macrocyclic agents** Gadovist® (Gadobutrol), Dotarem® (Gadoterate), and ProHance® (Gadoteridol) is characterised by the slow kinetics of complexation and decomplexation, both of which require significant activation energy. The kinetics of dissociation are characterised by the dissociation half-life, which, due to the very long half-life at physiological pH, can only be measured under acidic conditions, e.g. at pH 1.

The respective values for physiological conditions (pH 7.4) are extrapolated under certain assumptions for a H<sup>+</sup> catalysed mechanism. Any slight differences in dissociation half-life values between the macrocyclic agents are

extremely unlikely to result in relevant differences in-vivo, given the very high kinetic inertness of these compounds.

### Renal Impairment

The prolonged retention of Gd-containing contrast agents in the body in patients with severe renal impairment is considered to be an additional factor increasing the risk of Gd<sup>3+</sup> ions being released from the Gd-ligand complexes in vivo. Most of the marketed Gd-containing contrast agents, including Gadovist® and Magnevist®, are predominantly eliminated via the kidneys with comparable serum elimination half-lives of ca. 90 – 100 minutes in healthy volunteers. In patients with renal impairment the serum elimination half-life for all these Gd-containing contrast agents increases with increase in level of renal impairment. All marketed Gd-chelates are dialysable.

### Considerations for Administration

Based on the scientific literature, the following steps should be taken into account when considering administration of a Gd-containing contrast medium to patients at risk for developing NSF :

1. Evaluation of the medical history before administration of Gd-containing CM.
2. Identify patients at risk;
  - Patients on dialysis;
  - Patients with severe renal impairment;
  - including those with renal impairment in the context of hepatorenal syndrome or perioperative liver transplantation.
3. Consider carefully the need for an enhanced MR examination, taking into account the use of possible alternative imaging methods.
4. Use the lowest dose of Gd-containing CM that provides the diagnostic information sought.
5. As a general medical consideration for haemodialysis-dependent patients:
  - Perform haemodialysis promptly after administration of Gd-containing CM. ●



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## Emerging Trends Lead to Better Healthcare

Kevin E. Wilson, PhD

*New developments in dual energy x-ray absorptiometry (DXA) technology are leading to major improvements in diagnosing osteoporosis, more accurately determining future fracture risk, and most recently, diagnosing cardiovascular disease.*

### WHAT IS NEW IN DXA TECHNOLOGY?

Vertebral fractures are the most common fracture in osteoporosis and an indication for treatment irrespective of BMD. Newer fan-beam DXA systems can detect vertebral fractures with fast, low dose lateral scans of the vertebra from T4 to L4 in as little as 10 seconds. Some DXA systems can measure bone structure and strength using conventional DXA scans. On the horizon are 3-D DXA scans taking advantage of the rotating C-arms found on some of the newer DXA systems.

Recently, a DXA manufacturer received FDA clearance to assess an important risk factor for heart attacks and stroke: abdominal aortic calcifications (AAC). Using the same scan used to

identify vertebral fractures, the ability to assess the risk of two highly prevalent diseases, osteoporosis and cardiovascular disease, greatly increases the economic utility of DXA systems.

### OSTEOPOROSIS OVERVIEW

Osteoporosis is a “silent” disease. In a survey of 11 countries, 80% of the women diagnosed with osteoporosis did not realize they were at risk prior to the diagnosis. Four out of every ten white women age 50 or older will experience a hip, spine, or wrist fracture during the remainder of her life. Twenty percent of men will suffer a similar fate. All fractures are associated with significant morbidity and mortality, but hip fractures are particularly traumatic. Twenty percent of the women who suffer a hip fracture die within the first year. It is estimated that in Europe, 179,000

men and 611,000 women will suffer a hip fracture each year and that the cost of all osteoporotic fractures in Europe is provisionally €25 billion. Due to aging populations, by 2050, the worldwide incidence of hip fracture in men is projected to increase by 310% and 240% in women.

### MEASURING BONE MINERAL DENSITY (BMD)

Fragility fracture and BMD at the spine or hip measured with DXA are the two primary methods for diagnosing osteoporosis in an individual. While non-DXA measurements or risk factors can be used to pinpoint a patient's future fracture risk, BMD with DXA is the only recognised diagnostic test for osteoporosis other than radiographic evidence of a fracture.

Fig. 1: New directions in DXA imaging



Tomographic 3-D representation of the hip



Fracture shown in vertebral assessment puts women at increased risk of more fractures



Image showing severe abdominal aortic calcification

## VERTEBRAL FRACTURE ASSESSMENT (VFA)

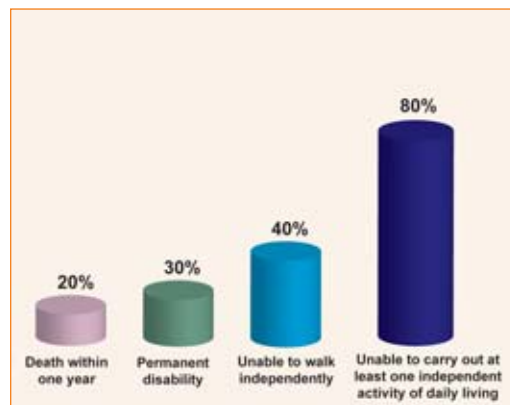
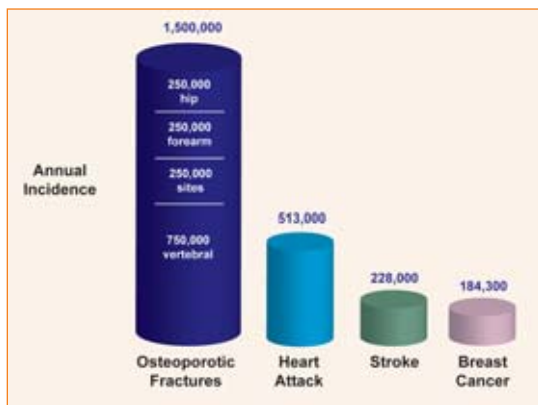
Vertebral fractures, which are associated with increased disability and morbidity, are the most common osteoporotic fracture; however, only about one-quarter of vertebral fractures come to clinical attention. Nevertheless, women with

both the International Osteoporosis Foundation and the National Osteoporosis Foundation, based in the US, agree that its presence is an indication for the need for osteoporosis treatment irrespective of BMD. By combining VFA with BMD, the two strongest risk factors for future fracture can be obtained on the same device with little additional exam time.

HSA is the leading bone structure analysis method for DXA scans used in research and pharmaceutical studies and has been included in over 30 peer-reviewed articles.

## 3-D BONE IMAGING

The natural extension of HSA is to consider the femur as the 3-D object that it is, and calculate its strength in 3-D. The next generation of DXA imaging for the diagnosis of osteoporosis will use the rotating C-arm feature found on some DXA devices to take multiple projections of the femur. These multiple projections will be combined to form a tomographic 3-D representation of the hip. This low-dose tomographic assessment is expected to become the ultimate clinical



vertebral fractures have been shown to have a five-fold increase in their risks for a subsequent vertebral fracture, and a two-fold increase in the likelihood of a hip fracture. The importance of low-trauma vertebral fractures is such that

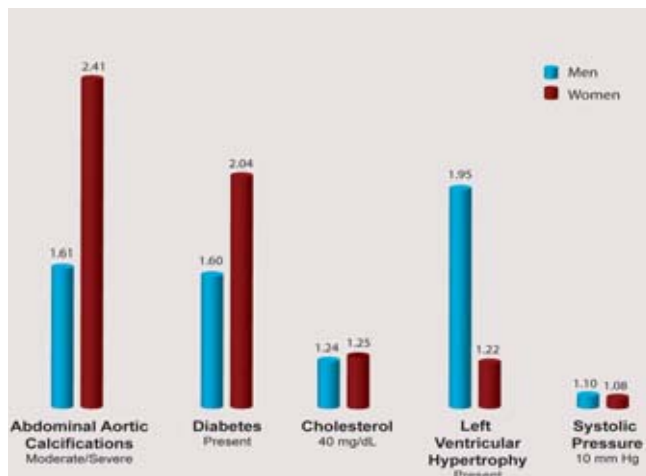
## HIP STRUCTURAL ANALYSIS

Hip Structural Analysis (HSA) is a programme for computing the structural properties of various cross sections of the proximal femur, using 2-D DXA scans. HSA algorithms are able to calculate bone strength in the two dimensions projected by the DXA scan. HSA algorithms are able to calculate bone strength in the two dimensions projected by the DXA scan. HSA algorithms are able to calculate bone strength in the two dimensions projected by the DXA scan.

tool for diagnosis of osteoporosis; not only will it give a more accurate picture of bone density, but also the geometry and underlying strength of a bone.

## DXA AS A PREDICTOR OF HEART DISEASE AND STROKE

The FDA recently cleared one manufacturer's DXA system for the visualisation of abdominal aortic calcification, strongly associated with cardiovascular disease. This new indication targets the number one cause of morbidity and mortality in older women and men: heart disease and stroke. AAC is a particularly valuable measurement since it contributes independently of traditional clinical risk factors such as cholesterol, blood pressure, diabetes, and age to the prediction of heart attack risk. A woman suffering from moderate to severe AAC is at 2.4 times increased risk of cardio-



vascular heart disease, even after adjusting for age, cigarettes, diabetes mellitus, systolic pressure, left ventricular hypertrophy, bone mass index, and cholesterol.

## EVALUATING DXA DEVICES

Two manufacturers sell a variety of central DXA systems in the U.S. market. Each has a number of different features and capabilities. Central DXA systems use either fan-beam or pencil-beam technology. Millennium Research Group, a research and consulting group, notes that fan-beam systems have shorter scan times and better image quality than pencil beam systems. Only fan-beam systems are capable of vertebral and 3-D imaging, abdominal aortic calcification detection and body composition analysis. Millennium says that fan-beam systems are quickly replacing the older pencil-beam systems.

## CONCLUSION

DXA systems have advanced beyond BMD measurements. The new DXA devices could change the way physicians and scientists look at osteoporosis and how hospital administrators think about the utility of DXA devices. VFA assessment allows for early detection of fractures and fracture risks. HSA and 3-D imaging promises to provide information on bone strength and structure. AAC detection measurements are extending DXAs' utility addressing the important preventive health fields of cardiovascular disease and physical fitness

To receive the full version of this article, including references for further reading, please contact Managing Editor Dervla Gleeson at [editorial@imagingmanagement.org](mailto:editorial@imagingmanagement.org).



# Reveal.

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Osteoporosis and cardiovascular disease strike women and men of any age and all ethnic backgrounds. These silent diseases can reach a crisis point before the patient shows any symptoms.



Abdominal aortic calcifications can now be detected using a low dose IVA image.

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Thank you,

**The IMAGING Management Editorial Team**



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## HOW TO... WRITE A BUSINESS CASE

**Drafting business cases is an essential and growing part of medical imaging, as it becomes more commercially-minded, and by necessity, more budget-conscious. As General Manager at the Hammersmith Trust Imaging Department, I have a variety of roles, which include drafting measures to eliminate waiting times in imaging at the hospital and writing business cases for investing in and renewing equipment.**

In the UK, imaging is beginning to transition to a payment by results system, based on actual throughput. We are in a tricky in-between stage just presently which means that imaging's costs are bundled with the overall HRG tariffs that the hospital itself receives, and it is difficult to separate radiological funds.

Implementation of a payment by results system over the next few years will unbundle our own independent budget and make it easier to pinpoint sound investments and to justify costs. However, it will also put pressure on the department to ensure that we are making business-smart decisions. Drafting a business case is a vital way of ensuring the solid foundation of the department.

### Justifying Expenditure

Basically, if you want to develop your department properly, you must develop a

business case. In the past there was much less bureaucracy and formality to the process of investing in new equipment and developing the department. We have a more transparent, democratic process now, and therefore more formal applica-

new needs and give you the seed for a good idea.

#### **Include present and future costs**

- Include sound information on present activities and costs in this area, then fore-

*“Drafting a business case ensures a solid foundation for the future”*

tions are required. We have to justify both clinical and financial expenses now, and the big buzz word these days is ‘Return on Investment’ (ROI), which maps out what the income associated with a business case will be.

For example, at the moment we have ongoing business cases in the works for equipment such as new MRI and PET/CT machines. In the past we developed business cases for PACS, and were the first European hospital to invest in PACS. We also developed a business case for voice recognition software. We have to clearly demonstrate by these business cases how it will benefit the Trust and how we intend to pay for new additions to our armamentarium of radiological IT.

### Steps to Drafting a Business Case

#### **Begin with an idea**

- Identify equipment or services that are lacking in the department. The department's annual overall plan can flag up

cast future proposed activities and ROI. It is crucial, though problematic, to ascertain this kind of forward-looking information. From a finance point-of-view, ones needs to speak to the hospital accountants and departmental accountants. It is also a good idea to speak to colleagues involved in providing data on departmental activities who can help analyse trends and back up data on demand and supply.

#### **Get relevant colleagues on your side**

- Involve colleagues such as clinicians, radiologists, radiographers and other related experts and initiate meetings between key personnel. This early clinical engagement will get others on your side.

#### **Convince the people that hold the purse-strings**

- In order to convince the people who will be allocating the investment for your proposed business case you need to be clear on why there is need for the proposed development and direct it to the right people. It is worth discovering who

these people are and finding a ‘champion’ who is well-positioned to advocate for you, such as the Director of Operations. Ensure these people are on the Board so you don’t waste your time.

#### **Look at what else is out there**

- Ensure other projects internally won’t conflict with yours and so adversely affect funding. Do a market analysis and assess what your rival hospitals are involved in. I use a database called ‘Doctor Foster’ which gives this kind of useful information.

#### **What Should You Include in Your Plan?**

The key headings of a typical business case should include an introduction, motivation for the new development, the current situation and projected activity, potential costs versus benefits and an implementation plan as well as after-care.

Here is a checklist of the most essential components of any well-compiled business case:

- **Introduction**

Contains a summary giving background to the plan and stating clearly what the new activity will be. Include lots of background information such as the number of patients currently and prospectively affected, the level of present costs and what other departments are and will be affected.

- **Drivers for change**

Clearly states the motivation for the business case, e.g., change in the needs of the local population, a new service elsewhere that has created demand in the hospital, to bring in new revenue, or in fact if new national guidelines will compel this change.

- **Current situation and projected activity**

Quantifies present activity, waiting lists and patient satisfaction as well as project-

ed activity. You need to show you looked at all the possibilities and argue for your option as the preferred one.

- **Costs versus benefits**

You need to know the costs of the additional capital investment and assess the related income. Calculate how long it will take to pay back the cost of the investment.

- **Implementation plan and aftercare**

Be confident and clear in order to show decision makers you know what will happen to the money and how long it will take to get the project up and running, and how you aim to assess if patients and staff are pleased with the development once it is active.

#### **Obstacles in Writing a Business Case**

In my experience, there are quite a few obstacles in writing a business case. The

main one is that the goal posts are constantly moving and changes such as staff leaving, mergers of Trusts and financial problems can all leave your case a little less than watertight.

It takes considerable time and effort to write a business case. You are relying on others to get information and it can be difficult to get your case proposed on the agenda of important meetings as these are planned in advance, and if the correct people are unaware of you from early on you are less likely to succeed.

Also, people are so busy that it is difficult to find the time to get their input in order to write the plan. Even if you get initial approval from the right people, perhaps you will find that the money is not there to realise the plan and it can be difficult to persuade others of its urgency in competing with others. M

#### **Advice to Others**

- **You don’t have to start from scratch. There are usually other templates available within your hospital or department that will give you a good starting place;**
- **Engage with clinical staff;**
- **Keep your plan short;**
- **Know your audience;**
- **Speak with the relevant people as early as possible;**
- **Ensure your data is robust; and,**
- **Don’t get stuck in a rut!**





## SERVICE DELIVERY IN THE UK

### Competition between the NHS and the Private Sector



Despite technological advances, radiology faces unprecedented challenges related to the ability of radiology to deliver what the consumer wants. Service delivery has become a buzz word at radiology scientific meetings. In the UK, the Labour government has placed an emphasis on improving the National Health Service (NHS). Due to deficiencies in service provision, radiology was suddenly thrust into the limelight. Capital investments have resulted in improvements in the number of patients scanned and in patient throughput. Nevertheless, due to manpower problems, collaboration with the private sector was needed to meet targets.

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In some situations, the private sector has risen admirably to the challenge of providing the volumes of imaging investigations required, some of which are not able to be met by local NHS resources. In places this has been achieved by leasing arrangements with the private sector. Elsewhere, numerous companies have bid for this outsourced work and as such, provisions are somewhat fragmented and varied throughout the country.

More recently, large block contracts have been awarded to private companies in the UK to deliver a certain number of imaging investigations. This has been a political initiative designed apparently to provide the patient with a choice of venue for their investigations. Several problems have been encountered. These include the disequilibrium of local services, which are now seen to be competing with each other for patients. As this will inevitably result in some departments being winners and others losers, it may damage radiological provisions and service planning in certain hospitals with consequent adverse outcomes for the local population.

#### Problems Encountered with Private Imaging

The status of radiologists varies considerably throughout Europe and in many European countries radiologists have not had a good working relationship with their clinical colleagues and hence have had little influence on patient management and imaging strategies. In the UK, radiology has had a long tradition of being a

clinical field and radiologists are not just technicians but provide a clinical opinion. Radiology here is about helping the clinician make a diagnosis of a patient and requires dialogue and communication in clinical groups.

This has been achieved in the last ten years with a proliferation of multidisciplinary meetings. More specialties now meet regularly with not just radiologists, but other important personnel such as pathologists, nurses, clinicians, surgeons, oncologists, etc., and it is at these meetings that everybody provides an input into patient care and the management pathway. Robbed of this opportunity, with just a piece of paper providing a report, this may result in a deterioration of healthcare at the point of delivery. It is important that with outsourcing, these values of British radiology are not compromised. In addition there may be medico-legal implications of outsourced imaging reports where clinicians are not able to discuss the nuances of phrasing with their radiology colleagues and these may result in inappropriate action being taken.

#### How Can Public and Private Concerns Work Together?

Careful scrutiny needs to be kept on the quality of the scanning performed and also the quality of the reporting produced. Rigorous audit is necessary to make sure standards of imaging are kept as high as possible and doctors and other personnel need to be appropriately regulated.



Provision of outsourcing and the involvement of the private sector in imaging needs to be a collaborative approach with due regard taken about the local needs and demands of the patient population. Unilaterally imposed, these policies will be detrimental to patient care in the long run. Local radiologists must be involved in planning the service delivery of the local area. Appropriate resources, be they private or government-financed, must be present if a satisfactory level of service is to be provided.

As countries get wealthier, more and more imaging is required driven by medico-legal considerations as well as by consumer expectations. Radiology will have to rise to the challenge of delivering timely investigations with prompt and accurate radiological reporting con-

veyed easily to the referring clinicians. With digital imaging and PACS, this will hopefully be achievable with the appropriate infrastructure in situ.

### Conclusion

Local radiologists must engage with their local private providers to offer a complete imaging service in their area. The demand for imaging is likely to grow but if the market is flooded by private companies there will be problems. Therefore planning is required to see what the demands are and to provide resources accordingly. It is important that the collaboration between industry, radiology and the private sector continues to be a progressive one rather than one which results in the destruction of adequate service provision for all. ▶▶

## MEETING IMAGING REQUIREMENTS IN THE UK

### Outsourcing Helps Reach Eighteen-week Target

**A commissioner-based national study of the fifteen key diagnostic tests published by the Department of Health in the United Kingdom on the 18 April 2007 indicate that there are currently 733,273 patients waiting for diagnostics with 141,000 waiting greater than thirteen weeks. The underlying causes for the increased waiting times are mainly due to the increased demand associated with the under-utilised resources within the NHS that provide these services. Adherence to NICE (National Institute for Health and Clinical Excellence) guidelines, together with the eighteen week target for treatment, have only increased the demand for diagnostics to be carried out within a structured time frame. Increasingly, the NHS is utilising external services to help meet this target.**

Budgetary constraints, equipment availability or availability of professional and/or administrative staff all contribute to diminished provision within the NHS. To achieve the target of eighteen weeks, for example, there is a need for fifty MRI scans per thousand of the population to be performed, as opposed to the current figure of seventeen per thousand, which is soon to be bolstered by the second wave procurement from the independent sector to twenty three per thousand of the population per annum. The NHS is not as yet gearing up to meet this target.

tion, the government sent out to tender the second wave procurement, which launched in March 2005 to provide the NHS with an additional two million diagnostic procedures per year.

The department of health have implemented additional measures within the NHS to try to cut waiting lists, including:

- Improving efficiency within existing NHS units by cross-fertilising best practices and publishing guidelines for diagnostic departments. ([www.radiologyimprovement.nhs.uk/View.aspx?page=/default.html](http://www.radiologyimprovement.nhs.uk/View.aspx?page=/default.html))

### What are the Government Doing?

The government has acknowledged the growing waiting lists and, in June 2004, the first wave of procurement was awarded to Alliance Medical, which won a £95million, five-year contract to provide and operate twelve mobile MRI scanners for the NHS. Following the first wave implementation and initia-



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Diagnostic Name	Patients Waiting	Number Waiting 13+ Weeks
Magnetic Resonance Imaging	103,179	6,249
Computer Tomography	58,689	652
Non-obstetric ultrasound	195,240	7,733
Barium Enema	9,988	142
DEXA Scan	21,645	1,982
Audiology - assessments	142,451	87,812
Cardiology - echocardiography	50,047	5,712
Cardiology - electrophysiology	1,050	270
Neurophysiology - peripheral neurophysiology	23,356	7,895
Respiratory physiology - sleep studies	5,534	1,042
Urodynamics - pressures & flows	9,012	1,698
Colonoscopy	31,812	8,046
Flexi sigmoidoscopy	17,754	2,904
Cystoscopy	24,730	4,091
Gastroscopy	38,788	5,637
<b>TOTAL</b>	<b>733,273</b>	<b>141,864</b>

Table 1. DoH: Diagnostics waiting times & activity data - month ending Feb 2007

- Encouraging appropriate direct referrals from GPs and allied health professionals, thereby speeding patient journey and saving the cost of unnecessary secondary/specialist consultations.
- Enabling patients to choose between all available NHS facilities rather than just those within the patient's geographic area.

### Advantages of Outsourcing

There are clear advantages to be gained from outsourcing to the independent sector.

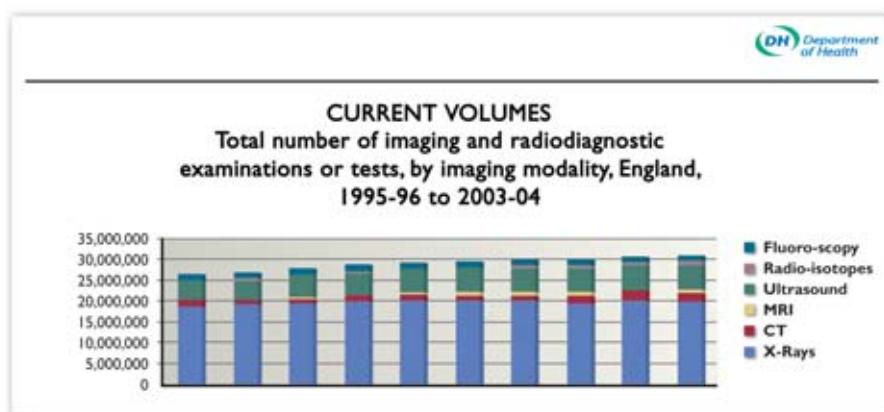
- Decreased waiting times naturally help the eighteen week target to be met.
- Mobile services enable patients in remote areas to access diagnostic treatment.
- Bulk negotiation in the private sector decreases the tariff for diagnostic services.
- Rapid access to diagnostic services improves clinical productivity in other areas of the NHS.
- The construction of new facilities, designed around the clinical flow of patients, also ensures greater productivity.

- The inclusion of independent sector providers means patient choice is widened, which will lead to a more responsive patient-centred service. Patient choice will, in turn, improve the productivity of existing NHS services, with the competitive challenge forcing existing providers to re-examine their processes to perform better than the new providers.

### Regulating the Independent Sector

As patient safety is of paramount importance, the procurement process for diagnostics has also ensured adherence to the standards as set out by the recommendations of the Royal College of Radiology, the Medicines and Health Products Regulatory Agency, the department of health and the Healthcare Commission. The latter is currently in the process of determining its role in encompassing diagnostic radiological services under its auspices.

Lessons learnt from the first wave procurement have resulted in compliance with strict clinical governance, which encompasses stringent reporting policies (double reporting) and clinical audits. The independent sector contracts require collection and reporting on a wide range of performance indicators, which will undergo monthly assessment and annual publication. This naturally ensures a rapid recognition of, and immediate solutions to, any identified problems.





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 Paediatric Radiology  
 Other (please specify)
- Ib. I am Chief of my Department
- Yes  
 No

### Non-physician professionals (respond below)

- Ic. What is your occupation? (check only one)
- Administrator/Manager:*
- Radiology Administrator  
 Radiology Business Manager  
 PACS Administrator
- Executive*
- Chief Information Officer / IT Manager  
 Chairman / Managing Director / Executive Director  
 Chief Financial Officer / other executive titles
- Other*
- Medical Physicist  
 Academic  
 Chief Technologist / Senior Radiographer  
 Manufacturer  
 Business Consultant  
 Distributor / Dealer

### All respondents reply to the questions below

2. In what type of facility do you work? (check only one)
- Private clinic  
 Hospital (check number of beds)  
 More than 500 beds  
 400-499 beds  
 300-399 beds
3. With what technologies or disciplines do you work? (check all that apply)
- Diagnostic X-ray  
 Nuclear Imaging  
 Interventional Radiology  
 CT  
 Ultrasound  
 MRI  
 Mammography  
 Bone Densitometry  
 PACS/Teleradiology  
 Cardiac Imaging  
 PET  
 Echography  
 Angio/Fluoroscopy

The development of independent sector clinical sites, concentrating on a single modality, ensures increased productivity, as well as assuring clinical excellence both in the hardware purchased and the quality of the reporting radiologist. The utilisation of UK-based radiography staff, with ties to academic centres both inside and outside the NHS, ensures a high standard of service provision.

### Future Developments

In the table below it is clearly noted that, in keeping with technical development, there has been an incremental increase in the number of examinations taking place since 1995. However, the increase has been mainly due to a greater demand for CT and MRI scans. Although significant numbers of diagnostic scans are to be allocated to the independent sector, the NHS will still be doing the majority of the diagnostics.

### Conclusion

Second wave procurement will bring some of the diagnostic modalities in line with the NHS eighteen week target. There will still be some shortfall, most probably in MRI provision and in PET/CT. There is also to be an expected growth in demand for diagnostics in the UK market as technological and medical advances progress. The growth may be gradual but alternatively, it may step up acutely if there is concurrent rapid technological or medical research development. As single modality centres hone their patient end-to-end process and start to provide significant throughput of cases, they will be able to reduce unit costs of diagnostics. The independent sector should become integral in the patient process and in patient choice and thus will ensure cost-effective high quality examinations, which will naturally lead to decreased patient morbidity. ▶

## BRITISH SOCIETY OF INTERVENTIONAL RADIOLOGY (BSIR)

### Advocating for Education and Research



AUTHOR

**Prof. Anthony Watkinson**

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**Interventional radiology, or image-guided surgery, is an expanding specialty in the United Kingdom. In most hospitals we are building a reputation as an effective and cost-conscious field that has the potential to treat and contribute to the management of a wide range of diseases. However, there are some serious concerns to be faced by interventional radiologists in the immediate future. This article provides insight into the situation in the UK for interventional radiologists, and how the discipline is regarded and is developing.**

Interventional radiologists are doctors who specialise in performing image-guided minimally invasive surgery, replacing traditional surgical operations and reducing morbidity, mortality and hospital stays. The interventional radiologist interacts with many specialist groups in the hospital environment and there are now IR techniques used to treat a wide range of conditions involving blood vessels, the brain, the liver, the biliary system, the gut, the chest, obstetrics and gynaecology, the urinary tract as well as a wide range of musculoskeletal conditions.

As a long-term advocate of the field of interventional

radiology, I have witnessed many new developments becoming standard treatments. I was first inspired to pursue this career in 1986 despite the challenge of first completing FRCS and FRCR (surgical and radiological qualifications) and taking on dual fellowships in the subspecialty alongside

some of the leading pioneers of our specialty including Prof. Joachim Burhenne (Vancouver) and Prof. Andy Adam (London). This compounded my belief that much of the future of surgery was going to be minimally invasive.

### British Society of Interventional Radiology (BSIR)

The British Society of Interventional Radiology aims to promote interventional radiology and support education and research within this field. The society organises an annual scientific meeting and helps to promote other educational activities. It also co-hosts



the Endovascular Forum, a bi-annual meeting, along with the Vascular Society of Great Britain and Ireland. As President of the BSIR, I represent and advocate for my specialty. I have served on the council of the BSIR since 1998 and the last ten years has seen a great number of changes with rapid technological advances.

The society has grown exponentially since it was first set up in 1988 when 78 members attended the first BSIR meeting in Stratford. The society is active in the field of audit and research developing several registries and has been involved in several national randomised trials. Membership is now well over 400 with approximately 650 people attending the most recent annual BSIR conference in Glasgow.

The society runs a website ([bsir.org](http://bsir.org)) to keep members informed of current events and to allow exchange of ideas, experience and progress in interventional radiological techniques. The website also seeks to inform other healthcare practitioners and the public about our practice and the types of procedures we undertake and how they might compare with other treatments. The website is interactive and feedback or comments from all users is encouraged.

### **Challenges Faced by UK Interventional Radiologists**

One of the problems is that we are a small specialty and many UK interventional radiologists also have major commitments in diagnostic radiology. One of the challenges has been getting interventional radiologists to become more clinically involved with the patient. In order for interventional radiology to continue growing and have a role in modern patient management the discipline needs to embrace complete patient care from a more broader aspect. We need to be involved in accepting primary referrals, running outpatient clinics for new patients and following up our patients. We need to get away from the concept that we are just technicians.

### **Future of Interventional Radiology**

We are a relatively new discipline which has grown out of the field of diagnostic radiology. This has created problems with the perception of the ability of interventional radiologists to provide complete patient care. However, many have taken on the role of the primary clinician, in a multidisciplinary setting, accepting primary referrals, running outpatient clinics and following up their own patients. In addition, many interventional radiologists have been great innovators and have developed techniques and treatments that are now mainstream patient care. I hope this trend continues

and I look forward with anticipation to see what advancements the next generation of new trainees bring. With this in mind, we are developing certain measures to ensure future stability for this next generation.

The BSIR has developed a new curriculum for specific IR training. The Royal College of Radiologists (RCR) here in the UK has worked hard to provide more specialised training based on the trainees preferences (Focused Individual Training – FIT) which will enable fast-track training. In addition the BSIR has been active in developing guidelines for the provision of future services, particularly in the field of emergency vascular disease and obstetrics.

There is plenty of opportunity for young trainees who choose to specialise in IR. Previously, radiology attracted much interest from medical students and junior doctors as it was seen as a good lifestyle option. The modern hospital based interventional radiologist is more procedure-based involved in 24-hour patient care. Also, the field of IR is expanding into several new territories, particularly in the fields of oncology and gynaecology. Interventional Oncology (IC) is a rapidly expanding field involved in the whole gamut of patient care. From the delivery of targeted chemotherapy to guided tumour ablations new treatments are appearing all the time and being refined and developed. With advances in gene therapy and nanotechnology the interventional radiologist who can guide his microcatheters into the most difficult places and will be in high demand.

### **Increasing UK Coverage**

During my term as President many projects are coming or have come to fruition. I feel the biggest challenge we face is to ensure hospitals in the UK provide a 24/7 service of high quality covering all aspects of interventional radiology. How this is achieved with current staff shortages will require considerable determination and strength of mind of many dedicated individuals. Officers of the BSIR in the UK at the invitation of the Royal College of Radiology have been in discussions with the Vascular Society of Great Britain and Ireland and the Royal College of Surgeons to try and establish a joint training programme. This is aimed at offering improvements in patient care and emergency safe cover across the full spectrum of interventional and surgical procedures currently provided by radiologists and vascular surgeons. This hopefully will ensure provision in the future of high quality 'image guided surgery' and prevent many of the turf war battles that have occurred and are occurring in other parts of Europe and the USA.



### Conclusion

Working in the National Health Service (NHS) in the UK within a public healthcare system has created a situation where, in most instances, there are excellent working relationships between interventional radiologists and a wide range of clinicians. Instead of surgeons cherry-picking the most lucrative procedures for themselves and tossing the leftovers to the interventional radiologists, patients are being sensibly discussed in a multidisciplinary environment in which the inter-

ventional radiologist is an equal contributor. Consequently decisions about patient management and treatment strategies are based on the best care for them and not on financial reward. If this unbalanced system evolved in the UK, as it has in other countries, then interventional radiology could be seriously disadvantaged in the future and it could lead to disharmonisation of the specialty. I hope that in the UK, the BSIR remains well-positioned to fight for the future of IR and work towards the best possible patient management. **M**



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## HEALTHCARE AND RADIOLOGY IN SCOTLAND

### Improving Service Delivery

Since the Scottish Executive and Scottish Parliament were convened officially on July 1, 1999, powers in devolved matters such as justice, health, education and environmental policy, previously exercised by the Secretary of State for Scotland and other UK Ministers, were transferred to the Scottish Ministers.

The Scottish Parliament has legislative power for health generally, including overall responsibility for the National Health Service (NHS) in Scotland, public and mental health. The education and training of healthcare professionals and the terms and conditions of NHS staff, including general practitioners, also fall under their remit.

### Central Management of Health in Scotland

The Chief Executive of NHS Scotland leads central management of the NHS. He is accountable to ministers for the efficiency and performance of the service and heads the health department which oversees the work of fourteen area health boards responsible for planning health services for people in their geographical area and special health boards such as NHS Health Scotland. Resource is allocated both on a population proportional way and in line with a complex formula which takes into account a number of factors including deprivation.

### National Framework for NHS in Scotland

In 2005 the Scottish Minister for Health commissioned 'Building a Health Service Fit for the Future - A National Framework for Service Change in the NHS in Scotland'. This review, led by Prof. David Kerr, described a proactive, modern NHS, in which services were embedded within Scottish communities rather than centered on acute hospitals in major urban centres. This model, it was argued, with its emphasis on proactive, anticipatory care, was better suited to the challenges of an ageing population and long term growth. Scottish Ministers accepted this prescription for the NHS in October 2005, with the publication of a subsequent action plan, "Delivering for Health".

In terms of radiology, "Delivering for Health" made some specific recommendations to enhance cooperation between local NHS Boards and recognised the need to further develop clinical leadership. It looked to balance demand and capacity by applying nationally-agreed definitions and to benchmark and monitor performance using data collected through a Scotland-wide information system. It also identified the need to develop services that could be sustainable in remote and rural areas through appropriate role extension and the separation of image capture from reporting.

### Radiology and "Delivering for Health"

Following publication of the report, the Minister for Health announced waiting time targets for eight key diagnostic tests, including CT, MRI and ultrasound.



The Access Support Unit within the Scottish Executive was charged with national performance management against this target and quickly identified the need to adopt nationally agreed definitions to enable the collection of robust performance management data. The National Radiology Information Development Group (NRIDG) therefore worked with the Information Statistics Division to develop an appropriate information system to unify the seven different Radiology Information Systems in use across Scotland. The NRIDG informed the operational requirement of the specification of a national procurement exercise to enable the service to collect information as a by-product of running the service on a day-to-day basis.

### **Diagnostic Collaborative to Deliver Shorter Waiting Times**

At this stage, a Diagnostic Collaborative was announced, to support the service deliver the waiting times targets. The Collaborative provided some resource to local Health Boards to fund some “stand back” time for staff to undertake service redesign. The methodology was following that used by the Massachusetts-based Institute of Healthcare Improvement previously used by the Modernisation Agency in England.

This involved using the Model for Improvement and promoted the use of Plan-Do-Study-Act cycles of change. In addition, assessment of local demand, capacity, activity and queue information through rigorous information-gathering was undertaken. This allowed process mapping with involvement of all staff groups and users of the service and identification of key constraints which were then subject to local scrutiny and application of “High Impact Changes” which had been developed south of the border and had a track record of service improvement. The NRIDG again worked to develop the capacity demand toolkit in conjunction with the national Diagnostic Collaborative Team.

### **Improving Delivery Through Service Redesign**

It is fair to say that the role of the national team was to give understanding and support to the service in developing the local information and applying the tools of process mapping and “High Impact Changes”. The information gathered belonged to each locality and the solutions were different in each situation. This understanding of local demand and capacity did flush out where delivery could be improved through service redesign.

Examples were application of leave policies, DNA (did not attend) policies and patient-focused booking where appointments are agreed with patients rather than just given to them. The process of developing information made the business case robust.

Another element of the Diagnostic Collaborative has been the sharing of best practice and new ideas. This is done through newsletters, a web page, electronic knowledge exchange but also National Learning Workshops. The formal national and local structure involving executive leads, programme managers, information managers and clinical leads has had enormous strength in supporting a developing network. The waiting times are reducing and the next goal will be sustainability. It is very clear that the waiting list initiative, in the absence of service redesign, would not result in a sustainable improvement in patient experience through improved access.

### **Other Service Improvement Initiatives**

Major planks of service redesign have been built on the ‘High Impact Changes’ but also on examining traditional roles and role extension together with backfilling of roles to allow education and training. The College and Society of Radiographers laid out its Four-Tier Model for radiographer role extension. In Scotland the Scottish Executive commissioned NHS Education Scotland to profile roles, skills and knowledge frameworks and to ensure that these could be accredited to ensure trust and understanding of the roles together with transferability. They also funded backfilling of assistant practitioner roles (50) to create capacity to allow practitioners to train as advanced practitioners. Several consultant radiographer posts have also been funded.

### **Future Benefits**

The other major plank in service redesign has been implementation of the national Picture Archiving and Communication Systems (PACS). Once there is a national PACS, national RIS, and agreed definitions for information, many things will be possible in a more cohesive fashion. In particular, a national asset register could be developed to allow a rolling programme of equipment replacement.

Other benefits would be our ability to do trends analysis on investigation patterns through review of data and also to do predictive planning when we work with other information, e.g., cancer prediction work. In turn this helps us scope both equipment and manpower profiles for the future and also educational needs with the higher education institutions. ■



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# INTEGRATING CROSS-BORDER HEALTHCARE WORKERS

## Perspective of a Polish Radiologist in the UK

**In recent years the NHS has struggled to retain sufficient numbers of healthcare workers, leading to a shortage of medical staff. To combat this skills deficiency, the NHS set targets to attract 7,500 more consultants, 2,000 new GPs and 20,000 more nurses by March 2004. The Royal College of Physicians in particular noted that this shortage was due to early retirement deals and the European Working Time Directive, which limits the hours a doctor can work. In this article, I will share my experiences in coming to work as a radiologist in UK, highlighting both the positive and negative experiences as a result.**

Before I decided to work in the UK, I had recently completed my radiology training and was working as a consultant in a large hospital in Krakow, splitting my weekly workload between many different modalities. I then noticed in the Polish Medical Journal, advertisements recruiting for locums in UK healthcare facilities. In May 2005, I decided to apply for a three-month position as a radiologist at the imaging department of the Aberdeen Royal Infirmary in Scotland, one of the North-East's largest medical facilities. Subsequently when a full-time position as a consultant radiologist appeared, my husband who is a clinical researcher, and our three young children made a permanent move to the UK. In October 2005, I then began my full-time position as a consultant radiologist, specialising in breast imaging.

### Changing Regulations for Foreign Healthcare Workers

Two years ago, when I first arrived here, all I had to do to take up my post was to fill out some registration paperwork for the General Medical Council (GMC) in London. There was no problem with my medical qualifications, which were taken as equivalent, or with my previous experience.

A recent addition to the requirements is an exam called the International English Language Testing System (IELTS) which demonstrates language equivalency in the range of medical jargon to ensure you do not have problems understanding your cases; this is not just for Polish workers though, but for any medical worker coming to the UK whose main language is not English.

A GMC initiative is now in place since March 2007 to prevent growing identity theft. Once your application for registration has been assessed, you must undertake an identity check at the GMC offices in London. A

photograph is taken during your identity check made available to employers so that they can be assured of your identity when you start work. Obligations for registration as a foreign medical worker with the right to work in Britain include an IELTS certificate to show you have taken this test and passed with a minimum

score. You are also obliged to provide proof of identity, evidence of qualifications and what is known as a 'certificate of good standing'.

### Specialised Versus General Radiology

In Poland, to become a consultant radiologist you have to train for five or six years and pass a final exam. Working in Poland, in a big facility, your weekly schedule divides your time up within the different modalities of the department, giving you broad practical experience, but you are not specialised in anything. If you end up working in a smaller facility that offers a limited range of services, you may not even get the benefit of practicing your skills on a very wide range of modalities.

In the UK, when you become a consultant radiologist, you choose your subspecialty and then follow a fellowship in this area. You then follow seven clinical sessions of which four are based on your choice of subspecialty for at least the following four years. This has the effect of creating highly-specialised experts, and has a positive result for patients and co-workers. However, as your job plan doesn't leave you very much extra time it limits exposure to other radiological subspecialties and you risk losing these skills.

Despite having had such a positive experience integrating into life in the United Kingdom, I haven't forgotten that if we do ever decide to return to Poland while I am still in the job market, it may cause difficulties for me. Whereas my husband is working for the same company he did in Poland, and my children are receiving a sound education and not losing their language, I would not so easily slip back into the Polish healthcare system, due to a loss of general practical expertise – over there as a 'breast expert' I would still need a sound practical knowledge of the main modalities.

» continued on p.47



# PACS INTENSIFIES COMMERCIAL PRESSURE ON RADIOLOGISTS

Interview with Marcel Swennenhuis

INTERVIEWEE

**Marcel Swennenhuis**  
Global Marketing Director  
AGFA Healthcare  
Mortsel, Belgium

**“PACS’ rapid absorption world-wide, is not just down to the initial hope that it would save money on long-term film costs. With PACS came the ability to clarify and manipulate images, the advent of integrated information systems and a solution to problems such as the shortage of radiologists in some countries, the increasing demand for imaging exams and the growing aging population in Europe. With hindsight, it has altered the development of radiology as a profession, forcing radiologists to think more about customers and what they want.”**

Has globalisation impacted radiological workflow?

☛ Increasing globalisation means that the cost of PACS is coming down. In the next few years, hardware will become extremely affordable for clinicians who didn’t previously have access to the images without the radiologist, e.g., an orthopaedic surgeon may soon purchase PACS technology to view an exam before the radiologist has even had time to make the report! Also, the clinician is becoming more involved due to multi-disciplinary team meetings and has greater input in the diagnosis process than ever before. If there is a shortage of radiol-

ogists, will other less qualified clinicians fill it? This is a big risk. Radiologists must now prove that they bring added value to the imaging process to avoid losing ground.

What factors will increase commercial pressure on radiologists in the future?

☛ Nobody could have foreseen the rise of private imaging centres in the US, 8 – 10 years ago. Now there are over 5,000 such centres, a number that increases by 10% each year. This is the direct result of PACS. It has the effect of making radiologists realise they have to compete with referring clinicians for their customers. In the EU it depends on the reimbursement structure of the individual country. For example, in Holland, hospitals are scored on performance and results are published on the internet for patients to read and make informed choices about where they have their treatment or diagnosis performed. This puts commercial pressure on radiologists to focus on patients.

How will the global PACS market change in the coming years?

☛ Ironically, prices in the EU are lower due to greater competition. The problem in Europe is that most major hospitals already have a comprehensive PACS solution. Therefore the new targets are the smaller institutions and private centres

that have yet to get on the PACS bandwagon. Many smaller companies have shot up to service the needs of smaller imaging centres, and are edging the big industrial forces out of the market. This has led to situations, for example, in Holland, where there are not many private imaging centres, and the PACS market is collapsing. However, in Germany where there are many private imaging centres, there is a very strong market.

What are some common mistakes PACS purchasers make?

☛ Many imaging centres and medical institutions in the process of developing an investment package, are not necessarily making the best choices. If you are working in an area that does not have terrifically high throughput or that necessitates the highest quality display, then you can save by choosing the lesser model, and channelling capital into better areas such as increasing the number of workstations, or improved software.

Radiology departments need to define their concrete, real needs. When choosing which equipment to buy, they real question is: can I do the same job with the less expensive model? And would capital be better invested in other areas? ❧

❧ continued from p.46

## The Language Barrier

My best experience working in the UK, has been getting involved in such a well-run breast imaging service, and I really feel that our patients could not possibly be better serviced.

Language, however, is by far the most difficult area in integrating into a foreign healthcare system, and indeed country. After two years I have not fully adapted to

not only the casual Scottish vernacular spoken in the streets but also the medical abbreviations so beloved by UK doctors. As well as appalling handwriting, you have to decipher their own personal range of ‘codes’, in order to understand the request made by the referring physician. My worst experience though, occurred once when I was on-call and in the middle of the night got a phone call from a consultant pester-

ing me into performing an exam which I did not believe were necessary. In my native country I would have no problem arguing my corner with my colleagues, but here, in the middle of the night, when my brain is dreaming in Polish, I ended up just giving in and performing the exam – I hope that with time, my language skills will give me the ability to disagree effectively when necessary. ❧

# Key Seminars & Conferences

## MAY 2007

- 9 – 12 **57<sup>TH</sup> ANNUAL NORDIC RADIOLOGICAL CONGRESS**  
Malmo, Sweden  
[www.nordiccongress.org](http://www.nordiccongress.org)
- 16 – 19 **GERMAN RADIOLOGY SOCIETY (DRG) ANNUAL MEETING**  
Berlin, Germany  
[www.roentgenkongress.de](http://www.roentgenkongress.de)
- 19 – 25 **ISMRM/ESMRMB JOINT ANNUAL MEETING**  
Berlin, Germany  
[www.ismrm.org](http://www.ismrm.org)

## JUNE 2007

- 3 – 7 **44<sup>TH</sup> ANNUAL EUROPEAN SOCIETY OF PAEDIATRIC RADIOLOGY MEETING**  
Barcelona, Spain  
[www.espr2007.info](http://www.espr2007.info)
- 11 – 13 **UK RADIOLOGICAL CONGRESS 2007**  
Birmingham, United Kingdom  
[www.ukrc.org.uk](http://www.ukrc.org.uk)
- 12 – 15 **EUROPEAN SOCIETY OF GASTRO-INTESTINAL AND ABDOMINAL RADIOLOGY (ESGAR)**  
Lisbon, Portugal  
[www.esgar.org](http://www.esgar.org)
- 27 – 30 **25<sup>TH</sup> EUROPACS ANNUAL CONGRESS**  
Berlin, Germany  
[www.europacs.org](http://www.europacs.org)
- 27 – 30 **21<sup>ST</sup> CARS 2007 ANNUAL CONGRESS**  
Berlin, Germany  
[www.cars-int.org](http://www.cars-int.org)

## SEPTEMBER 2007

- 8 – 12 **CARDIOVASCULAR AND INTERVENTIONAL RADIOLOGICAL SOCIETY OF EUROPE (CIRSE) ANNUAL CONGRESS**  
Athens, Greece  
[www.cirse.org](http://www.cirse.org)
- 12 – 13 **ESGAR – 7<sup>TH</sup> WORKSHOP ON CT COLONOGRAPHY**  
Malmo, Sweden  
[www.esgar.org](http://www.esgar.org)
- 13 – 15 **ESMRMB SCHOOL OF MRI – ADVANCED COURSE ON APPLIED MR TECHNIQUES**  
Innsbruck, Austria  
[www.esmrm.org](http://www.esmrm.org)

## OCTOBER 2007

- 1 – 3 **ESMRMB SCHOOL OF MRI – ADVANCED COURSE ON BREAST & PELVIS MR IMAGING**  
Madrid, Spain  
[www.esmrm.org](http://www.esmrm.org)
- 7 – 11 **17<sup>TH</sup> WORLD CONGRESS ON ULTRASOUND IN OBSTETRICS & GYNAECOLOGY**  
Florence, Italy  
[www.isuog2007.com](http://www.isuog2007.com)
- 15 – 17 **8<sup>TH</sup> INTERNATIONAL SYMPOSIUM ON VIRTUAL COLONOSCOPY**  
Boston, United States  
<http://www.bu.edu/cme/seminars/VC07/index.html>

- 18 – 20 **EUROPEAN SOCIETY OF CARDIAC RADIOLOGY (ESCR) 2007 ANNUAL SCIENTIFIC MEETING**  
Rome, Italy  
[www.escr.org](http://www.escr.org)
- 20 – 24 **JFR 2007 ANNUAL MEETING**  
Paris, France  
[www.sfrnet.org](http://www.sfrnet.org)
- 22 – 25 **WORLD OF HEATH IT (WHIT) CONGRESS**  
Vienna, Austria  
[www.worldofheathit.org](http://www.worldofheathit.org)
- 24 – 27 **EUROSON 2007 19<sup>TH</sup> CONGRESS**  
Leipzig, Germany  
[www.euroson2007.de](http://www.euroson2007.de)

## NOVEMBER 2007

- 14 – 17 **MEDICA ANNUAL TRADE FAIR**  
Dusseldorf, Germany  
[www.medica.de](http://www.medica.de)
- 25 – 30 **RSNA ANNUAL CONGRESS**  
Chicago, USA  
[www.rsna.org](http://www.rsna.org)

## DECEMBER 2007

- 13 – 16 **30<sup>TH</sup> ANNUAL SAN ANTONIO BREAST CANCER SYMPOSIUM**  
San Antonio, TX, USA  
[www.sabcs.org](http://www.sabcs.org)

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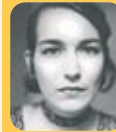
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## Taking Digital Radiography to the Next Level



### Introducing the radically different KODAK DIRECTVIEW DR 9500 System

We've broken away from tradition with a design that incorporates both the tube and detector in the ceiling-mounted 3D U-arm. Now, the system moves easily around the patient to capture images on the left and right side of the body without the need for additional patient positioning. That means enhanced workflow for you and greater comfort for your patients—a winning combination.

Advantages of the new design include:

- Two operator interfaces on the 3D U-arm allow you to change the X-ray generator parameters and settings without leaving your patient
- With auto-positioning the system moves into the pre-programmed position for the next exam
- The bucky and tube are always aligned giving you confidence for faster positioning.

[www.carestreamhealth.com](http://www.carestreamhealth.com)

**Carestream**   
HEALTH