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MANAGEMENT

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Social Media

- LEGAL ASPECTS OF RADIOLOGY • CLOUD COMPUTING • RADIOLOGY IN BRAZIL
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THE ALMIGHTY POWER OF IT

The revelations of Edward Snowden made it once again clear: "Big Brother" is watching us everywhere. It is not up to me to comment on the ethical impact of the U.S. National Security Agency, in particular as I was wondering why no western government was complaining against this infringement of our privacy. But it brings the incredible impact of IT into the spotlight.

"IT really is everywhere".

With this in mind we have taken the decision to create a new, integrated platform to face the challenges of today's world. Beginning in the 1990s highly specialised journals served our communities. But the latest research has highlighted a growing need for an all-inclusive platform. Different disciplines have to learn from each other!

Let me therefore welcome you to the first issue of HealthManagement. Based on IMAGING Management (we will continue with this numbering), it will incorporate the ideas and research of Healthcare IT and Cardiology Management, as these disciplines require a broad understanding with refined knowledge of specific management issues. For example, imaging is in many healthcare departments now, and is not just confined to the radiology department.

We aim to be the premier healthcare management and technology journal, thus providing a cross-departmental understanding of the key healthcare issues for the relevant stakeholders.

The Cover Story of our first issue focuses on social media. Facebook, Twitter and LinkedIn have all grown in popularity, and we highlight what platforms you will find in healthcare. Lorenzo Faggioni (p.12) looks at social media in radiology as research tools and for everyday diagnostic activity. We interviewed Roland Talanow (p.16), the founder of Radiopolis, a global community for radiologists, which includes

a wide array of tools and forums for the imaging world. Bertalan Meskó, creator of Webicina, is another social media visionary, and is interviewed on page 18.

Ethical and legal issues in radiology are the focus of our Imaging Insights section. Aparna Annam (p.20) looks at legal aspects of radiology, and a session at the last Radiological Society of North America (RSNA) Annual Meeting, which covered what residents and fellows need to know about this important issue. Peter Mackenzie (p.24) follows with an article on medicolegal aspects of radiology, with insights from the Medical Protection Society on recent trends as well as advice on how to manage risks. One way radiologists can affirm their professional ethics is to join the RSNA's Radiology Cares Campaign (p.28). This is an innovative campaign to promote the visibility of radiologists. The final article in this section is by Mathias Goyen (p.30), who looks at the exciting prospects of personalised medical technology.

Our IT Intelligence section covers cloud computing for health information management with an article from Mu-Hsing Huo and colleagues (p.34), which explains the concept and opportunities and challenges for health information management.

In Management Matters (p.40) Rebekah Page Rogers discusses communication for different types of leaders in healthcare.

Next, in Cardio Spotlight (p.43) Sowmya Rajagopalan covers the latest developments in cardiac imaging.

In Interventions (p.45), Philippe Pereira and colleagues write about the advances in lung cancer treatment that interventional radiology

provides.

In Focus is on infection. Jared Greenberg (p.48) covers healthcare-associated bacterial infection as a source of sepsis in patients with HIV.

In Perspectives (starting on p.50), we interview Ankit Shukla from Frost & Sullivan about medical technologies in the future. Focusing on Brazil, we feature an interview with Waleska Santos, the founder of Hospitalar, the leading medical fair in South America and in Compass (p.54) look at the state of radiology there.

Datebook on page 56 lists upcoming congresses. Ciara Madden (p.57) describes the delights in store at the forthcoming Cardiovascular and Interventional Radiology Society of Europe (CIRSE) Annual Meeting. ■

Enjoy this first issue of HealthManagement, and let us know what you think.

Register for free on our website at www.healthmanagement.org to share your views and receive updates.



Section Editor-in-Chief - IT

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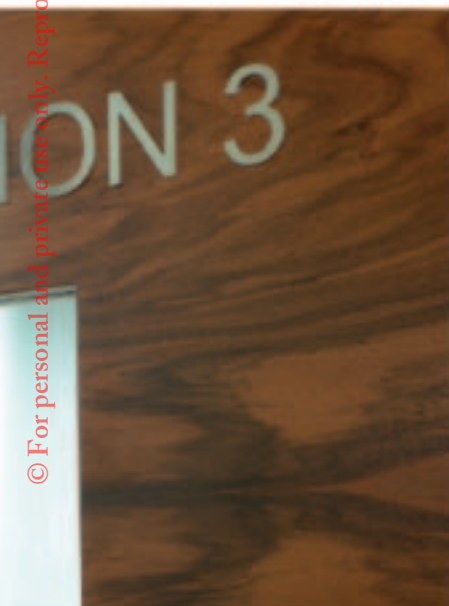
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166, Agias Filaxeos Str., 3083, Limassol, Cyprus
Tel: +357 25 822 133
Fax: +32 2 868508
office@healthmanagement.org

Publisher

Iphigenia Papaioanou
i@healthmanagement.org

Editors

Claire Pillar
cp@healthmanagement.org

Lee Campbell
lee@healthmanagement.org

Edward Susman, International
ed@imagingmanagement.org

Communications Directors

Toni Papas
toni@healthmanagement.org

Katya Mitreva
katya@healthmanagement.org

Luiza Kudelka
luiza@healthmanagement.org

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No Systematic Link Between Medtech Innovation And Increase In Healthcare Expenditure

New research from the European Health Technology Institute (EHTI) confirms that there is no uniform relationship between medtech innovation and an increase in healthcare expenditure. The impact of medical technology on healthcare costs is a result of multiple, dynamic factors, such as whether a technology expands the number of treatable conditions, improves the capacity of the system to treat more patients, or extends life, inducing additional years of healthcare consumption. Consequently this impact varies greatly and can result in novel technologies being cost-saving, cost-neutral or cost-increasing.

At a time where public budgets have been under increasing pressure and scrutiny, public spending on healthcare has grown at a faster pace in the last decade than the economic growth. Although there is awareness of the impact of demographics and chronic diseases on the healthcare budget, progress in medical technology is often seen as a key driver of this rising healthcare expenditure. The findings of research by the European Health Technology Institute (EHTI), however, stipulate that viewing the relationship between rising cost and medtech as static and straightforward is not productive and a more balanced view is needed.

These findings of a broad literature review of 86 publications including both qualitative and quantitative research indicate that the relationship between rising healthcare expenditure and medical technology progress depends on many factors including the availability of alternative interventions, characteristics of the patient

population, the treatment setting or whether the therapy is for a previously untreatable condition.

“A technology that increases costs in one setting or in one group of patients can be cost-neutral and even cost-saving under differing circumstances;” lead researcher Dr. Corinna Sorenson said on the EHTI research findings. *“Moreover, even if a given technology increases costs, it may increase benefits by an even greater amount and therefore be considered a worthwhile investment. A sound and comparative evaluation of technologies is needed to optimise investments in healthcare.”*

The research also noted that the term ‘medical technology’ is often used in studies to cover a wide range of interventions, including novel drugs in areas such as cancer, many of which greatly add to costs. For medical technology not including pharmaceuticals, the healthcare budget invested has remained stable over the last decade.

“Our 5-year industry strategy, endorsed by our entire membership, confirms the medtech industry’s commitment to value-based innovation as a way to steer Europe’s healthcare systems onto a sustainable path while ensuring improved patient outcomes. To achieve this, Europe needs smart investment in health which also considers patient and broader socioeconomic benefits,” said Serge Bernasconi, MedTech Europe’s Chief Executive Officer.

The EHTI report can be read in full in ClinicoEconomics and Outcomes Research 2013:05 pp.223-234, www.dovepress.com

Number of Countries Using Patient Summary of epSOS is Increasing

Currently in pilot stage, the epSOS project aims to design, build and evaluate a service infrastructure that demonstrates cross-border interoperability between electronic health record systems in Europe.

Since 19 June 2013 Swiss citizens are able to make use of the epSOS Patient Summary service when going to another epSOS piloting country. The University Hospitals of Geneva as participating pilot site offer the epSOS Patient Summary service for outgoing Swiss patients.

“Switzerland is not a member state of the EU, yet our experiences in epSOS are of great value to us”, says

Adrian Schmid, Head of the Swiss Coordination Office for eHealth. The Swiss epSOS Patient Summary can then be retrieved by an authorised health professional in one of the many epSOS pilot sites abroad (see: www.epsos.eu/poc_database).

With Switzerland joining the pilot operation phase, the epSOS services have now reached beyond the EU Member State borders.

For further information on the epSOS project, please visit: www.epsos.eu

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New Ethics Code for European Radiologists

The European Society of Radiology (ESR) published its Code of Ethics in March. Drawn up by a distinguished group of radiologists from the Ethical Compliance SubCommittee of the Professional Organisation Committee it is intended to be a living document, continuously updated.

The code is designed as a set of ethical principles and professional responsibilities to guide radiologists' conduct in their relationships with patients, colleagues, employers, industry, authorities and society, beyond legal requirements.

The four ethical principles are:

- Beneficence;
- Nonmaleficence;
- Respect for patient autonomy;
- Social justice.

These principles underpin the radiologist's professional responsibilities:

- Safeguard clinical independence and professional integrity;
- Advocate for patients but do not manipulate the system to obtain benefits;
- Interpret images and decide on interventions in the context of the overall medical situation of the patient;
- Protect patient confidentiality;
- Maintain appropriate relations with patients;
- Strive to continually improve professional knowledge and skills;
- Be aware of their limitations and seek consultations when needed;

- Be committed to continuous improvement in quality of care. This entails working collaboratively to reduce medical error, increase patient safety, avoid overuse of resources, minimise inappropriate practice variation and optimise the outcomes of care;
- Secure the safety of patients and personnel;
- When patients are injured, inform them promptly. Radiologists' failure to disclose medical errors (e.g. a missed diagnosis) constitutes unethical conduct. However, the report of the error should be concise and non-judgemental;
- Provide healthcare that is evidence-based and which uses limited resources in the most appropriate and cost-effective way;
- Respect other healthcare professionals and collaborate for the benefit of the patient;
- If a radiologist works in a practice or institution, he/she should place his/her professional duties and responsibilities to his/her patient above the commercial interests of the owners or others who work within these practices.
- When referring a patient to institutions or services in which he/she has a direct financial interest, a radiologist should provide full disclosure of such interest. Paying a physician for referring a patient to a radiologist is unethical.

As far as contravention of the code of ethics is concerned, the ESR committee has stated that this should be left to national radiology societies.

The code is available on the ESR website at www.myesr.org

European Parliament Affirms Role of Magnetic Resonance Imaging

The prospect of limiting magnetic resonance imaging in healthcare due to European legislation protecting workers from radiation has been averted after a decision by the European Parliament in June. MRI in healthcare has been exempted from the regulations, which limit exposure to electromagnetic radiation and oblige employers to assess and reduce risk. Healthcare organisations are obliged to take measures to prevent adverse health effects and safety risks.

"This text strikes a balance between the health and safety of workers and the possibility of using electromagnetic fields when needed, for example for medical purposes," said Elisabeth Morin-Chartier, the rapporteur,

during the debate before the vote.

The Alliance for MRI welcomed the move. In its statement the Alliance said, "This derogation is necessary to ensure the unimpeded use of MRI so that patients have access to the highest standard of care across Europe." The Alliance further pointed out that the technology is highly regulated with criteria set to eliminate any danger to workers and patients. The Alliance said that it supports the adoption of guidelines to ensure that working practices are in line with the latest technological developments.

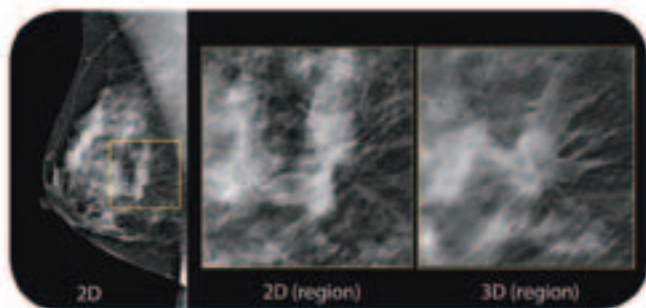
The legislation is due to receive final approval by the end of June.

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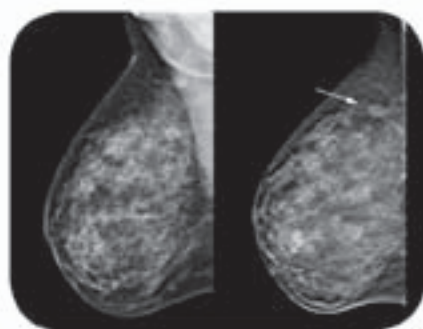
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Mammographically occult cancer in the digital image (left image) is visible with tomosynthesis (right image).

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- That had a 15% reduction in pre-arbitration false positive rates in a major European study when using 3D mammography plus 2D digital mammography compared to using 2D alone.¹
- That has over sixty citations in trade publications, abstracts and scientific presentations.

¹ Comparison of Digital Mammography Alone and Digital Mammography Plus Tomosynthesis in a Population-based Screening Program Per Skaane, Andriy I. Bandos, Randi Gullen, Ellen B. Eber, Ulrika Ekoth, Ulni Haakenaasen, Mina Izadi, Ingvild N. Jebsen, Gunnar Jahr, Mona Krager, Loren T. Niklason, Solveig Hofvind, and David Gur Radiology. 2013; 267:47-56.

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SOCIAL MEDIA IN RADIOLOGY

AN INCREASINGLY POWERFUL SET OF TOOLS FOR RESEARCH AND EVERYDAY DIAGNOSTIC ACTIVITY



Author

Dr. Lorenzo Faggioni

Department of Diagnostic and
Interventional Radiology
University Hospital of Pisa
Pisa, Italy

lfaggioni@sim.org

Figure 1.

Review of a CT colonography examination on an iPad® with the OsiriX HD® software. Supine and prone views are displayed on the same screen and can be compared simultaneously (presented at ECR 2012 by Faggioni L et al., doi 10.1594/ecr2012/C-1455)

Social media have now become familiar companions to everyday life, thanks to the widespread diffusion and ongoing technological evolution of highly portable mobile devices wirelessly connected to the Internet. In parallel, an increasingly large number of applications of social media have been designed to aid the radiologists' work. Some technical factors have contributed to driving this evolution, including:

- A dramatic increase in the degree of component miniaturisation, leading to the development of ultra-mobile devices (such as smartphones and tablets) with an excellent power-to-weight ratio and long battery life;
- The availability of faster wireless internet connections with greater data capacity, enabling transfer of larger amounts of data within reasonable time compared to just a few years ago;
- The development of cloud-based and stand-alone software tools

(either as ultra-mobile versions of desktop or laptop applications, or new apps natively conceived for ultra-mobile platforms) for the medical community.

In the following sections the main current applications of social media for radiologists will be reviewed, and some of the most popular tools designed for the radiological community will be briefly illustrated.

Social Media for Education

Medical education is one of the fields in which social media may offer a very valuable support to radiologists and to physicians in general. Several online resources are available for continuing self-education of healthcare professionals, as well as for teaching and training of medical students and residents (Mosa et al. 2012; Payne et al. 2012; Székely et al. 2013).

The main resources are represented by educational websites, which typically provide news, clinical and/or radiological cases, and review articles distributed for free or at a relatively low cost. Some of them are also optimised for usage on smartphones or tablets for maximum portability.

Two excellent educational websites (both offering online CME tests) are Auntminnie (<http://www.auntminnie.com>) and

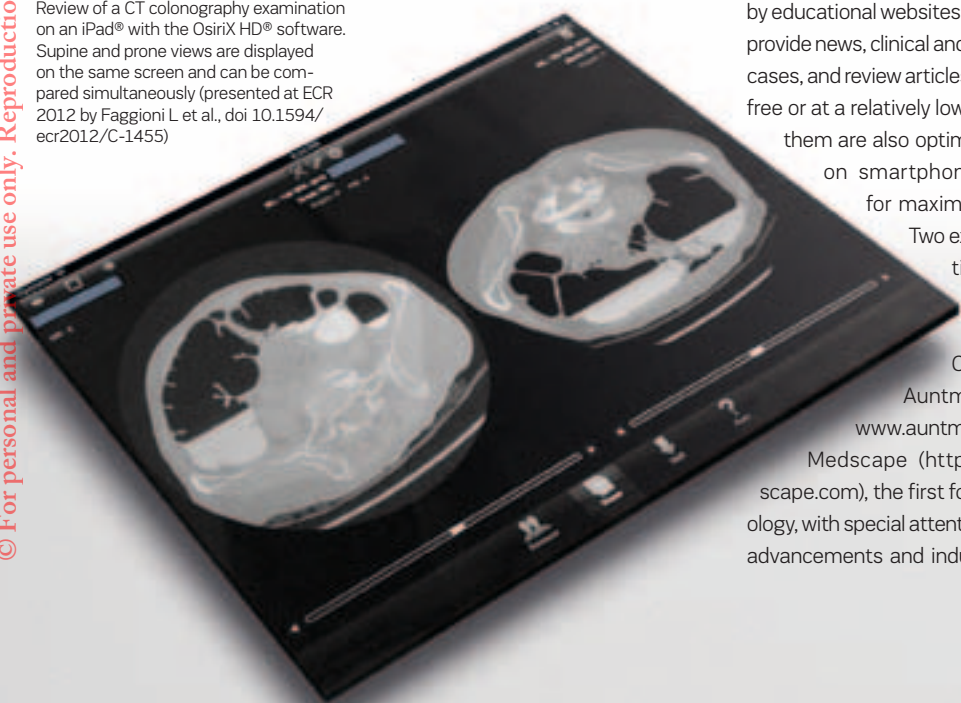
Medscape (<http://www.medscape.com>), the first focused on radiology, with special attention to technical advancements and industry products,

the other providing articles and news covering all medical specialties.

Major radiological societies give access to education and training resources, such as the European Society of Radiology (ESR, <http://www.myesr.org>), the Radiological Society of North America (RSNA, <http://www.rsna.org>) and the American Roentgen Ray Society (ARRS, <http://www.arrs.org>). Registered members can contact other members and share information, ideas or comments on virtually any topic of interest posted on website forums. To this purpose, radiological societies have a Facebook and/or a Twitter account, dramatically expanding the potential for interaction among radiologists and between them and other specialists. Members can also gain online access to official society journals and apply for participation in congresses and enrollment in stages, seminars or exchange programs for fellowships.

Other portals exist, such as Radiopolis (<http://www.radiopolis.com>), offering collaboration and educational resources for radiologists including forums, community blogs, and interactive teaching files. More dedicated resources are also available for use in radiologists' daily practice, such as calculators (e.g. glomerular filtration rate, pneumothorax size, TNM-based tumor classification) or statistical analysis tools.

Another important website is Radiopaedia.org (<http://radiopaedia.org>), an open-edit educational radiology resource which has been primarily compiled by radiology residents, registrars, fellows, and consultants from across the world. Users can even share their own cases or post articles on the site through a process of collaborative



publication. All these portals have links to the major social networks (i.e. Facebook or Twitter), favouring dissemination among non-members and further expanding potential collaboration among radiologists.

Mobile Apps

The evolution and increasing diffusion of ultra-mobile devices has spurred the development of lightweight, user-friendly, and exhaustive apps providing schematics, diagnostic flow charts, calculators of physiological parameters, and anatomoradiological atlases. Those apps, many of which are freely available online, usually require only modest processing power and can run natively on smartphones or tablets, easing on-the-go consultation by radiologists during their working sessions. Two examples are Radiology Assistant (<http://www.radiologyassistant.nl>) and IMAIOS e-Anatomy (<http://www.imaios.com/en/e-Anatomy>), the former providing schematic, but rigorous information on the main diagnostic topics throughout the entire body, and the latter detailed atlases of cross-sectional anatomy based on images obtained from several imaging techniques (such as CT, MRI, or conventional radiography).

Social Media for Consulting and Image Sharing

Another important role of social media in radiology is to enhance communication among radiologists, and between themselves and non-radiology specialists (Székely et al. 2013). A typical scenario is the solution of a difficult case by a working radiologist that cannot be easily and/or quickly solved by searching across several websites or radiology treatises (which, in turn, usually refer to more specialised and hard-to-find books or articles). Likewise, social media can be essential to get

information about particular conditions that occur rarely and are hard to find in conventional textbooks, monographs, or reviews. For instance, while these latter resources are usually adequate for working out many 'typical' cases, it is not rare in a radiologist's everyday working life to see patients with several comorbidities and/or distorted anatomy (e.g. due to surgical interventions or radiation therapy), where it can be really troublesome to formulate a diagnosis. Under these conditions, it can be very effective to describe the case in detail to a colleague on a post or via chat, ensuring that the consultant can have access to all needed information. In addition, such a collaboration model has a great potential for reducing overall reporting times and interpretation errors, especially in complicated cases for which the advice of a colleague with specialised skills in a par-

available for use on Apple® (iPhone®, iPad®) or Android devices.

Social Networks

Increasingly popular social networks to connect physicians and other professionals from different countries and specialties are LinkedIn (<http://www.linkedin.com>) and ResearchGate (<http://www.researchgate.net>). ResearchGate is more academic-oriented, and allows subscribers to publicly keep track of and share their own publications, with the option to upload PDF versions of their published full-text articles for consultation by other users. Vice versa, users may follow the research activity of other subscribers, request full-text papers, ask questions, and endorse registered colleagues with experience in specific topics.

.....
“Radiologists should be aware of the great potential of these resources as well as of their current limitations and risks”

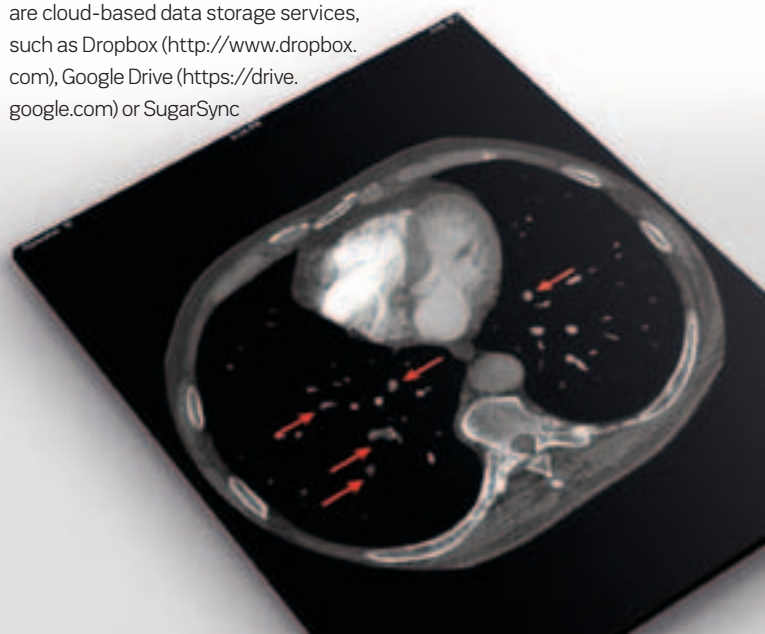
ticular field can be extremely helpful. To this purpose, tablet versions of VoIP (Voice over Internet Protocol), video-chat, and instant messaging services (such as Skype or Apple Facetime®) can be useful. Online services are also available that allow sharing of medical images with colleagues or patients using an authenticated account, such as Image32 (<https://www.image32.com>). Images from any imaging modality can be uploaded in DICOM format and compressed with the option to remove protected healthcare information (PHI) layers for secure data transfer and storage. Common types of web browsers are supported and ultra-mobile versions of the service are

Cloud-based Tools

Other, more general-purpose tools for sharing images and all types of data are cloud-based data storage services, such as Dropbox (<http://www.dropbox.com>), Google Drive (<https://drive.google.com>) or SugarSync

Figure 2.

Review of a CT pulmonary angiography examination on an iPad® with the OsiriX HD® software. Note good depiction of pulmonary emboli down to subsegmental level (presented at ECR 2012 by Faggioni L et al, doi 10.1594/ecr2012/C-1461).



(<https://www.sugarsync.com/>), which provide online disk storage for free or upon payment of a fee (depending on the purchased total disk size or amount of exchanged data). Files can be organised in folders as on a regular physical disk, shared with other users chosen by the subscriber, and are transferred and stored on redundant servers using advanced encryption algorithms to maximise data protection and integrity. However, it is the user's responsibility to ensure that no confidential information is unduly delivered over the Internet, and specifically radiologists must take extreme care to avoid breaching patients' confidentiality when sharing medical images with colleagues through the web.

iChat Theatre feature built in OsiriX (<http://www.osirix-viewer.com>), enabling users to video-chat with colleagues while showing them radiological cases from the OsiriX environment. In this setting, the recent availability of tablets with very high screen resolution allows radiologists to see or show images on hand-held devices connected to the hospital PACS infrastructure, without the need for costly and bulky dedicated stand-alone workstations (see Figure 1). However, it should be considered that, while some tablets and image viewing apps have gained FDA and/or CE approval as medical devices, they do not have the ergonomics, flexibility, and processing power of conventional workstations (though

CT (Mc Laughlin et al. 2012), CT pulmonary angiography (Johnson et al. 2012), or spinal MRI studies (McNulty et al. 2012), with the potential of saving time and improving patient care (see Figure 2). Surgery is another area that may benefit from the evolution of ultra-mobile technologies (Dala-Ali BM et al. 2011; Mohan and Branford 2012), with some surgeons already using tablets in the operating room to assist interventions (a nice example is World 1st iPad Surgery: OsiriX 3D navigation, can be seen at <http://youtu.be/n5nbNlqqdAY>).

Conclusions

Social media and ultra-mobile devices have dramatically evolved over the last five years and, despite their youth, they can offer radiologists a wide set of tools that can be very useful for their scientific and professional activity. In particular, today radiologists may rely on a wealth of educational resources and collaboration tools that can be accessed virtually everywhere a wireless internet connection is available, without the need for dedicated workstations, printed atlases or textbooks, or physical vicinity of consultants. Radiologists should be aware of the great potential of these resources as well as of their current limitations and risks (with particular reference to mobile image viewing solutions and data confidentiality issues), in order to get the maximum benefit from them. ■

radiologists must take extreme care to avoid breaching patients' confidentiality when sharing medical images with colleagues through the web.

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A more advanced level of collaboration can be achieved if real-time remote interaction with a consultant can be integrated with image viewers, potentially allowing for a more complete exchange of information among users. A nice example of such a fully integrated collaboration service is the

this latter limitation can partly be overcome by thin-client solutions, by which all operations are performed remotely on a server) (John et al. 2012). Keeping in mind those limitations, tablets have been shown to be effective for preliminary 2D reading of medical images in an emergency setting, such as head

Websites

American Roentgen Ray Society (ARRS)

www.arrs.org

Auntminnie www.auntminnie.com

Dropbox www.dropbox.com

European Society of Radiology www.myesr.org

Google Drive <https://drive.google.com>

Image32 www.image32.com

IMAIOS e-Anatomy www.imaios.com/en/e-Anatomy

LinkedIn www.linkedin.com

Medscape www.medscape.com

OsiriX www.osirix-viewer.com

Radiological Society of North America (RSNA)

www.rsna.org

Radiology Assistant www.radiologyassistant.nl

Radiolopolis www.radiolopolis.com

ResearchGate www.researchgate.net

SugarSync www.sugarsync.com

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CONTACT

ECCLESIA Group

International Coordination

dieter.mildenberger@ecclesia-group.eu

+49 (0) 5231 603-6456

www.ecclesia-group.eu



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RADIOLOPOLIS

THE INTERNATIONAL RADIOLOGY COMMUNITY FOR EDUCATION, RESEARCH AND CLINICAL PRACTICE



Interviewee

Dr. Roland Talanow

President, Radiopolis
Lincoln, CA
United States

roland@talanow.info

Interviewed by

Claire Pillar

Managing Editor

With so much information available on the Internet, the advantages of a one stop shop are clear. One such resource is Radiopolis (<http://www.radiopolis.com>), which brings together a wealth of information resources and tools for the radiologist. HealthManagement interviewed Radiopolis founder Dr. Roland Talanow about his vision for this fast-growing radiology community. Talanow studied to become a medical doctor in Germany and completed a radiology residency and a nuclear medicine fellowship in the United States, where he is now based.

When and why did you start Radiopolis?

I started in 2009. The idea of a central platform, a 'metropolis' for radiology (thus Radiopolis) was born out of the necessity to combine all the projects I have developed in the past. I presented many projects at meetings, and afterwards they got forgotten, because people don't want to remember this and that website for some niche purpose. That's why I put everything into a 'cloud' and combined it with a social aspect.

The social aspect is extremely important to me because of my past experience, when I could not find a peer who was as interested in these 'unusual' projects as I was. So why not create a platform where people can find each other? Thanks to Radiopolis people found each other and we have developed and presented over 50 projects at conferences since Radiopolis has been launched.

Is Radiopolis primarily a continuing education and knowledge sharing resource?

Yes, and there is more in development, but we do also have valuable sections for clinical practice and for businesses.

Radiopolis can be seen as a Facebook for radiology, with the professionalism of LinkedIn. We have subforums for different interests and groups for subspecialties (subcommunities). These can be kept private or public. Privacy and member protection

is our highest concern, which is what distinguishes us from Facebook and other social media sites. We care about quality – not quantity.

There are other radiology communities on the Internet. What's different about Radiopolis?

The major difference is the cloud computing concept and the ability to customise and change towards the user's needs. An example of customisation in Radiopolis is a consultation section that can be used via a realtime chat or handheld application – RadSnap (<http://www.RadSnap.com>).

What are the benefits of registering as a Radiopolis member?

- **Secure environment:** Radiopolis is more secure than Facebook or LinkedIn since all members/registrations are screened (by a human) and only eligible people gain access. We have the highest level of security. You can for example upload an image to a private chat with another member.
- **Educational resources** and tools for students and residents: Thousands of links to educational websites, book sections, self exam tools, tutorials, videos, teaching files and much more.
- **Clinical benefits:** programmes and resources valuable for daily clinical routine such as calculators (GFR, Crea, cortison dose etc.), staging tools, consultation sections, news section, CME and conference calendar, job centre

(over 50,000 jobs worldwide), differential diagnoses programmes, links to virtually all radiology societies and journals and a user tailored literature search section.

- **Business section:** this includes jobs postings, a business index, news section, hospital index etc.

How many members are there?

Around 12,000. There is literally no country NOT present.

Is there a mobile version of Radiopolis?

The complexity and interactivity of Radiopolis website makes it difficult to make the site completely mobile. However, we are working on some sections that will be available on mobile devices. One example is the free RadSnap application which allows case consultation and teaching by sharing cases (see <http://www.RadSnap.com>). Any radiologist interested in mobile radiology should join the Radiopolis "Mobile Radiology - Radiology Apps" group.

We also just launched a site index for mobile applications in radiology, which can be reviewed and rated. We are working on that with Dr. András Székely from Hungary. Please refer to our paper in the January issue of the European Journal of Radiology (Székely et al. 2013).

What are you most proud of in Radiopolis?

That it became the largest community

for radiology professionals worldwide. Almost every day I receive emails with thank yous from students, residents and radiologists for providing such a resource. That is very fulfilling!

Are there any forums in languages other than English?

Yes, there are groups for different languages and countries, for example German speaking, Hungarian, Spanish, Turkish, Kurdish, Mexican, Panama, Indian, Iranian, Filipino, Saudi Arabia, Russian.

Radiolopolis is founded on giving and sharing expertise. How is this monitored?

We put the highest importance on HIPAA (the U.S. Health Insurance Portability and Accountability Act) compliance, and require that any patient information needs to be removed for example when uploading cases. We recently also integrated tools to de-identify afterwards if they forget.

In regard to answers given in forums, it is common sense, and up to your own judgment. Some members already know each other and also you can see their experience level in their profile. A real-time chat offers also a private and instant communication venue between two users.

Radiolopolis has brought researchers together. Can you give some examples?

These are just a few examples of projects initiated in Radiolopolis and presented at many radiological and medical conferences:

- **RadDx** - a web-based tool to form a concise differential diagnosis of findings in diagnostic and interventional imaging;
- **Radiology Museum** - a central repository of historic and contemporary radiological artifacts;
- **Radiation Passport** - an educational iPhone and iPod touch application for patients and healthcare professionals

about radiation-associated cancer risks from medical imaging exams and procedures (Baerlocher MO et al. 2010);

- **CancerStaging tools** - a free and customised online tool to facilitate quick and accurate staging of common malignancies;
- **eLearning-Radiology.com** - quality assurance of radiology education material on the internet;
- **PubRad** - PubMed for radiology;
- **Study about smartphones, tablets and mobile applications for radiology** (Székely et al. 2013);
- **Study about radiation awareness amongst radiology professionals;**
- **Study about the "Predictive analysis of the use of a novel procurement tool to acquire radiological technology for NGOs".**

How does the RadDX differential diagnosis tool work?

Users enter data in a comprehensive form, based on what they see on the study and clinical and demographic data, if available. This will be compared

to the database of entries provided by subspecialists, analysed and the results shown in the order of priority.

This is not to substitute for the radiologist but to serve as a learning tool for the radiologist in training/resident and as a confirmation and support tool to either confirm the differential diagnosis the radiologist thought about or come up with additional ones the radiologist did not think about. This gives additional peace of mind. This programme is built in a modular way for different subspecialties (MSK, neuro, breast etc).

What is the process for uploading a case to Radiolopolis, for example if a radiologist wants another opinion? Who checks the image, and once it is on the site, what happens?

Uploading a case is as simple as a click of a button. Every member has automatically his/her own case gallery/teaching file collection. In the upload form, several categorisations based on specialty, modality, image plane, body region help retrieval later on.

Image:
Radiolopolis sitemap



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twitter

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<https://twitter.com/Radiologyman>

Radiopolis:

<https://twitter.com/Radiopolis>

facebook

FB page:

<http://www.facebook.com/radiopolis>

FB group:

<http://www.facebook.com/groups/radiopolis.education>

Website:

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The user may add a title or question (depends if the case is for teaching or consultation purposes), a description, which could contain for example pertinent patient demographics and clinical history. It is however clearly stated that NO patient identifiers are allowed. We have watchdogs to make sure the cases are not violating any rules. I personally check most cases too.

Each uploaded case receives its own personal page which contains an individual discussion forum, viewing tools, and additional tools like 'Get more', where we automatically fetch images and other information from the web as an extra service. For that we use our affiliate site <http://www.searchradiology.com>, a peer-reviewed radiology specific search engine. It all stays in our cloud.

After a case has been uploaded, it is promoted in Radiopolis and on our various Facebook and LinkedIn pages and groups to increase the

likelihood of a timely answer.

PubRad is the radiology-specific search tool for PubMed. What are the advantages of using this instead of going straight to PubMed?

PubRad was developed to make PubMed search more efficient from a radiology standpoint. It pre-filters results specific to radiology, allows users to select a specific journal or multiple journals to search at once and also to search PubMed unfiltered. You can create your own literature portfolio on Radiopolis by saving the links to articles in your own folders.

Does Radiopolis link to other radiology resources on the web?

We have a huge link/website index, which is categorised to find the right resource. Links can be searched or browsed in categories such as Radiology Societies, Hospitals & Universities, Online Textbooks,

Radiology & Anatomy Atlases, Teaching Websites, Teaching files & Case Collections, Reference Databases etc. When added, these were peer-reviewed by at least one person.

Are there any upcoming developments for Radiopolis that you can tell us about?

Developments to come include a professional consultation section with DICOM capabilities, CME, closer collaboration with journals like the JRCR, more sophisticated educational sections such as tutorial creators, a desktop application that will integrate into the radiologist's daily workflow and more.

What social media do you use?

I am "Radiologyman" on Twitter. Twitter is another venue to distribute information and teaching. I also post interesting cases and blogs on the Radiopolis facebook page and groups. ■

SOCIAL MEDIA AND MEDICINE

INTERVIEW WITH DR. BERTALAN MESKÓ

Search for "social media and medicine" in Google, and the Social MEDIA course from Webicina is the top result. Webicina founder Dr. Bertalan Meskó is an acknowledged expert on using social media in the medical field and says he is working on becoming a medical futurist. As well as Webicina, Meskó runs the medical blog Scienceroll, manages medical projects in Wikipedia, organises scientific events in Second Life and is a health 2.0 consultant for pharma and medical technology companies. In Hungary he launched the first university elective course in the world that focuses on web 2.0 and medicine for medical students – now available at Webicina.

Interviewee

Dr. Bertalan Meskó

Founder and Managing Director
Webicina.com

Interviewed by

Claire Pillar

Managing Editor

What are medicine 2.0/ health 2.0 and why are they important?

Medicine 2.0 refers to the intersection between medical communication and social media; while health 2.0 is referring to how social media can transform healthcare delivery. Both are important trends as it is clear now that social media is changing the way medicine

is practised and healthcare is delivered in many ways but still following the path of evidence-based medicine.

Are social media tools for marketing, information, knowledge sharing or a mix of these?

A mix of these, and social media is just a form of communication. It is possible

to use collaboration platforms for publishing manuscripts together without geographical limitations; keeping ourselves up-to-date in our field of interest; or even building an online image for ourselves.

"Social media is just wasting time. I barely have time to read my email

and keep up to date with the professional literature.” What does social media have to offer the busy doctor and why should they bother?

Without the meaningful use of the Internet, it is impossible now to keep yourself up-to-date. Doctors need to acquire better time management skills and social media provides plenty of solutions for this. I follow about 300 medical journals and news/blogs. By investing my time into building professional social networks around myself, they filter the web for me, saving time and effort. Social media is only useful when used with strategy and design.

E-patients use the web efficiently; the job of medical professionals is based on communication, and as social media is now an integrated part of communication, they have to deal with this.

Is there enough ‘critical mass’ in social media to make it worthwhile for a radiologist to use?

Absolutely, this is one of the most active professions in medicine online. There are plenty of blogs, community sites, Twitter channels and Youtube channels, among others.

If a radiologist wanted to get started in social media, what would you suggest they start with?

They should start with listening to those radiologists who are already active online to see what kind of platforms they have been using and how they communicate with each other.

Anyone can start a blog or start tweeting, but there are plenty of abandoned accounts. How can you focus on the best resources?

There are two ways to do this:

- 1) Learn yourself how to assess the quality of medical websites and social media resources, which takes a lot of time and effort (although it’s worth it);
- 2) Or use services that curate medical social media resources such as Webicina.com.

Do you have advice on how to keep the personal and professional separate on social media?

The same rules apply for real life as for social media. If there are things I would never do in my real life, why would I do that in the online world? For those medical professionals who would like to share personal and professional content also in social media channels, they should separate these profiles clearly. For example, when a patient sends me a friend request on Facebook, I reject it and send a private message to the patient explaining the private nature of my Facebook channel while our relationship is professional. They always understand.

Any thoughts on where social media is heading?

It is heading to becoming even more personalised. It means e-patients will get even more information about their own conditions and be more up-to-date. Doctors have to keep up with this and acquire skills in digital literacy. This is where I have been trying to help them through university courses and a digital course (<http://thecourse.webicina.com/>).

Webicina hosts the Social MEDIA course on social media and medicine. How much time do you recommend to work through it?

The course consists of 16 lectures with hand-outs and tests. It takes 1-1 ½ hours approximately to finish one topic, therefore, based on personal preferences, it may take between 8 and 16 hours to finish the course successfully.

Webicina offers curated social media. What criteria do you use to include a social media resource in the collection?

The process of creating a particular collection is challenging and exciting as well. First, I ask those medical social networks I know the members

of about their favourite social media resources focusing on a medical topic. Then my team creates a collection based on these suggestions following my 300-step algorithm after which I review again each resource. Finally, the communities of medical professionals and e-patients check the collection before publishing it officially. This process ensures we only curate the very best of medical social media resources.



How can the radiologist follow the curated Webicina radiology collection without having to make frequent visits to the site?

This summer, we are introducing new features to the site such as the option to get personalised journals/newsletters via e-mail which can be customised based on the needs of the specific users. We hope radiologists will love and use this feature. ■

Image.
Dr. Bertalan Meskó

LEGAL ASPECTS OF RADIOLOGY

A PRIMER FROM THE RESIDENT AND FELLOW COMMITTEE OF RSNA

“Residents can’t get sued!” were the inexperienced words from a former classmate during our first year of training. While it’s a novel idea to not be held liable for your actions as a trainee, it simply isn’t true. This misconception was the spark behind holding a “Legal Aspects of Radiology” session at RSNA 2012 for residents and fellows to grasp a better understanding of the legal issues we face in our profession. The RSNA Resident and Fellow Committee put together a group of accomplished speakers including attorney Mr. Thomas Greeson, Dr. Leonard Berlin and Dr. David Yousem to address this topic.

Contract Awareness

As we go through the residency training system, we exist in a relatively protected environment with a familiar transition from one level to the next. Making the jump to the working world may hold many surprises if you are not prepared. Mr. Greeson, an attorney and former general counsel to the American College of Radiology, gave us some advice on how to evaluate a practice before joining. He stressed the importance of examining the relationship that the practice may have with the hospital to provide services and coverage. Mr. Greeson also described the elements of a contract between the new hire and the group. While there are specific items such as salary and vacation, other things to look for include details about becoming a shareholder in a practice, non-compete clauses and tail coverage.

Medical Malpractice Pitfalls Your First Year Out: How to Avoid Them

Dr. Leonard Berlin, a Professor of Radiology at both Rush Medical College and the University of Illinois College of Medicine, accomplished speaker and author of the book *Malpractice Issues in Radiology*, guided us through some of the mistakes we are prone to make in our careers and how to avoid them. He started with a brief overview

of the escalation of lawsuits, including the number of suits and the size of the payments. While it is a terrible thing to imagine your assets disappearing because of a lawsuit, he assured us that this is a very rare instance because of the tendency for the two sides to set limits. In addition, the vast majority of claims are either dropped or dismissed. This fear of being sued fosters the practice of defensive medicine and an increased number of studies being ordered to ‘not miss’ anything.

is also a very common error. It is not the first or even the second abnormality that is missed, but usually the third. Dr. Berlin cautioned us that when reading a previous report to not accept the interpretation of findings to be true, thereby leading to an alliterative error. If there is an error on a previous report from yourself or a colleague, we have a tendency to accept that error as correct and perpetuate the mistake in subsequent dictations. We can reduce making these errors by getting a full history, interpreting prior

.....
If there was a transgression in care, it may be worth admitting the mistake and settling, instead of facing the drama of a courtroom

He further discussed the most common causes of lawsuits: failure to make the correct diagnosis and failure to communicate. Dr. Berlin gave a summary of some of the more common errors and stated that the average error rate may be about 3-4 percent. Errors may be perceptual in nature, such as an error to observe the actual finding. They may be cognitive, which is a misinterpretation of a finding. Satisfaction of search, after finding the obvious abnormality,

exams with a grain of scepticism and using our disclaimers when appropriate (i.e. poor image quality).

Our second most common cause for lawsuits is failure to communicate a finding. We need to be familiar with practice guidelines (try reviewing the ACR Practice Guidelines for Communication). We know to call about the obvious emergent critical findings but not always the ‘incidentalomas’ that require non-emergent follow-up (e.g. the incidental



Author

Aparna Annam DO, FAAP

Chair, RSNA Resident and Fellow Committee
 Pediatric Interventional Radiology Fellow
 Department of Interventional Radiology
 Texas Children's Hospital,
 Houston TX, USA

apamaannam@yahoo.com



pulmonary nodule on a chest x-ray that requires continued investigation). He encourages us to write a strong report and if something warrants further imaging, then state it. It's neither legally protective nor useful to merely describe a finding and not give a meaningful interpretation of its significance. When you communicate a finding make sure you document it with the time and specific name of a person to keep a record that could prove valuable in court.

with a lawsuit. Once a lawsuit is filed, keep the details to yourself since any statement could be discoverable, including obtaining second opinions from colleagues. Discussion of the case should be restricted to your legal team, risk management and the insurance company. Above all else, never alter the original report.

He advised us to always evaluate the case thoroughly. Was there a breach in standard of care? If there was no divergence from the standard

other physicians for your mistake.

If you do see the inside of a courtroom, maintain an even temperament throughout the trial. Arrogance or belligerent mannerisms can easily rub the jury up the wrong way. If the plaintiff's attorney makes an incorrect statement, calmly interrupt and correct them so that you are not led down the wrong path in your own statement. If you don't remember certain facts, just state, "I don't recall." Do not let yourself be cut short in your response. You have the right to give your full answer to the question, but remember to do so in a thoughtful manner.

Most importantly, Dr. Yousem stated that if you are sued, don't take it personally. Remember, the trial itself is not just about you. The patient experienced a bad outcome and the question revolves around a deviation from standard of care. The patient may deserve some compensation. Whether there is a settlement or a trial, it is still something that can weigh heavily upon any physician.

While this is a brief outline of the topics that were discussed at RSNA 2012, hopefully, it serves as a starting place to increase awareness of the legal issues we face in our profession. We will all sign a contract for work and we should understand it and know what to look for. If we do make an error in our readings that results in a lawsuit, we have a little more insight as to what we may confront and how to handle the situation. ■

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if you are sued, don't take it personally. Remember, the trial itself is not just about you. The patient experienced a bad outcome and the question revolves around a deviation from standard of care

Lastly, Dr. Berlin left us with four questions to ask ourselves before signing any report: What do I see? What do I think it means? What do I think the physician will conclude? What do I want the physician to conclude?

You've Been Sued, Now What?

Dr. David Yousem, Professor of Radiology, Director of Neuroradiology and Vice-Chairman of Radiology at Johns Hopkins Hospital and author of the book Radiology Business Practice, How to Succeed, had even more to say on the topic of lawsuits. His insight stems from his years of experience and the unique situation of being married to a plaintiff malpractice attorney. His entire talk was given in a poetry format with the objective of maximising your legal defence, career and personal survival from a lawsuit.

Dr. Yousem gave advice as to the actions you should take when faced

of care, you may have a contestable case. Maybe there was a breach, but it was not what caused the injury to the patient. If there was a transgression in care, it may be worth admitting the mistake and settling, instead of facing the drama of a courtroom. This explains why 95 percent of cases are settled and never make it to trial.

If you are faced with a trial, be wary of the plaintiff's choice in expert witnesses. The expert witness should testify to what a reasonably prudent radiologist would interpret. This person should be someone in their everyday practice and not necessarily the world's authority on the subject. The missed finding may be completely unusual for the average radiologist but common for a super-subspecialist. Attend all the briefings for the case because if you are the defendant and present, you can challenge what the experts are saying in their depositions. Alternatively, be cautious in your own deposition not to blame

Technology Update

In Breast Cancer Detection, the Evidence Points to Tomosynthesis

Growing number of peer-reviewed clinical publications document significant advantages of Hologic® tomosynthesis; Now, Hologic has further advanced tomosynthesis with faster and lower-dose options including the C-View™ software option for 2D imaging and the Affirm™ tomosynthesis biopsy procedure

Tomosynthesis is going from strength to strength. Several recently published clinical studies demonstrate that screening with Hologic tomosynthesis in combination with conventional 2D imaging results in higher detection ratesⁱ⁻ⁱⁱⁱ and lower false-positive rates.ⁱⁱⁱ

In addition, Hologic has advanced tomosynthesis technology further with faster and lower dose options including C-View™ software for generating 2D images and the Affirm™ tomosynthesis biopsy option. These new procedures are being performed in increasing numbers across Europe, the U.S., and countries around the world.

European Data Shows Increased Detection, Decreased Recalls

Results of the first large-scale, prospective clinical study on breast tomosynthesis were published in April 2013 in the scientific journal *Radiology*. The study, "Comparison of Digital Mammography Alone and Digital Mammography plus Tomosynthesis in a Population-based Screening Program" was led by Per Skaane, M.D., Ph.D. from Oslo University Hospital Ullevaal. Well-respected in his field, Skaane and his research team conducted the previous Oslo I and Oslo II trials comparing digital mammography to screen-film for the detection of breast cancer.

The tomosynthesis study was based on 12,631 screening examinations in a large hospital in Norway. The researchers, using Hologic's breast tomosynthesis in combination with a 2D mammogram, found a significant increase in cancer detection rates, particularly for invasive cancers, and a simultaneous decrease in false-positive rates compared with 2D mammography alone. Significant findings include:

- A 40% increase in the detection of invasive breast cancers
- A 27% increase in the detection of all cancers (invasive and in situ cancers combined)
- A 15% decrease in false-positive rates

The authors reported that the increase in cancer detection was found across all breast tissue densities, from dense to fatty.

Another European study, "Integration of 3D digital mammography with tomosynthesis for population breast-cancer screening (STORM): a prospective comparison study," came to a similar conclusion. The study, led by a team of Italian and Australian researchers represented by Associate Professor Nehmat Houssami, at the University of Sydney's School of Public Health in Australia, was published in June 2013 in *Lancet Oncology*.

The study investigated whether integrated 2D mammography with tomosynthesis was more effective at detecting cancers and reducing false positives than 2D screening alone. Again, the use of Hologic's breast tomosynthesis

technology significantly increased cancer detection rates and simultaneously reduced false positives. Significant findings include:

- Breast tomosynthesis identified 8.1 cancers per 1,000 screens, compared with 2D mammography alone at 5.3 per 1,000 screens, an increase in the number of cancers detected by over 50%.
- Breast tomosynthesis resulted in a simultaneous 17% recall rate reduction.



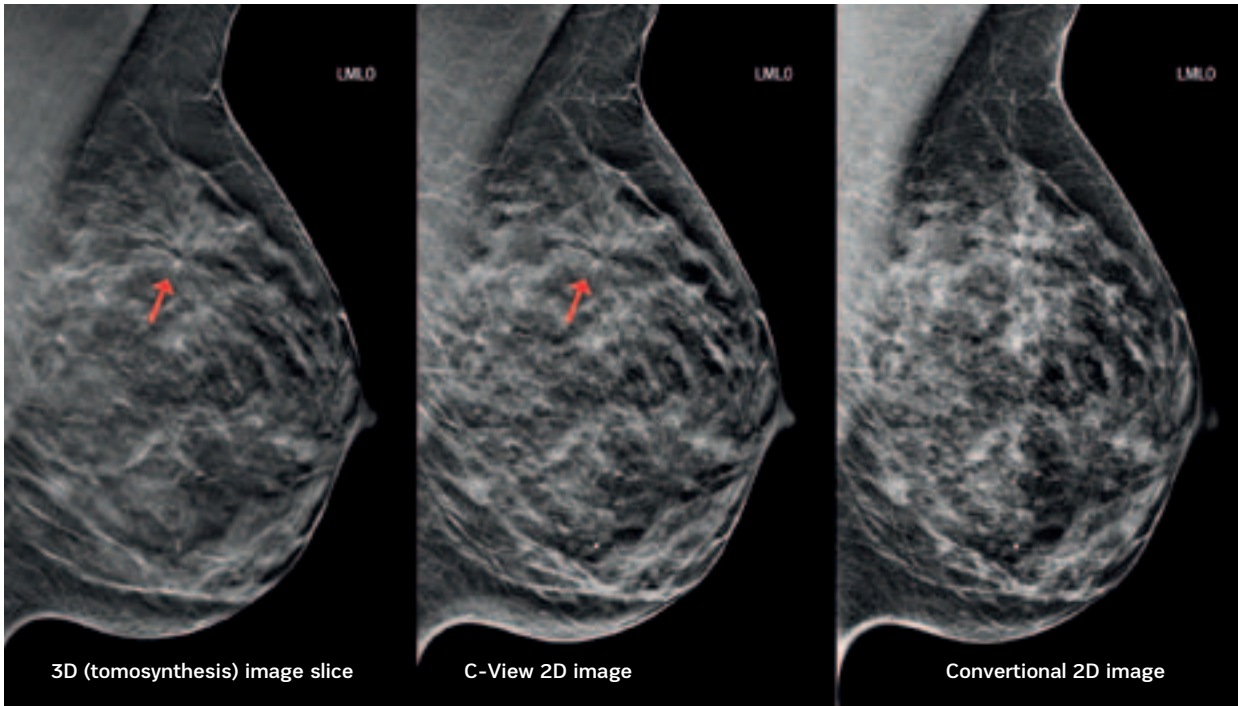
The Hologic Affirm™ breast biopsy guidance system, shown with the Eviva breast biopsy device on the Selenia® Dimensions® breast tomosynthesis system, may be used to perform tomosynthesis biopsies.

U.S. Study Results Consistent with European Findings

These positive results can also be seen in the U.S., with the first large-scale breast cancer screening trial reporting findings consistent with and supplementary to the Oslo Tomosynthesis Screening Trial and the Screening Tomosynthesis or Mammography (STORM) trial in Italy.

The study, "Implementation of Breast Tomosynthesis in a Routine Screening Practice: An Observational Study", compared breast cancer screening with

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Hologic's C-View software option provides a lower-dose solution by generating a 2D image from the tomosynthesis dataset, eliminating the need for a separate 2D exposure.

Hologic's breast tomosynthesis to conventional 2D mammography alone and showed a significant reduction in recall rates and a sizeable increase in cancer detection, particularly invasive cancer, across all breast tissue densities.

Published in the June issue of the American Journal of Roentgenology (AJR), the study was led by Stephen L. Rose, M.D., President and Founder of Rose Imaging, Medical Director of TOPS Comprehensive Breast Center, and Breast Radiologist affiliated with Memorial Hermann Health System in Houston. It evaluated recall, cancer detection and invasive cancer detection rates in a community-based breast imaging practice.

The Rose study found that the use of Hologic's breast tomosynthesis resulted in:

- A significant 38% drop in recall rates – from 8.7% to 5.5% (p < 0.001)
- A 35% increase in cancer detection rates - from 4.0 to 5.4 per 1,000 screenings (p = 0.18)
- A 53% increase in invasive cancer detection rates - from 2.8 to 4.3 per 1,000 screening examinations (p = 0.07)

The study population included 13,856 women who had received conventional 2D mammography screening exams and 9,499 women who received a Hologic tomosynthesis screening exam.

Ground-breaking Advances in Tomosynthesis

A lower-dose tomosynthesis option from Hologic, the C-View software option, has been commercially available in Europe and many countries in Latin America and Asia since 2011 and became available in the US in May 2013. Hologic's C-View software produces 2D images from 3D datasets. These generated 2D images may now be used in place of the conventional 2D exposure required by the US Food and Drug Administration (FDA) as part of a Hologic 3D mammography screening exam. The combination of Hologic's 3D and C-View 2D images results in a faster combined exam scan time (about 4 seconds) resulting in less

time under compression for greater patient comfort and reduced risk of motion. While Hologic 3D mammography is well under the MQSA and EUREF limits and deemed safe, the 3D and C-View exam offers lower patient radiation dose compared to combo mode. In fact, 3D mammography procedures with C-View offers a total patient dose similar to a 2D only exam while providing superior clinical performance for all breast types.

Another important advance in breast tomosynthesis is the ability to perform a breast biopsy using tomosynthesis guidance. The Hologic Affirm™ breast biopsy guidance system, combined with a Selenia® Dimensions® breast tomosynthesis system and the Eviva® breast biopsy device are being used in increasing numbers in Europe and the U.S. for this purpose. The Affirm tomosynthesis biopsy procedure allows the localisation and accurate targeting of regions of interest and is especially important for targeting lesions not found in 2D images or in other modalities. This new biopsy technique has numerous advantages over traditional stereotactic biopsy procedures, including faster lesion targeting, lower patient dose and reduced patient procedure time.

ⁱ Skaane P, Bandos A, Gullien R, et al. "Comparison of Digital Mammography Alone and Digital Mammography Plus Tomosynthesis in a Population-based Screening Program." Radiology. 2013 Apr; 267(1):47-56.

ⁱⁱ Ciatto S, Houssami N, Bernardi D, et al. "Integration of 3D Digital Mammography with Tomosynthesis for Population Breast-Cancer Screening (STORM): A Prospective Comparison Study" The Lancet Oncology, Epub 2013 Apr 25.

ⁱⁱⁱ Rose S, Tidwell A, Bujnock L, et al. "Implementation of Breast Tomosynthesis in a Routine Screening Practice: An Observational Study." American Journal of Roentgenology. 2013 Jun; 200(6): 1401-1408. Epub 2013 May 22.

^{iv} FDA PMA submission P080003/S001

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MEDICOLEGAL ISSUES IN RADIOLOGY

Clinical negligence claim costs continue to increase in many parts of the world. The growth in preventative screening measures involving radiologists and the increasing use of interventional radiology by providers of healthcare carries with it emerging risks for both clinicians and the provider hospitals. In this article, we look at what we can learn from studying claims against radiologists.



Author

Dr. Peter Mackenzie

Head of Membership Governance
Medical Protection Society
Edinburgh, UK

peter.mackenzie@mps.org.uk

Claims Experience and Trends

The general rise in litigation against doctors appears to be continuing apace. The Medical Protection Society (MPS) is a mutual indemnifier of doctors and healthcare professionals around the world, and has seen claims against private hospital consultants in Ireland increase by more than a third during 2012 (Medical Protection Society 2013). We are not alone: the NHS Litigation Authority, which manages claims on behalf of National Health Service hospitals in England, commented that it had seen a 30 percent increase in clinical negligence claims reported between 2010 and 2011, and an increase of 58 percent over the previous three years (NHS Litigation Authority 2012; Porter and Beckford 2011).

The picture for radiologists is starting to look remarkably, and unfortunately, similar to that for other groups of doctors. From a low base, MPS has seen a significant upward spike in the number of clinical negligence claims reported by UK radiologists since 2008. A recent review of medical malpractice suits against radiologists in the United States showed that nearly a third of radiologists have now had at least one claim in their career (Whang et al 2013). In the UK, this was mirrored by a study of twelve years' worth of claims against radiologists which found that nearly half of these claims related to delayed diagnosis or misdiagnosis of cancer, with nearly a third of these in relation to breast radiology (Halpin 2009).

With the increasing range and scope of interventional procedures, it is perhaps

unsurprising that we are starting to see claims arising from alleged negligence in this arena, relating to both technical performance and a 'failure to warn' of potential side effects. As interventional radiology moves apart from its diagnostic sibling towards recognition as a specialty in its own right, we are likely to see further differentiation between the claims brought against each group. The interventionalists may find that their claims become more akin to those of surgeons; improving availability and reduced cost of complex investigations such as CT and MRI may draw diagnostic radiologists to the fore in claims for misdiagnosis across a range of specialties.

MPS classifies a claim as an explicit demand for financial compensation due to alleged clinical negligence by a member, which puts MPS funds at risk. MPS does not require members to notify us of a claim (as insurers are required to under a claims-made policy) but in practice, the vast majority of members do notify us when they learn they are being sued.

MPS captures the reasons for recommending settlement to a member on each clinical negligence case.* For the purpose of this article we have reviewed a sample of claims brought against radiology members worldwide, where we have recommended settlement, since December 2007. This article highlights a few key points from this sample, as well as sharing our broader experiences of assisting over 280,000 doctors and dentists in over 40 countries around the world.

By far the most common reason for settlement on behalf of radiologists

was over concerns of misdiagnosis (nearly two-thirds). The underlying pathology in most of these cases involved delay in the diagnosis of cancers (approximately a third).

All of the failure to diagnose breast cancer cases were a result of incorrect interpretations of mammograms. It is interesting that Reynolds reports that surveys have indicated that the public attributes 100 percent sensitivity to mammography whereas its actual sensitivity is approximately 79 percent (Reynolds 2012). This reinforces our experience at MPS that managing patient expectations is a vital element in patient care. If patients have unrealistic expectations of the outcome of a test or procedure they are about to undergo, this can contribute to patient dissatisfaction if complications do develop.

Our experiences of the most common underlying pathologies in settled radiology claims relate to patients with cancers (approximately one third of settled radiology claims) and fractures (also approximately one third). The imaging modality most commonly involved in cases where the claim is settled is plain film (just under a third of settled radiology claims), followed by CT and MRI.

Case Report

A 43 year old woman presented with a palpable breast lump. At the surgeon's request a radiologist performed an ultrasound and a mammogram. The ultrasound showed a 1.2cm well-defined low echogenic soft tissue mass. The report suggested this to be

*We record the reasons for settling a claim as a "Root Cause of Settlement" (RCS) code. We currently have 38 different such codes. There may be more than one RCS code per case and there may be more than one member recorded as involved in each case. For this reason, all of the statistics that follow have been adjusted so that where more than one RCS code is stored on a claim the codes are weighted so that the total value of codes per claim add up to one.



a fibroadenoma. The rest of the breasts were clear, there was no specific abnormality and no further clinical investigations were arranged.

Unfortunately, the suggestion of the radiology report was taken as fact and no further treatment, investigation or follow up was undertaken. With hindsight the most appropriate action at the time of the events in 2006 would have been triple assessment, which would have included core biopsy of the lesion. There was a nine month delay in the diagnosis with an adverse effect on treatment and prognosis. The case settled for nearly ½ million euros on behalf of the surgeon.

Managing Risks and Improving Practice

At MPS over 14,000 cases were opened worldwide for doctors in 2011 alone (Medical Protection Society 2012). From our experiences in assisting our members with complaints and lawsuits (claims), we make the following observations. To help prevent claims from occurring, we suggest radiologists and the referring clinicians who requested the radiological intervention should focus on the following areas:

1. Patient Consent: Before conducting any invasive procedure you should ensure your patient has given valid consent including warning the patient of relevant rare but serious side-effects, as well as common side-effects. Specific risks should be mentioned and documented. You should assess the expectations patients have of the radiological investigation/treatment. If expectations are unrealistic, these should be addressed prior to the intervention itself. You should endeavour to check that your patient has understood the information and has an adequate time period to consider their treatment options, where possible.

2. Reporting: Ensure that the history given to the radiologist

has all relevant historical issues. Radiologists should ensure their reports accurately reflect the image they are commenting on; wherever possible including the degree of clinical confidence when suggesting any diagnostic possibilities (see case report on page X). If the

MPS experience highlights that issues around getting the diagnosis right are the most common reason for settling claims on behalf of radiologists, and in particular, delays in diagnosing cancers.

imaging reports indicate an abnormality, ensure you can reasonably exclude serious underlying pathology before suggesting benign diagnoses. Your report should be qualified depending on how confident you are in the abnormality you have identified and not be overly reassuring if significant clinical uncertainties remain. Between yourself and the referring physician/surgeon who requested the imaging intervention, you should ensure there have been adequate steps taken to rule out serious underlying pathology.

MPS experience highlights that issues around getting the diagnosis right are the most common reason for settling claims on behalf of radiologists, and in particular, delays in diagnosing cancers. This shows the importance of ensuring that if there is still reasonable doubt over whether cancer is present following an image study, further investigation/assessment is warranted. Share your diagnostic uncertainty with the referring clinician. As Halpin explains in his article, errors in reading imaging films may involve errors in perception (not seeing an abnormality that is present); or, we suggest, errors in interpretation (e.g.

wrongly suggesting a lesion is fluid filled when solid) (Halpin 2009). When providing possible clinical diagnoses in a radiology report, the radiologist must take care to provide the appropriate level of clinical confidence and not overstate this.

For interventional radiologists, patients increasingly want to be involved in deci-

sions about their care as part of a shared decision making process. Patients who have been involved in a discussion about the advantages and disadvantages as well as the risks (including collateral injury) involved will have fewer grounds for a successful claim should an adverse outcome occur, particularly if these have been documented.

Conclusion

Fortunately, only a small proportion of adverse outcomes due to medical error actually result in a complaint or claim. This is in large part due to a trusting relationship between the doctors and their patients, along with effective interpersonal skills, both before and after an adverse outcome. In the vast majority of clinical interactions in radiology, the radiologist's contact with the patient is at best transient and often there is none at all; the radiologist reports on an examination image in isolation and after the event, so it can be difficult to build a rapport with a patient. This can make radiologists more vulnerable to a claim as the patient does not see them as someone with whom they have developed a bond of trust and confidence – they are just a name on a report. ■

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The Evolution

Interview James Jay

of Imaging IT in Healthcare



How has imaging IT evolved in the past few years?

As imaging has grown in the last ten years, during the conversion from film to the digitization of images, it has really spawned very strong departmental solutions. Given the transformation from film to where we are today, workflow improvements have certainly been phenomenal.

But what it has really led to is the development of extremely specific workflows designed for individual departments both from how they read and diagnose images to the surrounding workflow. This development of departmental solutions has led to the creation of silos of images and imaging related data. There have been disparate attempts to try and get these images to other users but somewhat unsuccessfully.

Where do you see the big changes in imaging over the next ten years?

I think many of the next big changes will be driven by the expansion of the electronic medical record/electronic health record. For decades we have been using paper charts to manage patient data and now we are seeing this transition to a stronger use of electronic tools and digitization. This enables a few things. We will have a mechanism through which information can be shared more effectively between departments or at least the capabilities will exist and the infrastructure will be there for information to be shared. So we will see this transition towards enterprise-wide care and that is going to flow directly through to imaging.

The department specific, best-in-breed solutions I talked about before were fine within the silos created but as we see this transition to connecting information, connecting physicians and care providers throughout a hospital or even a community, we are seeing a much broader need to bring that information together, driven via the EHR. And for imaging in particular this presents some new challenges, because there are two real kinds of players in relation to solutions that are developed. Until today most of the focus has been on the diagnosticians of images within a department. There is a clear

need to break down the walls and stress the integration across those department diagnostic users of images and connecting them but then there is also the notion of a consumer of images. Imaging data is now more accessible and can be integrated with textual based data or information gathered within the EHR and there is the potential that that imaging related data could be very useful in how they care for the patient. Now you've got these two pools and many more departments that could be a potential user of imaging related tools and capabilities.

I think what we are going to see is a transition from departmental based imaging to what I would say is enterprise-wide imaging and it will serve both the consumer layer, in where it integrates tightly into the electronic health record and then still at the deep departmental level providing the right diagnostic tools for the department and connecting those departments with each other and with the consumers. The focus from a provider perspective will be how to connect the enterprise across different departments and how to connect that in with the EHR. So, it is much more than just putting an image in front of somebody, it is figuring out how we bring both imaging and non-imaging, discrete and raw text data into a format that is useable by both the diagnosticians and the consumers. This is clearly where our investment focus is at Agfa Healthcare. Our Imaging Clinical Information System suite of solutions (ICIS) is meeting some of these needs now, but we have many exciting innovations on tap to ensure we meet the needs of our customers going forward.

What will be different ten years from today, or put another way, how will imaging expand beyond traditional use today?

I have been in this business for 13 years now and watching the evolution that has happened over the last few years has been fascinating but we are just at the tip of the iceberg. We have just made that first transition from film to digital, now we'll make this transition from individual silos to an enterprise-

wide system, integrating this data. But what that is going to enable is a much broader use of the technology, so I think we are going to see physician providers that before might never have looked at imaging specific information, start to leverage imaging information and more so, I think because of the expanded use of it, you'll see a whole new wave of imaging.

Imaging 3.0 is a term used by many but basically there will be a wave of new algorithms, new ways that we can use images. This will include multimedia. At the present moment there are ultrasound devices that are starting to do MR, they are starting to do 4D, combining a 3D visual model with time phase studies. So some of the futuristic capabilities we've seen from an investment perspective, taking a model of the body and watching it progress over time, seeing the anatomical changes, changes related to disease state so I think the role that imaging and more importantly multimedia plays over the next ten years and even beyond will continue to marvel both providers and patients in what it can do to help drive improved care.

As healthcare institutions are moving towards integration and cross-departmental collaboration with enterprise health records, how does imaging fit in?

I believe the key here is to focus solutions as much on the consumers of images as the diagnosticians, it is about connecting departments and users. This presents a huge challenge because you have to figure out how to optimise, within these individual departments, and optimise the connection between them while at the same time providing the right workflow.

One of the biggest fears of all users of health IT is the overload or explosion of information, that they will be expected to look at all of it because it is there. Where as in the past you had a paper chart, you flipped through the last handful of visits, you look at key things and some notes and that's it. Now the expectation is higher because so much information is available. So the huge challenge is going to be getting the right information at the right time and driven not just by who I am but by what I am treating and what the episode is so the development of smart systems, leveraging the latest technology and connecting users at the right points will absolutely be one of the biggest challenges. As we enable integration across the enterprise with ICIS, we will invest to ensure we provide the right information to the right providers at the right time.

How is the market adapting to this new focus on integration, processes, productivity and added-value?

Well it is really a tale of two worlds. I think there is a large portion of the market that isn't adapting; they are fighting to hold on to their departmental solution. This is true of both smaller vendors and the big players in the market. Many larger vendors have built up sub-business units throughout their enterprise and they are not willing to break down those silos and connect them together even though they might have great departmental solutions across multiple areas. So there is a definite resistance to this transition. The other side of the coin is the vendors who are designing platforms from the ground up. And this isn't easy, it takes a big investment.

The other key issue is thinking about how can you serve the broader enterprise, both from the consumer and from the deep diagnostics. The number of departments is going to expand as imaging technology expands and we move beyond just the big producer radiology and start to pull in other departments. Here, integration capabilities will be absolutely key because there won't be one vendor that somehow produces everything that every customer needs. What is important is that you can offer the right breadth of solutions, both what you bring to the table and integration points for when someone has something best in breed but they are willing to play a role as part of an imaging enterprise imaging system.

At Agfa, we saw these changes coming and started the investment ahead of the curve. We took our knowledge of imaging and worked with key partners to build a new platform to enable optimization in the department and be the integration layer for the enterprise. Our ICIS suite of applications with the Agility engine powering it will be enterprise imaging solution of the future.

What role will the radiologist play in this enterprise imaging scenario?

It is interesting, the radiology department led the charge as the major producer of images, the ROI was clear and there was an explosion of imaging procedures being done. As a result they are now coming under a significant amount of pressure to further reduce costs and the number and appropriateness of procedures are coming under question. Another big challenge concerns radiation dose and how much should be given to patients.

Even though they are the main producer of diagnostic images, radiologists are still under an incredible amount of pressure and one of the big transitions that we are seeing how can they become a more active player in the broader care team. Traditionally working in their dark reading rooms, radiologists need to integrate more with the broader care team, to communicate potentially with the patients but certainly with the consumers of images and play a more active role in what the decisions are for the treatment of that patient.

You have painted a picture with many challenges for Imaging IT over the coming years. Where do you plan to focus your efforts?

We have decided to focus on a few key areas and I think we are already ahead of the curve with our investments along the enterprise imaging side of things. The first area is workflow. Enterprise imaging is all about workflow and how to connect the different departments and consumers from a workflow perspective. So we will be leveraging the latest technology. We are bringing a new engine to our solution that allows for not only manual management of activities of the department at the desktop level but also at the back-end service level and allows for introspection into other systems to bring data into the workflow that's presented for an individual user. This isn't coded but uses a workflow engine that can be adapted as needs change throughout the enterprise or within the department. So as activities and new things occur we can have elements built into the system very rapidly without multi-year development cycles to adapt to the market.

Another key area is on the communication side of things, we really want to make sure that we are focusing on connecting users, bringing information to and from different users. So that is clearly an investment area and it will go beyond the typical chat software and move to smart communication, getting the right information to the right people at the right time automatically.

Data is also of key importance in this transition to enterprise wide digitisation of health information. The challenge is how do we build our system so that we can not only enclose data that is within our system but also allow for introspection of other systems that contain data that is not structured, that is not from a data mining perspective just go make a query to a table and pull it out but unstructured yet important and relevant to our user and how they are using the system. So we're looking at a lot of things and leveraging partners that have done advanced work in this area to create solutions that will go to where we want to be over the next ten years. And this will be across the enterprise, again providing this information to the consumers and the diagnosticians.

And lastly our clinical tools and advanced algorithms. With our new platform we are building much more natively into the workflow of the desktop user, what is commonly used today from a 3D tools perspective but going beyond that mix of our own intellectual property and what we do from an advanced imaging perspective and also integration partners.

Interviewee:

James Jay
Agfa HealthCare
VP Imaging Informatics



RADIOLOGY CARES™ CAMPAIGN COMBATS ‘INVISIBILITY’ FACTOR



William T. Thorwarth Jr., M.D.

By encouraging meaningful physician engagement in the patient experience, the Radiological Society of North America (RSNA)'s new Radiology Cares™ campaign offers an effective solution to a common problem radiologists often face: invisibility.

“Even though we actively participate in patient care, we’re relatively invisible to the eye of the patient,” said William T. Thorwarth Jr., M.D., a radiologist/partner at Catawba Radiological Associates in Hickory, N.C., and RSNA Board Liaison for Publications and Communications. “We need to be seen as we actually are: active participants in patient care.”

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It is more critical than ever for radiologists to prioritise patient satisfaction and strengthen relationships with referring physicians, hospital administrators and insurers.

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At RSNA 2012, RSNA launched the “Radiology Cares: The Art of Patient-Centered Practice” campaign—an initiative linked with the annual meeting’s patient-centered theme—challenging radiologists to play a more visible and active role.

To aid that effort, RSNA has put together a library of online tools at RadiologyCares.org. Online resources include PowerPoint presentations that can be customised for specific audiences and patient-centered care literature from scientific journals, medical trade publications and mainstream consumer media. (see sidebar, p.29)

Central to the campaign is the Radiology Cares pledge encouraging radiologists and other imaging professionals to commit to more meaningful engagement in the patient experience, with the goal of helping patients make better informed decisions regarding their healthcare. Those taking the pledge at RadiologyCares.org receive campaign updates and new materials as they are developed.

“This campaign is an outgrowth of the efforts of the RSNA Public Information Committee (PIC), which has made great strides in increasing public awareness about modern imaging technologies,” said Mary C. Mahoney, M.D., director of breast imaging at the University of Cincinnati Medical Center’s Barrett Cancer Center and chair of RSNA’s Patient-centered Radiology Steering Committee. “However, research has shown that many consumers are unaware of the role radiologists play in their healthcare.”

In addition, various market forces—from the growth of teleradiology and non-radiologists performing imaging exams to changing reimbursement models and healthcare reform—present both a threat and an opportunity within the specialty. As a result, experts say it is more critical than ever

for radiologists to prioritise patient satisfaction and strengthen relationships with referring physicians, hospital administrators and insurers.

“The whole field will lose credibility and respect over time if all we do is read images and are not engaged in the process,” Dr. Mahoney said. “We need to bring more to the table or we’ll become less relevant to clinicians and patients.”

Self-Assessment Critical to Patient-Centered Practice

To become more patient-centered, Dr. Thorwarth suggests that radiology practices conduct self-assessments addressing the entire continuum of care. “We need to be continually asking, ‘What are we doing well? Where do we need to improve?’” he said. “Every radiologist knows the value of making the patient experience more positive, from convenient parking to a comfortable waiting area to easy and timely access to results.”

While the Radiology Cares campaign suggests increasing face-to-face interaction, Dr. Mahoney said talking to patients and sharing results is just one small piece of the overall patient experience. Specific initiatives undertaken to improve that experience—and keep up with the pace of change—will vary from practice to practice.

“There’s no such thing as being perfectly centered on the patient,” said Brent J. Wagner, M.D., president of West Reading Radiology Associates in Reading, Pa. “The fact that you are moving in the right direction is what really counts.”

When it comes to talking to patients, Dr. Wagner advises radiologists to look for opportunities for interaction and then strive to get the most out



Mary C. Mahoney, M.D.



Brent J. Wagner, M.D.



Jennifer L. Kemp, M.D.

www.radiologycares.org

of each exchange. “If we interact with just two or three patients a day, there’s no reason we can’t bring an emotional energy and investment to each of those interactions,” he said.

For example, Dr. Wagner said he takes the opportunity to meet with the parents of children who have had normal ultrasound exams, patients who’ve undergone biopsies and those asking to speak with a radiologist.

Educate Patients, Ask for Feedback

Empathy for patients manoeuvring through the healthcare system prompted Jennifer L. Kemp, M.D., and her colleagues to develop communication tools for their patients at Rose Medical Center in Denver, where she serves as chair of the Radiology Department. Those resources include patient education videos, a follow-up postcard and thank-you letters that solicit feedback.

“I wanted to include information on radiologist training in these pieces because I think even my friends and family don’t have a clue as to what I do,” said Dr. Kemp, also a private practice radiologist with Diversified

Radiology, a large Denver-based radiology group, and a member of RSNA’s Patient-Centered Radiology Steering Committee. “In our current healthcare environment, people need to know the value we offer.”



Radiology Cares

THE ART OF PATIENT-CENTERED PRACTICE

The postcard they give to patients directly addresses the invisibility issue and emphasises quality: “While you might not have seen us, we know you are here; we know your physicians and what they are looking for. We work hard to assure that you are having the best and safest test to address your symptoms.”

To improve accessibility to referring physicians, Dr. Kemp and colleagues list their direct phone number at the bottom of reports—a change she says has had a profound effect on both

physician relationships and her work life.

“Referring physicians call constantly now,” she said. “They want to talk about appropriate follow up or ask for a second opinion. As a result, I find my work much more rewarding; I feel more

connected with the patients. And it helps me to be a better radiologist.”

Despite the interruptions, Dr. Kemp said the volume of exams read by the six radiologists at her hospital is among the highest in her 50-radiologist group. “I’d rather be part of a team caring for patients than just someone turning out a report,” she said. “I strongly believe that I’m building a trust among referring physicians and patients because they know their exams are being read by a radiologist who cares.” ■

Web Extras

RadiologyCares.org features access to a wide variety of resources related to patient-centered care, including:

Education Toolkit: Your index to literature about the movement to become patient-centered from experts, scientific journals, medical trade publications and mainstream consumer media.

Presentation Toolkit: Customisable PowerPoint presentation decks to help you convey the importance of radiologists being patient-centered to your colleagues and communities.

RadiologyInfo.org: Direct your patients to RadiologyInfo.org for information on radiology procedures, treatments and therapies.

Contact: RadiologyCares@rsna.org with questions/comments about the campaign or to share your patient-centered activities.

Take the Pledge: “Take the Pledge” to communicate more effectively with your patients and other healthcare providers. The page posts a current tally of pledges to date.

Video Series: The page also features an entertaining, three-episode video series, “Radiology Cares: The Untold Future,” illustrating why you want to become more visible to your patients.

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PERSONALISED MEDICAL TECHNOLOGY



Author

Prof. Dr. med. Mathias Goyen

*HealthManagement Editorial Board
Member - Industry Adviser*

*Academic Research Director
GE Healthcare*

mathias.goyen@ge.com

Personalised medicine is all the rage and has become a dominant guiding theme of health research. The focus is on the development of drugs that allow customised treatment. Based on the genetic individuality of each person, patient groups with certain characteristics are identified to receive specific medication. For this, molecular genetic tests are developed to determine in advance whether or to what extent a drug works for an individual patient. Only then is the drug administered. The goal is to make the drug more effective and to reduce systemic side effects that continue to pose a significant challenge in drug treatment.

The principle of personalisation or customisation is not only interesting for pharmaceuticals but also for medical devices. Firstly, medical devices are required to implement personalised medicine as a direct combination of diagnostics and therapeutics ("theranostics"). Imaging without technology is unthinkable, for example. Also suitable, possibly mobile, in vitro diagnostics and medication administration technologies are needed. Secondly, the general objective of rendering medical treatment more effective and reducing side effects through patient-specific adaptation can also be applied to the design of medical components, equipment and systems.

Innovative medical devices are characterised by significant benefits for the patient and should be safe, gentle and efficient to use. The personalisation of diagnostics and treatment can therefore be regarded as a significant optimisation strategy that provides an increasingly important role for medical technology. Unlike pharmacology, however, the biological individuality of a person from the perspective of

medical technology is expressed less on the molecular genetic level and more on the anatomical, physiological and partly also on the cellular levels. There are a number of examples for this, such as autologous bio-implants, individualised methods and technologies for image-guided intervention and telemedical patient monitoring.

Background

The use of technical devices and aids is an indispensable part of modern medicine. In the areas of prevention, diagnostics, treatment, and rehabilitation, medical technology has a significant place in homes, private practices, and hospitals. The medical technology industry is a dynamic, innovative, and future-oriented industry that not only contributes to the creation of jobs and wealth but also makes significant contributions to better healthcare for the population and thus enjoys great social significance. Medical technology companies benefit from a diversified and internationally recognised research community in many countries.

Medical technology is a highly complex technological field characterised by an equally complex stakeholder structure and interaction. The environment is particularly marked by technological intensity, interdisciplinarity, regulation, and competition, as well as by demographic change. While this complexity results in numerous opportunities it can also produce factors that may hamper innovation. This may lead to negative economic effects for both related companies and for the respective country as an industrial location. In the worst case, however, patients receive no access to new technologies with medical benefits. Overall, only a

fraction of the continuously acquired medical technological knowledge ultimately trickles down to clinical care in the form of medical equipment, systems, and procedures.

Research and development are the basis for any medical technological innovation process. Conditions promoting innovation are thus of considerable importance for sustainable economic growth and employment in the medical technology industry. This is especially true for an export-oriented industry that must compete internationally primarily through technological leadership and quality.

Directions of Innovation

Five general directions of innovation can be identified:

Miniaturisation

Miniaturisation of technical components and systems, e.g., in instruments for minimally invasive surgery or portable sensor systems for monitoring vital parameters.

Biologisation

Integration of biological and technological components, e.g., in bio-implants such as cartilage and vascular implants.

Computerisation

Integration of information and communication technology into medical technological systems, e.g. computed tomography.

Personalisation

Adaptation of treatment to the individual case and medical history of a patient and hence the use of customised medical technological

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components, devices, and systems. This includes customised treatment by directly pairing diagnostics with treatment (theranostics), e.g., in theranostic implants.

Networking

Information technological integration of medical devices into existing data and communication networks, e.g., networking of various technical devices in the operating room.

The driving forces for these different directions are varied. At the core is a considerable medical need, which is mainly due to demographic developments that include a significant increase in the prevalence of chronic diseases (such as heart failure, diabetes, and neurodegenerative diseases) and a number of untreatable or inadequately treatable diseases. Innovative medical technology also possesses considerable potential to increase efficiency. Its combination with steadily growing technological capabilities and the increasing importance of the health industry and thus medical technology as a key catalysing element results in a significant technological and medical need-based innovation momentum.

The following technological areas have high potential for innovation with a continued high demand for research and development (R&D) and corresponding significant R&D risks:

- Diagnostic imaging procedures;
- Interventional techniques;
- In vitro technologies;
- Medical information systems and telemedicine;
- Prostheses and implants; and
- Therapy systems.

There are overlaps between the individual areas of technology so clear distinctions are not always possible. Furthermore, additional sub-topics which exhibit considerable

innovation activity, can be identified in the respective areas of technology.

There are interdisciplinary cross-cutting issues that are important in view of all the aforementioned areas of technology and that significantly drive the research and development of innovative medical technology (e.g. patient safety in medical technology, usability and user acceptance of medical devices, human-technology interaction and human-machine interfaces, cross-sectoral medical technology, education and training in medical technology, standardisation in medical technology and medical technology in the context of society and ethics.

Clinical Research

Clinical research using new medical devices and systems has changed in recent years and has been influenced by new regulatory frameworks.

In direct comparison with established clinical research in the pharmaceutical sector, innovations in medical technology are usually aimed at smaller groups of patients. Therefore, the identification of a suitable clinical partner for research and establishment of an innovation is often challenging for both the manufacturer and the research institution. A suitable clinical research partner must exhibit an appropriate skills profile in combination with an appropriate patient population and a sufficient number of cases.

Another difficulty arises from the requirements for proof of clinical benefit. In Germany for example, suitable methods and specifications for proving clinical benefit are missing on the part of the Federal Joint Committee (GBA) and the Institute for Quality and Efficiency in Health Care with respect to biologised medical technologies and/or medical technologies with combined active ingredients, the complexity

of requirements for clinical research was also significantly increased by the introduction of Advanced Therapy Medicinal Products (ATMP). In addition, there are problems of demarcation between medical devices and pharmaceuticals. In this increasingly complex regulatory environment, the interactions between manufacturers, research institutes, hospitals, university centres, and government agencies appear to be poorly developed and in need of improvement.

Again, compared to the pharmaceutical sector, medical-clinical research has been established less systematically, both on the part of hospitals and on the part of manufacturers, such that there appears to be room for overall expertise development. A further complication on the part of hospitals is the still relatively low level of interest of doctors in medical technological clinical research. One major reason for this is the higher impact factors of journals in the fields of medicine, molecular biology, and pharmacology. Added to this is an a priori lack of interest of researching physicians in medical technology, which is not least due to medical degree programmes focusing on biomedicine instead of technology.

Medical Device Approval

Medical devices may be marketed or used in Europe if they have a CE mark. This mark may be affixed if the essential requirements' are met and the mandatory conformity assessment has been carried out. The conditions of approval of medical devices are subject to constant changes. The EU Commission is currently working on the reorganisation of the standards, including more binding and detailed requirements for notified bodies and stricter monitoring of conformity assessments. The changes will also be aimed at better coordination of market observation and vigilance activities of national authorities at the



EU level. In addition, the requirements for clinical trials are to be adapted to the pharmaceutical law.

Overall, it should be noted that the approval process for medical devices is adapting to the regulations in the pharmaceutical sector and is therefore becoming more complex, time-consuming and costly. This results in an increasing burden and a higher risk, in particular for manufacturers of medical devices. Especially for small and medium-size enterprises (SMEs), this is increasingly difficult to deal with due to their limited financial capacity. It is also becoming increasingly difficult for research facilities, which supply companies with R&D results in the wake of the technology transfer, to integrate into the research process aspects geared toward the future approval of medical devices. A particular difficulty arises in the respective delineations of medical devices and pharmaceuticals in terms of the applicable approval guidelines and responsibilities.

On the other hand, internationally harmonised standards that adequately reflect the increasing technological complexity are of great importance for the future economic success of medical devices. They can be an important basis for quality assurance, safety, compatibility, and technical communication for medical device manufacturers, as well as support the global acceptance of components, devices, and systems. They thus serve to protect investments in hardware and software and are an important tool for maintaining competitiveness and sustainability.

Reimbursement

Reimbursement by statutory health insurance (SHI) is crucial for successful marketing of a medical device. In general, reimbursement of medical technological innovations by SHI is fraught with hurdles and often proves

to be a bottleneck in the medical technology innovation process.

Usually, the path of a medical technological innovation to reimbursability is long and fraught with risk. Unlike many pharmaceutical products, medical devices often cannot be fully protected by patents. This means that imitations that can be supplied much cheaper, without the high added cost for the reimbursement approval, quickly enter the market. This increases the economic risk, especially for SMEs. This is aggravated by a general lack of information with regard to detailed questions on reimbursement, which can also have a negative effect, again

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internationally harmonised standards that adequately reflect the increasing technological complexity are of great importance for the future economic success of medical devices

particularly affecting SMEs. Research institutions usually do not deal with reimbursement issues and the corresponding framework conditions are practically irrelevant in the phase of applied research.

From a business perspective, these hurdles result in an increase in the overall risk of medical device development and can lead to ideas or concepts being abandoned. The potential innovation will then never reach the patient. To make matters worse, the industry is not allowed to request inclusion of an innovation into the reimbursement catalogue and no direct involvement of the industry in the decision-making process is currently projected, as only patient initiatives and doctors can request inclusion.

From a methodological perspective, the proof of the clinical benefit of

innovations has proven to be a major problem. In particular, demonstrating the long-term benefit of medical devices by means of the gold standard of the RCT (Randomised Controlled Trial) is problematic and costly. There are no suitable methods and requirements for RCTs of medical devices, especially with regard to the definition of appropriate clinical endpoints. Small businesses often have no adequate expertise to carve out the benefits of innovation in this way. The financial expenditure for this is usually not feasible and is associated with considerable risk. In addition, RCTs cannot answer all the important ques-

tions of those that bear the costs, as the impact on healthcare services and thus the impact on reimbursement cannot be represented.

Conclusion

Medical device technology for personalised medicine is an exciting and promising area for development, which has immense potential for innovation. However, the costs and risks of investment in clinical research within current regulatory frameworks and the difficult path to medical device approval and reimbursement may hamper development. There is room for improvement given that research in medical device technology currently lags behind pharmaceutical research. ■

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CLOUD COMPUTING FOR HEALTH INFORMATION MANAGEMENT

Cloud computing refers to an on-demand self-service network infrastructure that enables the user to access computing resources at anytime from anywhere. Many managers and experts believe that it could have great benefits for health information management. However, cloud computing should be rigorously evaluated before its widespread adoption. In this paper, we discuss the concept, its current state in health-care, and evaluate cloud computing opportunities and challenges for health information management.

Authors

Mu-Hsing KUO
Andre KUSHNIRUK
Elizabeth BORYCKI

School of Health Information Science
University of Victoria
Canada

akuo@uvic.ca
andrek@uvic.ca
emb@uvic.ca

Introduction

Healthcare is the most data intensive industry in the world. Modern health information systems (e.g. Electronic Health Records (EHR), Computerized Physician Order Entry (CPOE), Picture Archiving and Communications System (PACS)) used in healthcare settings (clinics, hospitals and labs) can generate an unimaginably vast amount of digital health data (so called Big Data). For example, in the 1970s, an X-ray computed tomography (CT) scan of a patient's body generated 100 tomographic images (slices) with a data volume of 50MB (5122 pixels/slice). Now, a CT scan can generate 24,000 slices (20GB) for one patient. It is predicted that the future CT can generate 1TB of slices for a patient which if printed equals to 800,000 phone books. G. Hughes estimates the growth in global healthcare data of between 1.2 and 2.4 Exabytes (10¹⁸ bytes) per year. This number represents roughly 10 times the data contained in every US academic

research library combined. This data is also largely disparate and unstructured making health information management and extracting useful information all the more problematic.

In 2007, talk of a new on-demand self-service network infrastructure (i.e. cloud computing) became prominent. Many managers and experts believe that it can improve health information management and EHR adoption. However, a healthcare organisation should carefully evaluate the benefits and risks before moving its services into the cloud. The objective of this paper is to discuss the concept of cloud computing, its current state in health-care, and evaluate the opportunities and challenges of adopting this model for health information management.

What is Cloud Computing?

The U.S. National Institute of Standards and Technology (NIST) defined Cloud computing as follows:

Cloud Computing is a model

for enabling convenient, on-demand network access to a shared pool of configurable computing resources that can be rapidly provisioned and released with minimal management effort or service-provider interaction.

Cloud computing is a new model of delivering computing resources, not a new technology. Similar, more limited, applications are not new to many of us because we have been using this kind of service, such as Microsoft Hotmail or Google Docs, for years. However, when compared with conventional computing, this model provides three new advantages: massive computing resources available on demand, elimination of an up-front commitment by users and payment for use on a short-term basis as needed.

According to the NIST, cloud computing includes three fundamental service models (see Figure 1):

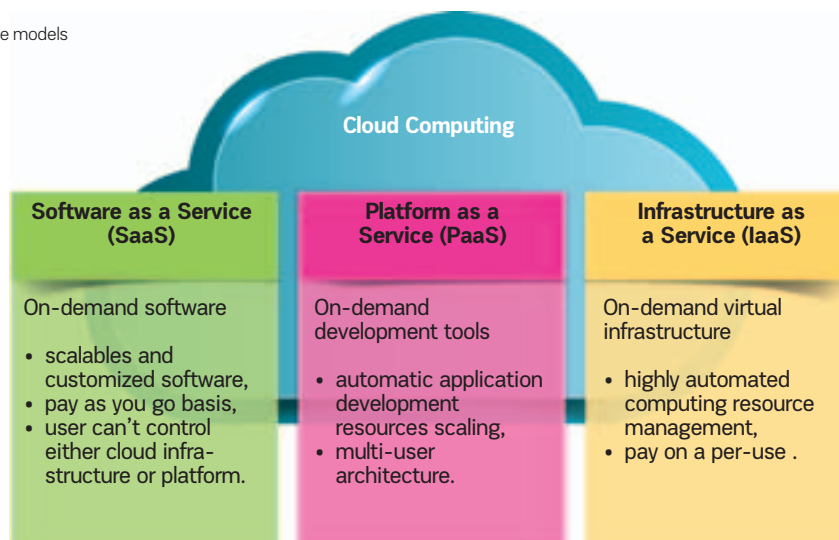
(1) Software as a Service (SaaS)

The applications (e.g. EHR) are hosted by a cloud service provider and made available to users over the Internet. The user does not control either the underlying infrastructure or platform. Examples of this service are Yahoo Mail, Microsoft Exchange Online, Google Docs and Oracle CRM On-Demand.

(2) Platform as a Service (PaaS)

The application development resources (hardware, operation system, programming languages, toolkits) are hosted in the Cloud. The PaaS user can use the services to develop higher level applications and

Figure 1.
The cloud computing service models



host them on the platform to serve its end-users. For example, Google AppEngine, Salesforce.com and Facebook provide user PaaS services.

(3) Infrastructure as a Service (IaaS)

The capability provided to the IaaS user is storage, networks, and other fundamental computing resources where the user can run and execute an operation system (OS), applications, or any software that they choose. However, the user is not able to manage or control the cloud infrastructure but has control over OS, applications, storage, and selected networking components (e.g. firewalls). Users typically pay on a per-use basis. Now, Amazon AWS (EC2, S3, SQS), Microsoft Azure and Rackspace Cloud offer such kind of services.

To deploy cloud computing, there are four commonly adopted infrastructures (see Figure 2):

(1) Public cloud

A cloud service provider makes computing resources, such as applications (e.g. EHRs) and storage, available to the general public over the Internet. Public cloud services may be free or offered on a pay-per-usage model. For example, Amazon Elastic Compute Cloud (EC2), Google AppEngine, Windows Azure Services Platform, Salesforce Chatter and BM's Blue Cloud provide cloud services to the customers who registered to their Clouds.

(2) Private cloud

The cloud infrastructure is dedicated to a particular organisation and not shared with other organisations. In other words, the proprietary network or the data centre supplies hosted services to a certain group of people. For example, Microsoft Azure enables customers to build the foundation for a private cloud infrastructure using Windows Server and System Center family of products with the Dynamic Data Center Toolkit.

(3) Community cloud

The cloud infrastructure is shared

by two or more organisations with common concerns, such as mission, security requirements, policy, and compliance considerations. The infrastructure management might be done by themselves or a third party.

(4) Hybrid cloud

The cloud infrastructure is usually composed of several sub-infrastructures (private, public, or community clouds). In this infrastructure, an organisation provides and manages some computing resources within its own data centre and has others provided externally.

The Cloud Opportunities

The main advantage of cloud computing is its low cost. All kinds of IT measures, such as in hardware, software, human resources, and management, are cheaper when implemented on a large scale. Cloud users, such as smaller hospitals and medical practices, can easily get a cost-effective and on-premise IT solution through cloud computing without the need to purchase or evaluate hardware or software, or to hire internal IT staff to maintain and service in-house infrastructure for mission-critical applications such as EHRs. The result is that the user can focus on critical tasks without having to incur additional costs with regard to IT staffing and training.

Most cloud providers replicate user data in multiple locations (data centres). This increases data redundancy and independence from system failure and

provides a level of disaster recovery. In addition, a cloud provider always has the ability to dynamically reallocate security resources for filtering, traffic shaping, or encryption in order to increase support for defensive measures (e.g. against distributed denial-of-service attacks). The ability to dynamically scale defensive resources on demand has obvious advantages for resilience. Furthermore, cloud computing has advantages for so-called green computing - the more efficient use of computer resources to help the environment and promote energy saving. Usage of ready-made computing resources tailored to an organisation's needs certainly helps it to reduce electricity expenses to cool off computers and other components. This reduces the emission of dangerous materials into the environment.

Many previous studies reported the successful application of cloud computing in healthcare service and research. Among them, Koufi et al. reported a cloud-based prototype Emergency Medical Systems (EMS) that enabled physicians easy and fast access to patient data from anywhere and anytime. Hsieh and Hsu developed a cloud based 12-lead Electrocardiography (ECG) telemedicine service that enables healthcare collaboration between onsite clinicians and off-site senior cardiologists. The service provided patients convenient, efficient and inexpensive ECG telemedicine, especially for patients in rural areas. Kudtarkar et al used Amazon's EC2

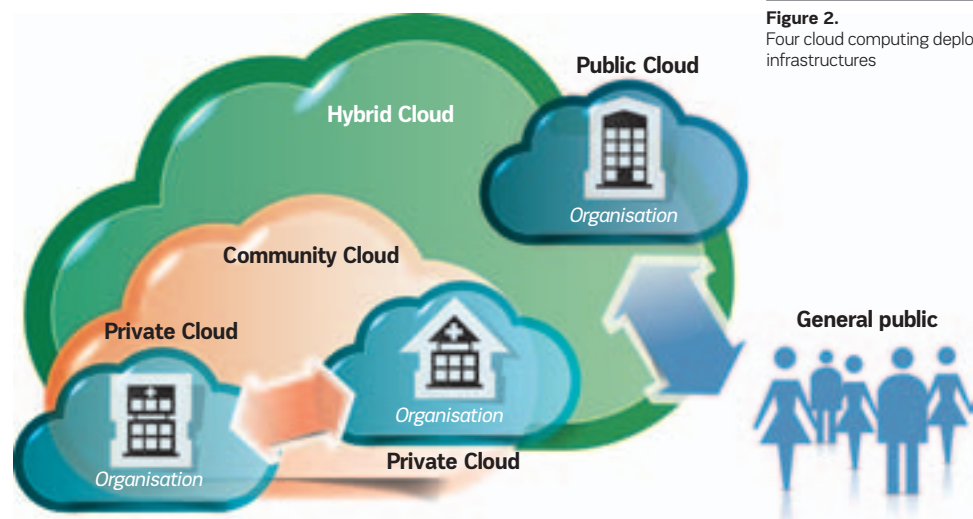


Figure 2. Four cloud computing deployment infrastructures



to compute orthologous relationships for 245,323 genome-to-genome comparisons. The computation took just over 200 hours and cost US \$8,000, approximately 40% less than expected. The Laboratory for Personalized Medicine of the Center for Biomedical Informatics at Harvard Medical School used high throughput sequencing and cloud computing to develop genetic testing models to develop innovative whole genome analysis testing models in record time.

The use of cloud computing for health information management is reported worldwide. For example, the American Occupational Network and HyGen Pharmaceuticals are improving patient care by digitizing health records and updating its clinical processes using cloud-based software. Using the service, billing to individuals and insurance companies is faster and more accurate and has reduced medical transcription costs by 80%. Mount Sinai Hospital in Toronto and the Canadian government are working together to build a community cloud that will give 14 area hospitals shared access to a fetal ultrasound application and data storage for patient information. In Europe, a consortium launched an advanced project called Trustworthy Clouds (TClouds) expected to be able to deliver a new level of secure, private and resilient computing and storage that is

prescription to delivery to intake to reimbursement, will be stored in the cloud and will be accessible to patients, doctors, and pharmacy staff. In Australia, Telstra and the Royal Australian College of General Practitioners announced the signing of an agreement to work together to build an e-Health cloud for more than 17,000 GPs using a single sign-on to access healthcare applications, diagnostic tools and other clinical and administrative software. In Asia, the Department of Health, Taiwan is preparing to build a platform for storing citizen's personal health information and medical records in a cloud.

The Cloud Challenges

Despite the many benefits associated with using cloud computing, there are also a number of issues that will need to be addressed before its widespread adoption. According to Kuo (2011), there are many potential issues that may arise for a cloud project (see Table 1, pg.38). Some critical issues are as follows:

Security and Privacy Issues

It is believed that data security and privacy are the major concerns to the adoption of cloud computing in health IT. Cloud computing is a shared resource and multi tenancy environment for capacity, storage, and network. The security

that users' sensitive data may be vulnerable to other malicious cloud users.

Data Jurisdiction Issues

In a cloud, physical storages could be widely distributed across multiple jurisdictions. Different jurisdictions may have different laws regarding data security, privacy, usage, and intellectual property. For example, the US Health Insurance Portability and Accountability Act (HIPAA) restricts organisations from disclosing patient's health data to non-affiliated third parties. The Canadian Personal Information Protection and Electronic Documents Act (PIPEDA) limits the powers of organisations to collect, use, or disclose personal (health) information. The European Union Data Protection Directive regulates the processing of personal data within the Union. Those regulations could make a great impact on a cloud project. Furthermore, the Uniting and Strengthening America by Providing Appropriate Tools Required to Intercept and Obstruct Terrorism (PATRIOT) Act gives the US government the right to demand data if it declares conditions as being an emergency or necessary to homeland security. The problem is that many main cloud providers such as Amazon, Microsoft and Google are US based.

Data Interoperability Issues

Cloud interoperability refers to the ability of two or more Clouds to share the same data, applications, services and platforms. There are many issues associated with interoperable data such as functional, data instance and metadata issues. Unfortunately, most cloud providers provide very little capability on data, application and service interoperability. This could be an issue for a cloud user migrating from one provider to another, or moving back to an in-house IT environment (i.e. data lock in).

Loss of Data Governance Issues

In some cases, a service level agreement (SLA) may not offer a

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cloud computing is a new model of computing that promises to provide more flexible, less expensive and more efficient IT services to the users

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cost-efficient, simple and scalable. To demonstrate TClouds, scientists prototyped a patient-centered home healthcare service to remotely monitor, diagnose, and assist patients outside of a hospital setting. The complete lifecycle, from

and privacy risks of this type of environment include network breaks, separation failure, public management interface, poor encryption key management, and privilege abuse. Also, the centralised storage and shared tenancy of physical space means

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commitment to allow a user to audit in-cloud data. The loss of data governance is the main concern when the user's confidential data and mission-critical applications move to a cloud computing paradigm where providers cannot guarantee the effectiveness of their security.

Conclusion

Healthcare managers and professionals are looking for strategies to increase health information management efficiency, flexibility and cost-effectiveness. Cloud computing is a new model of computing that promises to provide

more flexible, less expensive and more efficient IT services to the users. It is believed that this model can be a great opportunity for healthcare settings to improve information management. Nevertheless, when an organisation considers moving its service into the cloud, it needs to examine and address the new model's challenges, assess its capabilities to achieve the goal and identify strategies designed to implement it. We recommend that a potential user uses a SWOT (Strengths, Weaknesses, Opportunities and Threats) analysis to evaluate the feasibility of the cloud-based approach. If the answer is yes, then it can apply a strategic planning model to determine its direction, strategy and resource allocation to implement a cloud project. ■

References available upon request,
lee@healthmanagement.org

Table 1.
Potential Cloud Computing Issues

Category	Issues
Management	Lack of trust by users Organisational inertia Loss of governance Uncertain provider compliance
Technology	Data interoperability issues Resource exhaustion issues Unpredictable performance Data transfer bottlenecks Bugs in large scale distributed cloud systems
Security	Separation failure Public management interface issues Poor encryption key management Privilege abuse
Legal	Data jurisdiction issues Privacy issues

Researchers Develop System that Uses a Big Data Approach to Personalised Healthcare

University of Notre Dame researchers have developed a computer-aided method that uses electronic medical records to offer the promise of rapid advances toward personalised healthcare, disease management and wellness.

Notre Dame computer science associate professor Nitesh V. Chawla and his doctoral student, Darcy A. Davis, developed the system called Collaborative Assessment and Recommendation Engine (CARE) for personalised disease risk predictions and well-being.

"The potential for 'personalising' healthcare from a disease prevention, disease management and therapeutics perspective is increasing," Chawla said. "Health care informatics and advanced analytics, or data science, may contribute to this shift from population-based evidence for healthcare decision-making to the fusion of population- and individual-based evidence in healthcare. The key question is how to leverage health population data to drive patient-centered healthcare."

At the heart of CARE is a novel collaborative filtering method that captures patient similarities and produces personalised disease risk profiles for individuals. Using what is known as Big Data science, the system generates predictions focused on other diseases that are based on Big Data

from similar patients.

"In its most conservative use, the CARE rankings can provide reminders for conditions that busy doctors may have overlooked," Chawla said. "Utilised to its full potential, CARE can be used to explore broader disease histories, suggest previously unconsidered concerns and facilitate discussion about early testing and prevention, as well as wellness strategies that may ring a more familiar bell with an individual and are essentially doable.

Chawla points out that the core premise of CARE is centred on patient empowerment and patient engagement.

"Imagine visiting your physician's office with a list of concerns and questions," he said. "What if you could walk out of the office with a personalised assessment of your health, along with a list of personalised and important lifestyle change recommendations based on your predicted health risks? What if your physician was afforded a limitless experience to gauge the impact of your disease toward developing other diseases in the future?"

Chawla believes the timing is right for CARE given changes in healthcare, reimbursement, reform, meaningful use of electronic health care data and a mandate for patient-centered outcomes.



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LEADING AND COMMUNICATING IN THE HEALTHCARE INDUSTRY:

UNDERSTANDING THE TOOLS FOR SUCCESS

The healthcare industry is constantly advancing. In the past decade, the healthcare business has grown into a societal superpower that provides critical medical services for citizens and serves as an economic engine for communities. At the same time, the healthcare industry is complex and multifaceted. Due to the complexity of this system, changes in healthcare have left leaders weary and doubtful of their ability to provide their organisations with a sense of direction.

Author

Rebekah Page Rogers

East Carolina University,
Greenville NC
USA

rogersr@ecu.edu

Consequently, healthcare workers must be strong leaders in order to operate efficiently and effectively. The need for leadership is evident because today's healthcare leaders face more challenges due to the increasing complexities that arise in the healthcare industry. Twenty-five years ago, hospitals operated primarily to provide patient care and hospital managers did not have to deal with multiple business lines. The more complex the system, the less efficient its operation, is an adage that remains true for today's healthcare system. Researchers are realising that employee commitment and loyalty is at an all time low. Additionally, today's healthcare executives, physicians, and patients are generally "dissatisfied with the management in the industry" (Dye & Gasman, 2006; p.7). Leaders are an essential component of successful healthcare initiatives. Patients turn to physicians, nurses, and hospital administrators for guidance and direction. Souba wrote that "health care today needs...a new kind of leadership... strong leaders and a new cultural context in which they can lead" (Souba, 2011; p.1).

Leadership is about discernment; having the ability to discern and navigate the messy and tangled web of doing what you believe is right. Understanding the importance of effective leadership styles and communication practices, regardless of profession, can help further develop the capabilities and skills of leaders.

Learning about effective leadership practices is also important in order for individuals to grow professionally, personally, and developmentally in every aspect

of their lives. Leadership is a working component of every job. Individuals who exemplify superb communication and leadership skills will often find success in their organisation at a faster pace than individuals whose communication and leadership skills are not natural. Let's look first at the differences between management and leadership.

Understanding. The Differences Between Leadership and Management

When exploring leadership communication styles, it is first important to carefully differentiate between the terms leading and managing.

Curtis, Vries, and Sheerin (2011) suggested that managers administer, maintain, control, have a short-term view, and initiate. Kotterman (2006) contended that managers tend to "plan and budget," as well as focus on narrow objectives in order to "maintain order, stabilize work, and organize resources." Additionally, managers often seek to "control and problem solve" as they "produce standards, consistency, predictability, and order." Kotter (1995) in Kotterman "sees management as dealing with procedures, practices, and complexity and leadership as dealing with change" (Kotterman, 2006; p.16) On the other hand, Curtis, Vries, and Sheerin (2011) recognised that leaders innovate, develop, inspire, challenge the status quo, and focus on a long-term vision.

This article will shed light on the leadership communication styles of

healthcare professionals. By doing so, it will identify different leadership styles and how they are correlated to selected healthcare professions. Specifically, the terms transformational leadership, transactional leadership, and servant leadership will be explained, as well as how they can be applied directly to the healthcare professions of physician, nurse, and hospital administrator.

Types Of Leadership

Transformational Leadership

James McGregor Burns' book 'Leadership' from 1978 is considered to be the seminal text in the field of leadership studies. Burns defined transformational leadership as the following: "wherein one or more persons engage with others in such a way that leaders and followers raise one another to higher levels of motivation and morality." Avolio and Yammarino stated that transformational leadership consists of the following key factors: "One, charisma, instills faith, pride, and respect for the leader. The second, individualized consideration, involves treating all staff as respected individuals with unique needs. The third, intellectual stimulation encourages staff to think in new ways." (Spears, 1998; p.173) According to Burke and Cooper (2006), these types of leaders closely identify with their subordinates and with the purpose of the organisation. Motivation also plays a significant role in transformational leaders, especially since it leads to success in their position

and an optimistic outlook on the organisation. Additionally, transformational leaders are not set in their ways. They are open to change and often appreciate a creative approach to problem solving and teamwork.

Transactional Leadership

Transactional leadership occurs when one person takes the initiative in making contact with others for the purpose of an exchange of valued things. The trade could be financial, social, or emotional in nature: an exchanging of a product for money; the trading of ideas among businessmen; or even providing a listening ear to those in need. Burke and Cooper stated that, “transactional leadership has two components: the transactional leader exchanges rewards contingent upon the exhibition of desired behaviors and results, and intervenes when performance falls short” (Burke and Cooper, 2006 p.13). Burke and Cooper also noted that transactional leaders are different from transformational leaders in a fundamental sense– they work within the boundaries and the existing standards of the organisation. Few risks are taken and the focus of the work is on efficiency, control, stability, and predictability.

While transformational and transactional leaders are different, it is important to know that they are also complementary in nature to one another and are not complete polar opposites. Both styles may be associated with the achievement of desired performance objectives. It is clear that leaders can function using both styles cooperatively and can many times enhance each other on the job.

Servant Leadership

The term ‘servant leadership’ was coined by Robert Greenleaf in his influential 1970 essay, “The Servant as Leader.” Greenleaf believes these types of leaders focus on the service aspect first with a natural tendency to help others. Once service is achieved, then the individual aims to lead as a result. Greenleaf wrote that the best way to determine if a person is a servant

leader is to identify whether or not they grow as a person, become healthier, and more likely to develop an autonomous and selfless desire to serve others. Servant-leadership is a long-term, transformational approach to life and work.

Spears (1998) believes that the following characteristics are central to the development of servant-leaders: listening, empathy, healing, awareness, persuasion, conceptualisation, foresight, stewardship, commitment to the growth of people, and building community. Spears believes that these ten characteristics “serve to communicate the power and promise that this concept offers to those who are open to its invitation and challenge” (Spears, 1998; p.6).

self-reported themselves as being ‘coordinators’, ‘team workers’ and ‘company workers’. From this claim, it is obvious there is incongruence with how physicians function and how physicians view themselves. Physicians were trained to function under their own self control and partnership is a difficult quality to learn after many years of function in one particular way.

The healthcare organisation and the physician typically have different missions. Bujak noted that the most important action to create an effective healthcare organisation is to link the goals of individual physician practitioners with the actual needs of the healthcare setting. If physicians can see a direct connection with their success and the goals of

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the key to successful leadership in any hospital department is to ensure that the employees know and understand the vision and mission of the organisation and that they are able to work together on ensuring that vision and mission is communicated and implemented

The Physician as Leader

“Achievement, taking risks, stamina, intense focus, quick decision making, and personal accountability” are common traits among physicians (Bujak, 2008; p.4). Bujak suggested that physicians are motivated by their own personal goals rather than universal organisational missions. Souba wrote that “today’s medicine structure incents physicians and other leaders to focus on knowing, having (titles, power) and doing (out-performing) such that personal gain is often valued above service to others.” Physicians often tend to themselves and typically do not think of themselves as a team player. However, Palmer, Cragg, Wall, and Wilkie (2008) found that physicians do not regard themselves as being “me” people but rather, physicians’

the organisation, then a positive working relationship can occur. If this action is not the result, then the vision will fail and self-interest will take over.

With this said, healthcare organisations that seek to collaborate with physicians form their relationships based on negotiations. Bujak confirmed that one can enter negotiations by adopting one of the four postures: competition, accommodation, compromise, and collaboration. In many cases, physicians tend to operate under a transactional leadership style, which “correlates with the observation that their team preferences are for accepting and working within the system as it is (mostly transactional), rather than for making changes and shaping the future (more transformational)” (Palmer et al., 2008). Physicians are



expected to have all the answers, bear the ultimate legal responsibility, and never make mistakes. Therefore, it is not surprising that physicians have a strong need to be able to predict, and thus control, their environment.

The Nurse as Leader

According to Dirschel, "leadership in nursing is a goal, vision, and expectation for all professional nurses in any form of practice" (Dirschel & Klainberg, 2010; p.4). Ultimately, all forms of nursing leadership must result in excellent patient care and patient out-

safe, and supportive organizational culture and work climate." (Souba, 2011). Others believe that nurses embody a servant-like approach to leadership. It is important to note, though, that it is impossible to generalise any profession as a certain type of leadership style; each individual is unique in their own way. Regardless of which type of style these professionals embody, it is more important for them to educate themselves about the different styles of leadership and engage in their own self-reflection of how they can grow and better themselves as a leader.

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Physicians were trained to function under their own self control and partnership is a difficult quality to learn after many years of function in one particular way

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comes. The nurse leader possesses specialised leadership responsibilities and expectations that go beyond that of the generalised nursing responsibilities.

Dirschel believed that "the nurse leader is the visionary and the catalyst who brings power to nursing practice and creates an environment in which innovation and ideas about nursing practice can flourish". Further, the nurse leader should be a role model in seeking to create the best environment for nurses to succeed and must also communicate the need for a caring environment where patients are the priority. Dirschel subsequently recognised that the "the nursing leader also energizes the dynamics of the other personnel groupings and the vision, mission, structure, and resources of the broader institution." It is by these actions of the nurse leader that the professionals from different health-care specialties can better work together in concert with the overarching mission and vision of the institution as a whole.

Some scholars suggest that nurses embody a transformational style of leadership and often seek to create "a warm,

The Hospital Administrator as Leader

One might expect for a hospital administrator to be extremely power driven, status driven, and the like. The leadership development of a hospital administrator must start early in life. Typically, a person must climb up the ladder of success in an effort to become a hospital administrator. This career path could ultimately be embedded in the servant leadership ideology: the desire to give back or contribute in an effort to help others as a hospital administrator. Longest identified several key roles of the department manager which are:

- "Achieve internal agreement on the department's purposes and priorities;
- Build support for the department's priorities among internal and external stakeholders;
- Strike a workable balance between the economic, professional, and social interests of all those involved in the department; and
- Negotiate effective relationships inside the organization that houses

the department and, perhaps, with other organizations." (Longest, 1997)

Longest believed that the key to successful leadership in any hospital department is to ensure that the employees know and understand the vision and mission of the organization and that they are able to work together on ensuring that vision and mission is communicated and implemented. Hospital administrators must demonstrate effective communication to all people across all professions. These leaders must communicate in a way that inspires and motivates others to succeed in their job so the organisation as a whole benefits. Most importantly, hospital administrators must know themselves. It is by their own self-conceptualisation that they are better able to understand their own individual strengths and weaknesses. If successful at this task, administrators will be able to play to their strengths when working to increase effectiveness organisation-wide.

Conclusion

So what is the best type of leadership style for each of these professions? The answer is not that simple. The beauty is always in the beholder. Each individual carries their own unique "toolbox." Each individual has their own unique personality, experiences, beliefs, and attitudes. Leadership is not a "one size fits all" equation. The bottom-line is that individuals need to make themselves aware of the different styles of leadership and become more conscious and reflective of their own communicative and leadership practices. For it is with education and reflection that individuals are able to create positive change. ■

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References available upon request,
lee@healthmanagement.org

CARDIAC IMAGING

THE TRANSITION TO NON-INVASIVE APPROACH

Cardiovascular diseases account for 31 percent of deaths from all diseases globally and for almost 48 percent of non-communicable disease deaths. It is estimated that by 2030, there are likely to be around 23.6 million cardiovascular deaths.

It is considered to be extremely difficult to assess the burden/prevalence of cardiovascular diseases globally. An estimated 80 million adults suffer from cardiovascular disease in the US, which has the highest prevalence of cardiovascular diseases, closely followed by Germany and India. It is interesting to note that more than 60 percent of the coronary heart disease occurs in developing countries. Early diagnosis is as big a burden as treatment of these complex conditions, globally.

The volumes of diagnostic imaging procedures have increased a lot in the last decade, especially for cardiology applications. In the US, cardiovascular imaging accounts for nearly one-third of diagnostic imaging services and most of them include echocardiography and nuclear imaging. With improving reimbursement trends for most procedures, the diagnostic imaging market has been steadily increasing over the years.

Cardiology imaging diagnostic techniques can be broadly classified into **interventional cardiac imaging** - cardiac catheterisation or coronary angiogram and **non-invasive imaging** - cardiac magnetic resonance imaging (Cardiac MRI), cardiac computed tomography (Cardiac CT), electrocardiography, position emission tomography (PET)/ thallium or myocardial perfusion scan etc.

Interventional Cardiology

Catheterisation labs (Cath Labs) are

considered to be at the heart of interventional cardiology procedures. It is estimated that in countries like the US, at least 35-40 percent of hospitals have these facilities, equipped with interventional cardiology equipment.

C-Arms have been a part of cardiac imaging sector for a long time now. The growth in minimally invasive surgical procedures and the increasing burden of the cardiovascular disease population have supported higher adoption of these products.

In developed countries that account for the higher volume of cardiac imaging procedures conducted globally, non-invasive cardiac imaging procedures have increased adoption, thus impacting the diagnostic interventional procedure volumes negatively. The shift to non-invasive imaging is largely driven by the inconvenience caused by invasive imaging such as hospitalisation, insertion of catheters and a higher economic burden. Hence the newer installations of C-arms have declined steadily and installations are largely replacement-driven in this segment.

The market for C-arms was estimated to be worth around \$7.3 billion globally in 2011.

Cardiac CT

This is one of the biggest revenue generators in the cardiac imaging segment globally.

The main reason for higher preference for CT is that its image acquisition optimisation strategies allow clinicians to assess blood vessels with the same efficiency as coronary angiography, non-invasively and almost instantaneously. The most widely known application of cardiac CT is estimation of coronary artery score, which is the main

indicator of coronary artery disease.

Advances in cardiac CT have brought its use in clinical routine to unprecedented levels.

The 64 slice CT is considered the gold standard in the world of CT. The last 10 years has witnessed escalating numbers of slices to dose reduction in CT scanners. These have greatly acted as drivers to upgrade or replace existing CT scanners. Cardiac CT is one of the fastest growing segments in the CT market, in terms of volume of the procedures conducted.

Three-dimensional Cardiac CT is a revolutionary new method for evaluating heart conditions non-invasively. Prior to the development of this technology, only an invasive and expensive cardiac catheterisation could show this level of detail.

With the introduction of these 3D models, there has been a decline in invasive imaging procedure volumes. This technology has enabled long-term diagnosis and treatment without disrupting the whole body's functionality.

The market for Cardiac CT was estimated to be worth around \$2.5 billion globally in 2011.

Cardiac MRI

Cardiac MRI is one of the growing segments in cardiac imaging. This market is driven by technological advancements. It offers high contrast resolution in any oblique plane along the cardiac axes with temporal and spatial resolutions. The technique allows estimation of left and right ventricular size and function. The technique is considered to be a standard in evaluating myocardial infarction and cardiac ischaemia. The main reasoning for sparse usage of MRI than other modalities such as



Author

Sowmya Rajagopalan

Program Manager, Healthcare,
Frost & Sullivan

CT is the long scan time needed to get the same or similar clinical information. In emergency situations, where results are needed quickly, the use of MRI does not serve this purpose.

Clinical studies have proved that 1.5T is effective in detecting myocardial function and perfusion. The 3T system offers better quality machine hardware, pulse sequence design and image reconstruction. Thus, these technologically advanced systems are fuelling the replacement of the low strength MR systems.

The market for Cardiac MRI was estimated to be worth around \$1 billion globally in 2011.

Conclusion

The cardiac imaging market has been slowly transitioning from invasive to non-invasive techniques over the years. The choice of modality used is largely influenced by the cardiologist/radiologist's preference, and, interestingly, the pattern of preference for a particular modality varies across regions. The cardiologists' community has moved away from conducting multiple diagnostic imaging tests to diagnose a particular condition. Recent research indicates that preference is for using fewer types of scans.

The lack of guidelines linking

technique to be used for a given ailment has been a drawback in the cardiac imaging space. Hence with sufficient clinical data, one of these (Cardiac CT and Cardiac MRI) technologies could become the gold standard of imaging in the future. ■

'Envelope' Reduces Cardiac Implant Infections

Vanderbilt Heart and Vascular Institute is the first in the United States to use a new fully resorbable "envelope" that encloses implantable cardiac devices, such as pacemakers and internal cardioverter defibrillators (ICDs), and helps prevent surgical site infections.

The AIGISRx R Antibacterial Envelope from TYRX, Inc. received US Food and Drug Administration clearance on May 20.

The envelope is a fully bioresorbable, antibacterial pouch-like mesh envelope that holds cardiac rhythm devices securely in place when implanted in the body. The envelope contains the antimicrobial agents rifampin and minocycline, which are released locally into the tissue, to help reduce infections associated with cardiac implantable electronic devices (CIEDs).

"Over the last several decades, the number of cardiac device infections has risen significantly and out of proportion to the number of cardiac device implantations. With more than 500,000 CIED implantations annually in the US, it is critical that the infections associated with these types of procedures are avoided to help save lives and money," according to cardiologist Christopher Ellis, M.D., assistant professor of Medicine, who used the resorbable envelope for the first time on 7 August 2013.

The CIED is placed below the collar bone in a pocket the physician creates underneath the skin. Once the device is placed inside the mesh envelope and implanted into the pocket, the antimicrobials are released and the envelope

dissolves entirely within about nine weeks.

"The infection protection is still there. It's nice to know when I go back into the pocket several years from now, I won't even know it (AIGISRx) was ever in there," Ellis said.

Research by Ellis and colleagues at Vanderbilt has shown that the AIGISRx Antibacterial Envelope significantly reduced device infections by nearly 90 percent in high-risk patients, compared to patients who did not receive the AIGISRx.

The study, co-authored by Matthew Kolek, M.D., William Dresen, M.D., and Quinn Wells, M.D., was reported in the March issue of PACE.

Nationally, patients with surgical site infections following CIED procedures spend additional time in the hospital and undergo repeat surgical procedures to treat the infection.

These patients experience significant increases in morbidity and mortality, with one-year mortality rates of greater than 25 percent, and three-year mortality of up to 50 percent, depending on device type.

Cardiac device generators typically need to be replaced every five to eight years due to wear and tear, and each time the procedure is performed, the rate of infection increases exponentially, Ellis said.

In addition, there are some patients who are at greater risk of infection due to diabetes, kidney disease and prior device infection.

For more information, please visit: www.mc.vanderbilt.edu

THE ROLE OF INTERVENTIONAL RADIOLOGY IN LUNG TUMOURS

Lung cancer remains the number one cause of cancer-related deaths in women and men, and the incidence of lung tumours continues to increase. There are a variety of treatments for lung cancer, including surgical resection, radiation therapy, systemic chemotherapy, percutaneous thermal ablation or a combination of these treatment modalities in a multidisciplinary approach. However, only patients with limited disease are candidates for surgery, and some lung cancers (such as small cell lung cancer) are usually inoperable because metastases are present at the time of diagnosis. Another limitation of surgery as a treatment option is that a large number of patients present with either too limited a pulmonary function for surgery or are unable to tolerate an operation because of other comorbidities. In these patients, radiotherapy remains an option but only in a palliative setting. Radiotherapy offers overall survivals that are definitively worse than surgery at 5 years, ranging from 6 percent to 27 percent (Crocetti and Lencioni 2010).

How does it work?

Radiofrequency Ablation (RFA)

RF destroys tumour tissue by heating cells over 60°C through ionic agitation to obtain an irreversible protein denaturation. During RF ablation, an alternating high-frequency current is produced by a generator and oscillates in a closed-loop circuit between one RF-needle and one or more grounding pads placed on the patient's skin.

Microwave Ablation (MWA)

MWA represents a new wave of technology, and has some advantages for lung tumour ablation when compared to RFA, such as less severe heat loss and faster and higher heating of tissue. A further benefit of MWA is that microwaves are not limited by tissue boiling, lower thermal conductivity of lung tissue or by increased impedance of charred tissues. MW for clinical uses generally operates with electromagnetic waves at frequencies ranging from 0,915 and 2,450 MHz, resulting in dielectric heating to cytotoxic levels through rapid rotation of water molecules.

A New Treatment Option

In the last 10 years, the efficacy of image-guided thermoablation for treatment of lung cancer and lung metastases has been demonstrated, especially in patients with limited disease (Crocetti and Lencioni 2010). Of the modalities available, radiofrequency (RF) and microwave (MW) ablation are considered to be useful in the therapy of lung tumours (De Baere et al. 2006; Rose 2008), producing irreversible tumour destruction through application of thermal energy (see box). Planning,

monitoring, targeting and controlling are mostly performed by computed tomography (CT).

The Advantages

Ablation is minimally invasive, requiring only local anaesthesia. A further benefit is that it can be used to treat patients with a history of lung surgery or pulmonary disease with subsequent limited pulmonary function, as there is no lower limit of pulmonary function if treatment is performed by percutaneous thermal ablation. The major

limitation factor for thermal ablation as a treatment is the size of the tumour – the maximum tumour diameter should not exceed 3.5-4cm (Rose 2008; Lencioni et al. 2008). However, this may change, as preliminary results suggest that RF ablation combined with radiation therapy improves local disease control and survival in patients with larger lung cancer (Dupuy et al. 2006).

RF ablation plays an important role in treating pulmonary metastatic disease, being performed in patients with metastases from colorectal and lung cancers, renal cell carcinoma,



Authors

Prof. Philippe L. Pereira (photo)

Director, Clinic of Radiology, Minimally Invasive Therapies and Nuclear Medicine

Dr. Ernst Hohenstein

Senior Physician, Clinic of Radiology, Minimally Invasive Therapies and Nuclear Medicine

Prof. Jens Rassweiler

Director, Clinic of Urology

Prof. Uwe Martens

Director, Clinic for Oncology, Haematology and Palliative Medicine

SLK-Kliniken GmbH Academic Hospital, Ruprecht-Karls-University Heidelberg Heilbronn, Germany



melanoma, hepatocellular carcinoma and sarcoma. The maximum number of lung metastases that may be ablated is currently not defined, but the majority of hospitals prefer to treat patients with 5 or fewer pulmonary metastases.

Ablation as a Complementary Therapy

By combining RF ablation and surgery to treat a larger number of lesions in bilateral metastatic tumours, the chance of curing the disease whilst limiting invasiveness may be improved (Sano et al. 2008). Additionally, combining percutaneous thermal ablation with systemic chemotherapy may offer improved survival in patients with non-resectable colorectal pulmonary metastases (Chua et al. 2010). Due to the excellent tolerance of percutaneous thermal therapy, it is difficult to identify reasons against providing this treatment in the majority of cases, with the exception of severe untreatable coagulopathies.

Performing Thermal Ablation of Lung Tumours

Pre-treatment evaluation should include a chest CT in order to assess the size and location of the tumour, as well as its vascularity. CT is also used for placement of the ablation device and monitoring of the treatment. Staging for patients presenting with metastatic disease should also include abdominal and pelvic CT. When treating patients with primary lung cancer, positron emission tomography (PET)-CT should be performed to search for metastases. The superiority of PET-CT over CT has been demonstrated for the staging of primary lung cancers.

The thermal ablation procedure can be performed under general anaesthesia or local anaesthesia with conscious sedation, depending on the preference of the patient and interventional radiologist. The procedure involves inserting a needle-like device (RF-applicator

or MW-antenna) through the skin directly into the target tissue under CT guidance. CT is the most accurate imaging modality for percutaneous thermal ablation procedures to treat lung tumours. While the procedure is underway, vital signs are monitored and pain medication may be administered on demand. During thermal ablation, changes in the CT imaging (so-called ground-glass opacities or GGO) allow optimal monitoring of the extent of the tumour's destruction. The extent of these GGO surrounding the treated tumour on immediate post-ablation CT imaging has been shown to predict the effectiveness of thermal ablation (Lencioni et al. 2008). The patient may be discharged one day after the ablation procedure is completed. A chest X-ray is recommended four hours after the procedure to exclude any asymptomatic complications. CT imaging has been shown to be the most widely used imaging modality for post-procedural assessment. It is important to note that in the 1- to 6-month follow-up CT scans, the GGO increases in size from the baseline and then remains stable or decreases in size.

Promising Outcomes

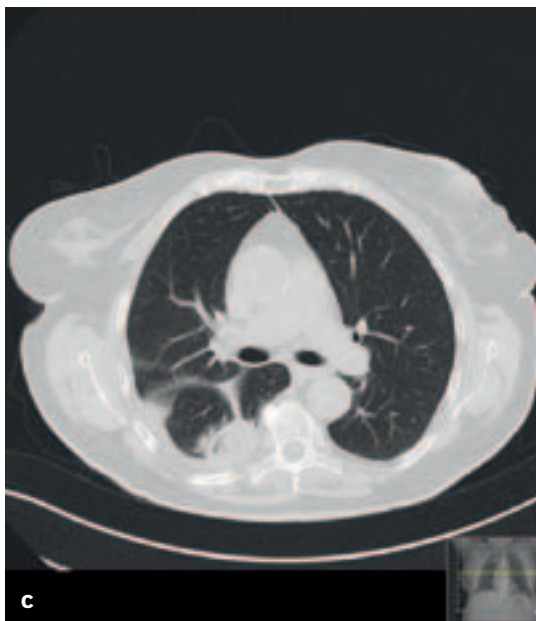
Clinical results of thermal ablation in lung tumours have mainly been achieved in nonsurgical candidates. A systematic review of 17 studies reports the high efficacy of RF ablation for lung tumours (Zhu et al. 2008). On average, the rate of complete tumour destruction was 90 percent for a median tumour size of 2.2 cm, with a median survival ranging between 8.6 to 33 months and an overall 3-year survival rate up to 46 percent in patients with non-resectable tumours (Shu Yan Huo et al. 2009).

The advantages of percutaneous thermal ablation over surgery include the possibility to obtain complete tumour eradication, even in patients with limited pulmonary reserve, as

well as to repeat the treatment or to treat several tumours with a low risk of complications. In a retrospective study of 39 patients with non-resectable pulmonary metastases from renal cell carcinoma, curative ablation was performed in patients with 6 or fewer lung lesions measuring less than 6cm, whereas palliative ablation was performed in patients with more than 6 metastases or with tumours larger than 6cm. There were significant differences in the overall survival rates between both groups, with 5-year survival of 100 percent and 52 percent respectively, thus suggesting that patients with up to 6 metastases may benefit from thermal ablation (Shu Yan Huo et al. 2009) when complete ablation is obtained. Among the different pulmonary tumours, tumour type did not significantly influence local tumour control.

Not only is a combination of RF ablation and conventional radiotherapy possible, it has already shown a better local control and survival than radiotherapy alone. Grieco et al. reported a 3-year survival of 57 percent after combined therapy in 41 patients with lung cancer (Grieco et al. 2006). Yan et al. achieved an overall median survival of 33 months in 55 patients with colorectal pulmonary metastases (Yan et al. 2006).

Percutaneous lung thermal ablation is considered to be a very safe procedure, with a low procedure-related morbidity rate compared with surgery, ranging between 15 percent and 56 percent, and a very low mortality rate from 0 to 5.6 percent (Zhu et al. 2008). Some patients will experience mild to moderate periprocedural pain, which can usually be managed with standard pain medication or non-steroidal anti-inflammatory drugs. Pneumothorax and pleural effusions are the most common complications, occurring in nearly 40 percent of patients. The frequency of chest tube placement is about 5 percent. Delayed



Images:
Case of a 78-year-old patient with urothelial carcinoma and a solitary lung metastasis

a) Lung metastasis 16mm in size, adjacent to the pleura visceralis in the right lung.

b) Exact positioning of a microwave antenna (Microsulis Medical, Angiodynamics) in the centre of the tumour.

c) Controlling after 4 weeks. Note the ground glass opacity around the metastasis.

d) Follow-up imaging after 6 months. Shrinkage of the ablative area with a scar after successful tumour ablation.

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pneumothorax at follow-up has also been reported. Percutaneous radiofrequency ablations have even been performed in single-lung patients particularly when ineligible to surgery or stereotactic ablative radiation therapy.

Conclusion

It is clear that thermal ablation of lung tumours with radiofrequency or microwave has many advantages – it

is feasible and safe, incurs lower costs (Alexander et al. 2013), allows quicker recovery, offers reduced morbidity and mortality, and therefore represents an alternative to surgery in selected patients. As lung thermal ablation is a new treatment, we recommend not only that patients should be informed about the benefits and risks of the procedure, but that they be treated in a centre with experience in thermal ablation which discusses indications

in a multidisciplinary tumour board. Recent and ongoing developments in percutaneous ablation, as well as in minimally-invasive surgical techniques and radiation therapies, have opened up exciting new possibilities to provide optimal therapeutic care to patients with lung tumours, and further evidence and debate may allow us to reach definitive guidelines in the near future. ■

HEALTHCARE-ASSOCIATED BACTERIAL INFECTION

COMMON SOURCES OF SEVERE SEPSIS AMONG PEOPLE WITH HIV



Authors

Jared A. Greenberg, MD (photo)

Section of Pulmonary and
Critical Care Medicine
Department of Medicine
University of Chicago
Chicago, US

jared.greenberg@uchospitals.edu

John P. Kress, MD

Section of Pulmonary and
Critical Care Medicine
Department of Medicine
University of Chicago
Chicago, US

In this Article, We Discuss the Emergence of Healthcare-Associated Bacterial Infections As a Major Source of Severe Sepsis Among People With HIV, and Recommend Treatment and Prevention Guidelines to be Heeded by Clinicians and Healthcare Practitioners.

The long-term prognosis for people with HIV has improved since the advent of highly active antiretroviral therapy (HAART). Over this time period, in-hospital survival for critically ill people with HIV has improved as well. Surprisingly though, studies have not consistently found HAART use prior to critical illness to be a predictor of intensive care unit (ICU) survival (Huang et al. 2006). Instead, ICU outcomes have improved mainly because admission patterns for people with HIV have changed with the development of HAART (Casalino et al. 2004; Pacheco et al. 2009). Patients are now less likely to be admitted for respiratory failure from *Pneumocystis jirovecii* pneumonia (PCP), which carries a particularly high mortality. They are more frequently admitted for sepsis and exacerbations of chronic illnesses, which have better short-term prognoses (Akgun et al. 2011). Continuing to improve outcomes for members of this population necessitates a better understanding of why people with HIV are now requiring ICU care.

Shifting Admission Patterns

Recent studies have found that sepsis is a more common reason for ICU admission for people with

HIV than it was at the beginning of the AIDS epidemic. At San Francisco General Hospital, California, US, the frequency of ICU admissions for sepsis increased from 10% to 20% from 1981 to 2003 (Powell et al. 2009). At Bichat- Claude Bernard Hospital, Paris, France, admissions for sepsis increased from 16% to 22% with the advent of HAART (Casalino et al. 2004). In addition to there being a greater number of admissions for sepsis, multiple studies have identified sepsis as a predictor of short and longterm mortality after ICU admission. Patients with HIV who are admitted to an ICU with sepsis have a two to four times greater risk of death than people with HIV who are admitted to an ICU for a different reason. (Mrus et al. 2005; Croda et al. 2009; Japiassu et al. 2010; Chiang et al. 2011). In one cohort, severe sepsis was the dominant predictor of 28-day and six-month mortality (Japiassu et al. 2010).

In the current HAART era, people with HIV are spending more time in healthcare settings because they are living longer, and they have an increased risk of developing a number of chronic diseases. Specifically, people with HIV have a greater incidence of chronic lung diseases than those without HIV (Crothers et al. 2011). Co-infection with Hepatitis B or C increases the risk of chronic liver disease (Verucchi et al. 2004), and HAART-related medication toxicities may lead to metabolic complications and cardiovascular disease (Friis-Moller et al. 2003). Chronic kidney disease is also more common

in people with HIV because of HIV-associated nephropathy and comorbid conditions such as diabetes and hypertension (Wyatt, 2012). Finally, a number of malignancies have greater prevalence in the HIV population (Pinzone et al. 2012).

Healthcare-Associated Infection

As people with HIV are receiving more healthcare during their lifetimes, the spectrum of bacterial organisms causing severe sepsis is likely changing. The term “healthcare -associated infection” has been coined to reflect an infection that may be acquired in the community, but has a similar antibiotic-resistant pattern to an infection contracted in the hospital. Patients are at greater risk for antibiotic-resistant bacterial infections if they were hospitalised in the previous 90 days, reside in nursing homes or long-term-care facilities, or receive chronic haemodialysis or intravenous therapy (Kollef et al. 2008). In a study by a public hospital in Atlanta, Georgia, focusing only on ICU admissions for sepsis, there were 194 acute infections among the 125 patients studied (Greenberg et al. 2012). The majority of these infections were nosocomial or healthcare-associated. Respiratory-tract infections accounted for 53% of acute infections and bloodstream infections accounted for 24% of acute infections. Japiassu and colleagues described a similar population of patients with HIV and sepsis in their ICU; the majority of infections were nosocomial and most



were pulmonary or primary bacteraemia (Japiassu 2010).

Prevention and Management of Infection

Current recommendations for the prevention and management of healthcare-associated infections do not account for a patient's HIV status (Kollef et al. 2008). The general approach for any patient begins with identifying whether he or she is at risk for a healthcare-associated infection. The strategy then involves early initiation of broad-spectrum antibiotics that are effective against methicillin-resistant *Staphylococcus aureus* (MRSA) and multidrug-resistant gram-negative bacteria. Empirical therapy for antibiotic-resistant Enterococci or fungal organisms depends on the clinical situation. The purpose of this approach is to ensure adequate antimicrobial coverage against the infecting organism, as mortality increases with delay in appropriate antibiotic administration. As the patient's clinical status evolves in response to therapy and culture results become available, the spectrum of antibiotic coverage should be narrowed to reduce the chance of breeding new antibiotic-resistant organisms (Kollef et al. 2008).

For critically ill people with HIV and severe infections, it is unknown whether initiating HAART in the ICU as adjunctive therapy is of benefit. There are no randomised control trials or consensus guidelines on the use of HAART in the ICU. In fact, clinicians are often hesitant to start a patient on HAART for a number of reasons. Firstly, many antiretrovirals can only be administered enterally and gastrointestinal absorption may be variable in ICU patients. Secondly, drug toxicities may be more likely to occur as antiretrovirals interact with common ICU medications,

and resulting organ failure may lead to reduced medication clearance. Finally, there is some concern that beginning HAART may lead to immune reconstitution inflammatory syndrome, which could worsen the patient's condition in the short term (Huang et al. 2006).

There are no recommendations for preventing nosocomial or healthcare-associated infections specifically for patients with HIV. Prior to the development of HAART, it was well documented that people with HIV were at greater risk of developing nosocomial infections than people without HIV (Goetz et al. 1994; Stroud et al. 1997).

.....

There are no recommendations for preventing nosocomial or healthcare-associated infections specifically for patients with HIV

.....

Thus, clinicians caring for patients with HIV should incorporate measures to reduce the risk for nosocomial infections, such as evidence-based practice bundles and timely removal of unnecessary intravenous catheters and indwelling lines (Berenholtz et al. 2011; Weber et al. 2011). It is also true that immune dysfunction increases the risk of developing bacterial infections. In a large, multicentre epidemiological study, lower CD4 cell counts were associated with increased risk of developing a serious bacterial non-AIDS infection (Sogaard et al. 2013). Utilising resources to improve HAART compliance in patients with advanced AIDS who are frequently hospitalised would likely have a large impact on reducing the number of ICU admissions for nosocomial or

healthcare-associated infections.

Conclusion

In conclusion, the landscape of ICU admissions for people with HIV has changed with the advent of HAART. Sepsis is a more frequent diagnosis for admission to the ICU and is a risk factor for short- and long-term mortality. Patients are now presenting to ICUs with greater amounts of prior healthcare exposure and thus may be more likely to develop severe sepsis from antibiotic-resistant bacterial organisms than from opportunistic infections. Further studies describing

the burden of healthcare-associated infections in different HIV communities are warranted. In addition, further investigation into ways to prevent and treat healthcare-associated infections, specifically for patients with HIV, would provide clinicians with more guidance. In the meantime, we recommend that clinicians follow the same guidelines for the treatment of healthcare-associated infections regardless of a patient's HIV status. We also suggest that clinicians focus on improving compliance with HAART in patients who frequently require healthcare, and that invasive procedures and indwelling catheter use is limited so as to reduce the risk of healthcare-associated infections and improve outcomes for critically ill patients with HIV in general. ■



HOSPITALAR – THE LEADING MEDICAL FAIR IN SOUTH AMERICA

Each May Brazil hosts the Hospitalar Fair and Forum, which is the leading medical fair in South America. HealthManagement spoke to its founder and President, Dr. Waleska Santor.



Interviewee

Dr. Waleska Santor

President of HOSPITALAR

Interviewed by

Claire Pillar

Managing Editor

Hospitalar has grown from its beginnings in 1992 to become the leading medical fair in South America. What are your ambitions for Hospitalar for the future?

It is our intention to constantly reiterate our importance to the industry by providing updated information, responses to health requirements, proposals for solutions to problems and suggestions for making better decisions. At the same time, our objective is to introduce new equipment, devices and services, so as to obtain better results in patient care.

We want to continue making a difference for the healthcare industry and to work to maintain the influence we have achieved. That is why we

technology and health. We were also treated to new ideas at the forum which, year after year, is becoming diversified, hosting new partners interested in introducing quality content about healthcare management. The new departures in 2013 at the forum were the CISS – the International Congress on Healthcare Services and the 1st Einstein Nursing Meeting, which was held in partnership with one of Brazil's top hospitals.

The numbers of international visitors to Hospitalar is growing year after year, and in 2013 we hosted professionals from 74 countries who came in search of new ideas that the Brazilian and global industry has to offer, given that we had 615 foreign exhibitors (out

and **Pia Olsen Dyhr**, Danish Minister of Trade and Investment. Hospitalar is increasingly becoming the meeting point for countries, and we intend to encourage this healthy exchange.

What other events are held in parallel with Hospitalar and what were the highlights in 2013?

In terms of exhibitions there were three parallel events to Hospitalar: "Diagnóstica" – the International Fair for Products, Equipment and Services Clinical Analysis and Pathology; "Hospfarma" – the International Fair for Hospital Pharmacy and Drugstore Products; and Digital Health – the International Fair and Forum for Telemedicine, Tele-Healthcare and



are permanently alert to trends and changes. Our intention is also to foster telemedicine, tele-assistance and e-Health, which in my opinion represent the shortest and most economical route for disseminating knowledge and providing distance support for basic patient services.

What were the highlights of Hospitalar 2013?

Worthy of mention is Digital Health, which had a 15% larger exhibition area and offered several professional enhancement events involving

of a total of 1,250) from 36 countries.

Proof of the international importance of the event is the fact that four European ministers of health came to the fair to find out more about the Brazilian healthcare market and to build closer relationships and partnerships. They were: **Daniel Bahr**, Germany's Minister of Health; **Kenneth Clarke**, Minister without Portfolio, in the government of Prime Minister David Cameron, for promoting British business overseas; **Arlene Foster**, Northern Ireland Minister of Enterprise, Trade and Investment;

Information Technology for Healthcare, which held its second edition in 2013 and has become a huge success with exhibitors and visitors.

In the case of the Forum, HOSPITALAR holds about 60 events simultaneously with the Fair. In 2013, worthy of note was the CISS – the International Congress on Healthcare Services, which replaced the Latin American Congress and introduced a more global approach to healthcare issues, with speakers from Russia, the United States, Scotland, Colombia, Spain and Brazil.

Another success was the unprecedented initiative of the Einstein Nursing Meeting, jointly organised by Hospitalar and Hospital Israelita Albert Einstein. The event provided professionals in the field with specialist knowledge and the results of the day-to-day activities of the hospital's nursing team.

We are also working to bring successful case studies so as to replicate these positive experiences in Brazil.

What are your expectations for Hospitalar 2014?

Our expectations are for a fair with lots of sales. There are signs that exhibitors will benefit from public healthcare investments, as the Brazilian government is now under pressure in this respect. Also, in 2014 there will be presidential and gubernatorial elections in Brazil, a fact that traditionally boosts sales at the fair. We believe that all sectors of the healthcare industry will experience a pickup in business, and businessmen need to prepare for this.

What are the healthcare trends in Brazil?

Telemedicine, tele-assistance and e-Health are growing sharply, democratising information and quality patient services. One example is the support that renowned hospitals are offering public hospitals or outpatient centres in areas of difficult access, whether for

education or medical opinions.

There are two other strong trends in Brazil – public-private partnerships in healthcare services and Social Healthcare Enterprises – a partnership model for managing healthcare establishments.

What are the challenges for healthcare in Brazil?

Firstly, being a huge, heterogeneous country with unequal healthcare services from region to region. Furthermore, we need more patient care centres because demand is on the rise due to the greater longevity of the population and the growth of C class, with the consequent increase in the number of healthcare plan beneficiaries. Even in top-tier private hospitals there are not enough beds.

Can you tell our readers about the Brazilian medical technology industry? "The success stories"?

A leading Brazilian company in the manufacture of neonatal products, Fanem is a highly successful case study. A genuinely Brazilian family company, it exports to more than 100 countries and invests heavily in research and development.

Just to get an idea of what Fanem has achieved, one only has to mention the company's plant in Bangalore (India), offices in Jordan (to serve the Middle Eastern markets) and a

presence in several countries in Africa, besides a patent in the United States.

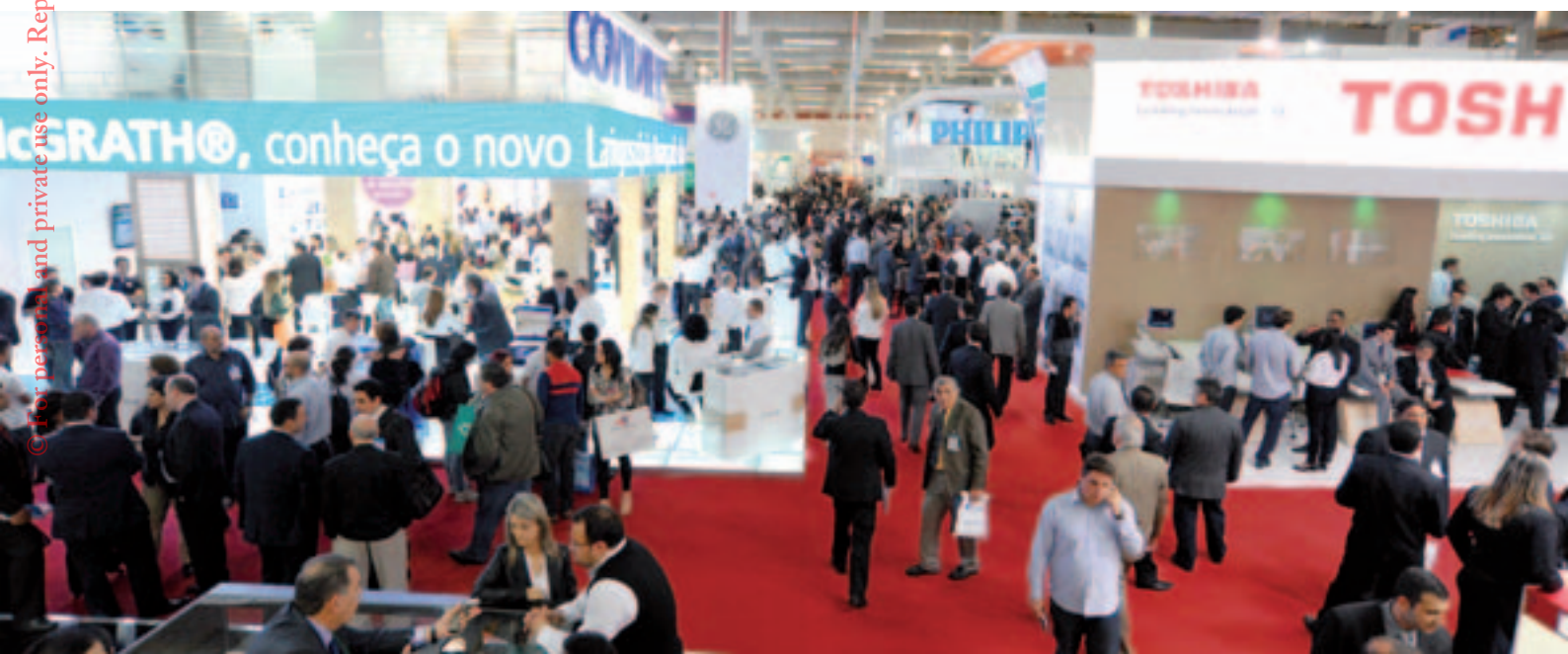
You have received several awards for your work - what have been the highlights of your career?

My greatest achievement and pride is the HOSPITALAR Fair + Forum, my brainchild, and whose 20 editions I have managed, personally overseeing the development and growth process.

As a doctor, I have always dedicated myself to business promotion activities while practising medicine and, together with my husband, businessman Francisco Santos, managing Couromoda – the International Footwear, Leather Goods and Fashion Accessory Fair, which has already held 40 editions, in São Paulo.

And thanks to the growth of these activities, I decided to make a professional choice: I gave up practising medicine to dedicate myself to organising fairs and congresses in Brazil and abroad.

As vice president of the Couromoda/Hospitalar Group, for about four decades I have been involved in organising and running all the Group's fairs, namely: Couromoda (footwear and fashion); Hospitalar (medicine and healthcare); Hair Brasil (hair and beauty care); São Paulo Prêt-à-Porter (apparel and fashion accessories); and "Reabilitação" (rehabilitation, prevention and inclusion). ■





MEDICAL TECHNOLOGIES – A GLIMPSE INTO THE FUTURE

Frost & Sullivan are well known for their market analysis and insights. Managing Editor Claire Pillar put questions about the future of imaging and other medical technologies to Ankit Shukla, Practice Director – Technical Insights, Frost & Sullivan.

Could you briefly describe the TechVision 2020 research process?

This research unveils 50 technologies that are set to dramatically transform industries, strategies and businesses. The selected technologies are spread across nine sectors - Sensors & Control, Materials & Coatings, Clean & Green Environment, Information & Communication Technology, Microelectronics, Sustainable Energy, Health & Wellness, Medical Devices & Imaging Technology, Advanced Manufacturing & Automation - and represent the bulk of R&D and innovation activity today.

This annual body of work in increasingly focused on deciphering the underlying impact of the top 50 technologies in shaping our tomorrow. "Therefore, apart from identifying the top 50 technologies for 2013, our global technology team has identified various convergence opportunities (e.g. self-healing artificial organs, Interactive Augmented Reality-enabled predictive remote patient monitoring etc.) enabled by a combination of the technologies. We believe these identified opportunities represent the exciting times ahead for the multitude of industries and markets they will impact.

TechVision 2020 showcases each selected technology, closely assessing the potential of a given technology platform to understand the true market opportunities, while evaluating the risk-reward elements. It appraises technology maturity and adoption ratings, possible year of impact and patent landscape, examines private and government funding trends, and explores future technology and application roadmaps.

And more interestingly, the output assesses future convergence opportunities as well as the next waves of innovation that will have lasting impact on industries and markets.

What are the most innovative health & wellness technologies in 2013?

Personalised medicine aims to characterise disease at different levels and evolution stages to target specific genes or molecular pathways. Diagnostic tests and therapeutic drugs continue to merge under the term of companion diagnostics, resulting in marketing a particular test with a corresponding drug or treatment. More clinical trials working with a specific group with genetic similarities are expected to considerably diminish side effects and contraindications.

Individually customised therapy benefits not only the patient's health. Physicians can prescribe a better therapy, regulatory authorities can assess the process in a more precise manner, payers benefit through more efficient use of available resources by potentially reducing the number of additional or ineffective treatments.

And the most innovative medical devices and imaging technologies in 2013?

Breast cancer is one of the most common cancers among women. Currently, deaths due to the disease are much higher than those caused by any other form of cancer. Through awareness about regular screening procedures have helped in reducing this number by almost 20%, interest has always remained in innovative imaging procedures with the ability to diagnose the

disease at the earliest possible stage.

Mammography has been one of the most successful diagnostic tests for the early detection of breast cancer. However, the procedure has its own challenges as the female breast is composed of different types of tissues and two-dimensional imaging cannot always produce an accurate representation of the three-dimensional tissues.

Breast tomography or 3D mammography has helped in addressing this issue to a greater extent. It does not exactly replace breast mammography but is performed along with mammography as an adjunct procedure. The x-ray arm of the device takes several pictures of the breast at different angles which later is combined to produce a 3D image of the breast at the radiologists' workstations. The picture is more detailed and can provide finer details about the breast. Data collected from breast tomography clinical tests have indicated that tomosynthesis increases the cancer detection rate, which consequently reduces patient callbacks quite significantly.

What emerging convergence opportunities are there for medicine?

Cloud based systems that can cost-effectively handle large volumes of biological data are being developed and this is the best example of an upcoming convergence area (Healthcare and IT). With the increase in throughput and reduced costs/base and costs/run, next-generation sequencing is likely to become more widely used in a number of research labs and diagnostic labs. Pharma companies will also use sequencing data during clinical development to guide the

Acknowledgements

Sandhya Kamath

Industry Manager
(Health & Wellness)

Darshana De

Industry Analyst
(Medical Devices & Imaging)



entire process and work on a personalised medicine approach. Since all labs do not have the infrastructure to store data in their servers or set up a bioinformatics division, there are a few cloud based data storage software that have been recently developed. However, much more needs to be done in this aspect to develop more publicly available data repositories and tools that will simplify the entire data storage and exchange process.

Healthcare systems face two major challenges: 1) increasing costs and limited budgets and 2) ageing population, increase in chronic diseases.

How are innovative technologies meeting this challenge?

One example is the advent of OMICS technologies and tests based on biomarkers: Predictive and/or screening tests that can help early diagnosis have been introduced in several countries, which help in informed decision making and also reduce healthcare costs in the long-run.

Medical imaging was identified by the New England Journal of Medicine as one of the top developments in clinical medicine in the last millennium. What do you see as the leading development in medical technology in the 21st century so far?

Hybrid imaging is seen as one of the leading developments in medical technology. Hybrid imaging is defined as the fusion of two or more imaging technologies into a single form of imaging. Ideally, this mode of imaging is considered to be most powerful, more powerful than the individual modalities. Some of the hybrid imaging modalities may be used to illustrate only anatomical details, and more and more hybrid imaging modalities are being used to explore in vivo molecular processes rather than anatomical details. Some of the hybrid modalities that are now in existence include ultrasonography (US)/magnetic resonance (MR) imaging, computed tomography (CT)/

angiography, MR imaging/angiography, etc. Researchers believe that the potential for hybrid imaging is immense and in future it can be used for the development of personalised medicine.

Can you identify trends in Medical Devices and Imaging Technology innovation? What's driving these innovations?

There is a clear trend towards molecular diagnostic and imaging technologies. More and more imaging technologies are focusing on the spatiotemporal distribution of molecular and cellular processes for diagnostic and therapeutic applications. The bottom line is to detect the disease at the cellular level to prevent its occurrence at macroscopic level.

Imaging is an easy target in healthcare budgets, as the costs are easily seen and have rapidly increased over the last few decades. How can industry work with clinicians to prove the benefits and value of medical imaging?

OEM vendors are now focusing more on the clinical benefits of the imaging modalities. Manufacturers need to be more innovative in order to provide accurate, reliable and end-user friendly equipment. The current trend is towards streamlining workflow procedures so that patient turnabout rate can be increased. Another focus is on the use of big data to improve healthcare delivery. Healthcare big data requires advanced algorithms for effectively processing the data with tolerable speed so that hospitals and medical centres can collect, search and share data without compromising on security. Hospital big data analytics can be implemented for enhancing hospital operations, tracking outcomes of clinical and surgical procedures, tracking patient history etc.

Do you think enough is being done to educate patients and society about innovative medical technologies?

Patient-resource websites play a key role in the adoption of new innovative medical imaging technologies. Most medical imaging companies have a page on their website dedicated to patient imaging, covering issues such as who needs a particular medical imaging procedure for which type of medical disorders.

Are barriers to innovation such as pressures on reimbursement, economic recession, concerns over diagnostic radiation hampering innovation in medical technology?

To a certain degree such factors are acting as challenges for medical imaging innovations. However, at the same time, there are funding bodies (government or private) that are financing the development of healthcare technologies. Healthcare technologies and IT developments have always remained the top priority of all developed and developing nations. Economic recession and reimbursement cuts have definitely impacted the healthcare industry, but manufacturers have started focusing on streamlining workflows with their imaging solutions within hospital environments so that hospital turnover can be increased. Also with the increased concern over diagnostic radiation issues, many companies are now working on low-dose high-contrast image generation.

What's on the horizon for medical imaging?

The trend is towards molecular imaging where the bottom line is to detect at the microscopic level before the disease starts to manifest at the macroscopic level. Imaging has progressed from displaying anatomical shapes to describing the internal functions of the main organs. Medical imaging is progressing towards more improved disease management along with personalised treatment. In the future, there is will more predictive diagnosis and personalised medicine for the prevention of chronic diseases. ■

RADIOLOGY IN BRAZIL

Brazil is the 7th largest economy in the world, and the largest country in South America in both area and population.

Brazil has a public healthcare system, funded by the government, called SUS (Sistema Único de Saúde – Unified Health System), which supplies healthcare to most of the population, and a private system, funded by private health insurance and businessmen. SUS was created in 1988 by the Brazilian Constitution. It is considered inadequate and lacking in quality, but is improving. There is a range of private health insurance in Brazil, which people can buy individually or companies might provide to their employees. 80% of the population rely on public healthcare. The public system is accessible even for people who have private health insurance. About 40 million people have private health insurance in Brazil. The

private sector accounts for almost half of healthcare spending. Of the 6,500 hospitals available to the Unified Health System, 48% are in the private sector.

Radiology teaching began in Brazil in 1916 and in 1932 the first university chair of the country in Radiology was founded.

CBR

The Brazilian College of Radiology and Diagnostic Imaging (CBR) was founded in 1948 at the 1st Brazilian Conference of Radiology, held at the Faculty of Medicine, University of São Paulo. The CBR is affiliated to the Brazilian Medical Association. CBR has 27 affiliated regional associations, and approximately 10,500 radiologists are members.

The aims and missions of the Brazilian College of Radiology and

Diagnostic Imaging (CBR) are: to disseminate scientific knowledge, to defend its associates, to stimulate professional improvement, to congregate and to direct its affiliate associations and to sustain the principles and the excellence of methods and procedures of diagnostic imaging and therapy.

In search of quality in service, since 1991 the CBR has developed training programmes in mammography, ultrasound, computed tomography and magnetic resonance. Each consists of a National Quality standard that after a series of assessments and surveys, grants the Seal of Quality in the specific area and the Certificate of Qualification from the CBR.

Since 2000 the CBR has been authorised by the Ministry of Education (MEC) for accrediting residency programmes, and applying the tests for granting Specialist and

STATISTICS



Source: Global Health Observatory, World Health Organization, Figures are for 2009 unless indicated

Total population	194,946,000
Gross national income per capita (PPP international \$)	11,420
Life expectancy at birth m/f (years)	71/78
Probability of dying under five (per 1 000 live births)	16
Probability of dying between 15 and 60 years m/f (per 1 000 population).....	202/100
Total expenditure on health per capita (Intl \$, 2011)	1,043
Total expenditure on health as % of GDP (2011)	8.9



Source: Portal Brasil http://www.brasil.gov.br/sobre/health/service/what-does-sus-stand-for-1/br_model1?set_language=en

Primary healthcare units	38,000
Public hospitals	
Federal	69
State	618
Municipal	2,278
Family healthcare teams	28,000
Hospital admissions per year	11.3m

Certificate of Practice Areas. Today this title is respected in the medical field, and to get it professionals must demonstrate their theoretical and practical knowledge, enabling a level of increasing excellence in radiology in Brazil.

The CBR organizes three events per year:

- Brazilian Congress of Radiology.;
- Ebraus course (Brazilian Meeting of Ultrasound);
- ESOR course, a partnership between the CBR and the European School of Radiology (ESOR).

The CBR has two publications:

- Boletim CBR, an informative magazine sent to CBR associates every month;
- Radiologia Brasileira (Brazilian Radiology), a scientific publication sent to CBR associates every two months.

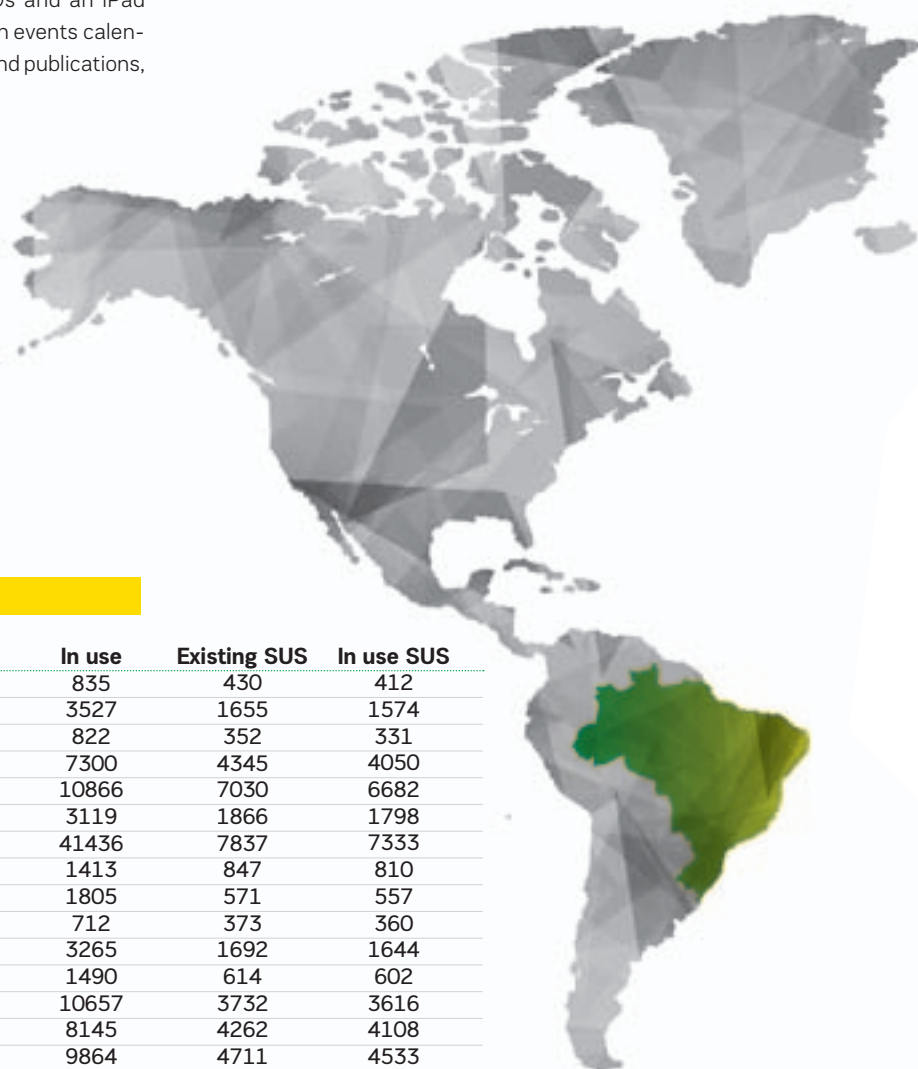
Sao Paulo Radiological Society

The Radiological and Diagnostic Imaging Society of São Paulo (SPR) is one of the affiliated regional societies of the CBR. The society was founded in 1968 and in 2013 has 3,000 members working in all areas of radiology: ultrasound, computed tomography, MRI, nuclear medicine and radiotherapy.

SPR publishes the monthly *Jornal da Imagem*, the scientific publication, *Revista da Imagem* and its website www.spr.org.br. It has a video library with over 1,200 DVDs and an iPad app, which includes an events calendar, lectures, videos and publications,

SPR welcomes international collaboration in order to develop and enhance contact between Brazilian radiologists and professionals from various regions of the world. Its scientific meetings have included collaborations with France, Italy, Chile, the International Society of Radiology and most recently with the World Federation for Ultrasound in Medicine and Biology.

The SPR holds annually the *Jornada Paulista de Radiologia (JPR)*, which attracts more than 12,000 people from Brazil and beyond. ■



Diagnostic Imaging Equipment

Equipment	Existing	In use	Existing SUS	In use SUS
Gamma camera	872	835	430	412
Mammography with Simple Command	3666	3527	1655	1574
Mammography with Stereotaxis	860	822	352	331
X-ray up to 100 mA	7767	7300	4345	4050
X-ray 100-500 mA	11377	10866	7030	6682
X-Ray more than 500mA	3234	3119	1866	1798
Dental X-Ray	43026	41436	7837	7333
X-ray with Fluoroscopy	1579	1413	847	810
X-ray for bone densitometry	1839	1805	571	557
X-ray for haemodynamic	732	712	373	360
CT	3356	3265	1692	1644
MRI	1517	1490	614	602
Color Doppler Ultrasound	11003	10657	3732	3616
Ultrasound echograph	8410	8145	4262	4108
Conventional Ultrasound	10231	9864	4711	4533
Exclusive Film Processor for Mammography	2004	1962	1819	1783
Computerised mammography	195	190	137	133
Total	111668	107408	42273	40326

Source:
http://cnes.datasus.gov.br/Mod_Ind_Equipamento.asp?VEstado=00



September

September 14 – 18

CIRSE, Barcelona

<http://www.cirse.org/?pid=857>

September 19 – 22

ESUR, Istanbul, Turkey,

www.esur2013.org

September 27 – October 1

ECCO17-ESMO38-ESTRO32,
Amsterdam Netherlands,

www.ecco-org.eu

October

October 2 – 4

European Health Forum Gastein
Bad Hofgastein, Austria

www.ehfg.org

October 3 – 5

ESHNR 2013, Izmir, Turkey,

www.eshnr.eu

October 3 – 5

ESMRMB Annual Scientific
Meeting, Toulouse, France

www.esmmb.org

October 5 – 9

ESICM LIVES, Paris, France

www.esicm.org

October 6 – 9

World Congress of Ultrasound in
Obstetrics and Gynecology

www.isuog.org/worldcongress/2013

October 9 – 12

25th Euroson Congress,
Stuttgart, Germany

www.ultraschall2013.org

October 10 – 11

MIR, Barcelona, Spain

www.mir-online.org

October 11 – 12

EUSOBI Annual Scientific
Meeting, Rome, Italy

www.eusobi.org

October 18 – 22

JFR, Paris, France

jfr2013.radiologie.fr

October 19 – 23

EANM, Lyon, France

www.eanm.org

October 20 – 22

World Health Summit,
Berlin, Germany

www.worldhealthsummit.org

October 29 – 30

European Telemedicine
Conference, Edinburgh, Scotland

<http://telemedicineconference.eu>

November

November 12-14

HIMSS Europe CIO Summit 2013
Madrid, Spain

www.hitleadershipsummit.eu/2013/

November 18-19

Health 2.0 Europe, London, UK

www.health2con.com

November 20-22

Compamed, Dusseldorf, Germany

www.compamed-tradefair.com

November 20-23

Medica, Dusseldorf, Germany

www.medica-tradefair.com

November 28-29

EAHM Congress, Luxembourg

<http://eahm-luxembourg2013.lu>

MORE EVENTS @ WWW.HEALTHMANAGEMENT.ORG

CIRSE 2013

DRIVING INTERVENTIONAL RADIOLOGY FORWARD

The CIRSE Annual Meeting has long been a central hub for anyone with a professional interest in image-guided, minimally invasive medicine; interventional radiology (IR). The meeting attracts a spectrum of participants as extensive as the discipline itself, from interventional radiologists to vascular surgeons, nursing staff and radiographers, as well as medical students, at both post-graduate and undergraduate level.

Catering for Everyone

To accommodate the needs of these diverse interest groups, a range of session types are organised. For less experienced delegates, such as medical students and the recently qualified, Foundation Courses and Workshops offer a good grounding in the A-Z of certain procedures or diseases.

For established practitioners, more in-depth opportunities for medical advancement are provided. The results of latest trials and current best practice are imparted at Special Sessions; hands-on workshops allow for targeted practice; industry updates can be obtained at Satellite Symposia and a state-of-the-art technical exhibition; and rigorous debate is facilitated at various discussion forums, such as the new Evidence Fora, Interactive Case Sessions and the highly regarded Morbidity and Mortality Conference.

Covering the Full Spectrum

As well as catering for a mix of abilities and learning approaches, CIRSE also

strives to ensure balanced coverage of the many areas of clinical interest. To this end, the scientific programme features six key tracks, which aid attendees in selecting the sessions of most relevance to their practice:

- Vascular interventions;
- Interventional oncology;
- Transcatheter embolisation;
- Neuro interventions;
- Non-vascular interventions; and
- IR management.

Tackling Burning Issues

The congress will also host two Hot Topics Symposia debating up-and-coming IR therapies, which are yet to become widely performed and thus lack strong clinical guidelines as how to best be incorporated into a hospital's care plan. In order to ascertain the clinical indications and collaboration needed for these procedures, renowned experts will give their personal experiences, assessing the data that is already available and outlining best-practice scenarios.

Stroke Therapy

One such hot topic is *Intra-arterial stroke management* – should this be an IR procedure? Given the rising incidence of stroke amongst Europe's ageing population, rapid access to the most advanced and effective treatments is of great importance. IR has added several treatment options to the mix, including embolisation for haemorrhagic stroke and thrombolysis, thrombectomy and recanalisation for ischaemic stroke.

However, debate continues over how to best integrate these procedures into hospital protocols and who should do the procedures. Should these procedures only be performed by neuroradiologists? Do interventional radiologists have a role? Should neurologists have a role? How should doctors performing these procedures be adequately trained and certified? How can a hospital or health authority offer these therapies in an efficient and cost-effective manner?

These topics and more will be



Author

Ciara Madden

Cardiovascular and Interventional
Radiological Society of Europe
Vienna, Austria





addressed by invited speakers (Dierk Vorwerk, Ingolstadt/DE; Tommy Andersson, Stockholm/SE; Klaus Hausegger, Klagenfurt/AT; and Jim Reekers, Amsterdam/NL), followed by a panel discussion and a question-and-answer session.

This session is designed to complement the Neuro intervention programme track, which will offer a range of sessions on the theory and practice of stroke management.

Lung Cancer – a New Frontier for IR

This year's second hot topic is *Treatment of lung cancer – the choices and how to make them*. This is a relatively new field for IR, which has already made great strides in treating liver, bone and renal tumours.

Various therapy types have been investigated in lung tumour models, including embolisation, mechanical ablation and several categories of thermal ablation. Sufficient data is now available to

support their use in certain clinical settings, particularly radiofrequency ablation.

Like all cancer treatments, the key predictor of success is good patient selection, and the challenge facing interventional radiologists and their oncologist colleagues is to determine how to best incorporate these therapies into treatment plans. A thorough knowledge of the advantages and limitation of the various technologies available is also crucial.

To provide more clarity, several renowned oncology specialists (José Vilar, Valencia/ES; Thierry de Baère, Viljuif/FR; Afshin Gangi, Strasbourg/FR; Lisbeth Kenny, Brisbane/AU) will discuss current data and clinical indications.

Celebrating our Global Community

Preceding both these Hot Topics Symposia will be the prestigious honorary lectures. This year, the Gruentzig Lecture will be delivered by Andrew

Holden (Auckland/NZ), who will discuss *EVAR for AAA – evolution or revolution?*

The 2013 Roesch Lecture will be given by Mario Bezzi (Rome/IT), and will address *High-intensity focused ultrasound: an IR tool for the future?*

CIRSE is a global IR society, and to improve cross-cultural medical exchange, a special *CIRSE meets Singapore* session will also take place, at which this CIRSE Group Member will showcase their latest research and explain their working protocols in subjects as diverse as HCC, haemodialysis access and CLI.

Exploring the World of IR

CIRSE 2013 will once again offer a unique opportunity to immerse oneself in the world of interventional radiology. A host of session types will impart the most up-to-date knowledge, and the lively congress atmosphere will enable the IR community to exchange ideas and investigate the latest technologies. Be sure to join us – there is a great deal to be discovered. ■



**ECCO
17**

17th ECCO - 38th ESMO - 32nd ESTRO
European Cancer Congress
Reinforcing multidisciplinary
AMSTERDAM, 27 SEPTEMBER - 1 OCTOBER 2013

**ESMO
38**


ESTRO 32

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The European Cancer Congress 2013: The largest platform for practice-changing data in Europe

The recognised multidisciplinary setting of the Congress is once again providing ideal surroundings for participants to leverage knowledge, promote education and build awareness about oncology - placing the patient at the heart of all discussions.

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ESMRMB 2013

30th Annual Scientific Meeting

October 3–5, Toulouse/FR

Make sure to register until July 16
at www.esmrmb.org to benefit from
reduced registration fees!

The ESMRMB is very pleased to have its 30th congress in Toulouse, France, this year and the Scientific Programme Committee as well as Local Organising Committee is working hard on an exciting programme of the congress. A lot of different sessions will be offered and the ESMRMB Congresses were accredited with approx. 18 CME credits in previous years and accreditation from EFOMP has been requested. Please visit our website www.esmrmb.org for registration and information on numerous registration categories. We would be pleased to welcome you to our congress!

Congress City Toulouse:

Toulouse, in the heart of southwest France, is located on the banks of the Garonne River. The city combines medieval architecture with eclectic music, delicious food, student atmosphere and constant innovation.

Toulouse captivates with its heritage, tiny cobbled streets and some excellent cuisine. The development of the city of Toulouse began before Roman conquest of the region had even begun. When the Romans did take over and assert influence, they rebuilt an even larger city which then became the largest intellectual city in the region. Much of the cultural and artistic development took place in Toulouse between the 11th and 16th centuries, but the culture has remained until today. In recent history Toulouse has been dominated by the aviation industry and the first regular airline of France took off from Toulouse. Furthermore, it has been the birthplace of many aeronautical pioneers. Even today many aircraft companies are based in or have branches around Toulouse. Fuelled by the energy of its student population Toulouse's calendar bursts with outdoor concerts, art festivals and food markets. It's the home of several excellent restaurants and more than one UNESCO World Heritage site. Due to the typical pink stones of Toulouse's buildings the city is also called 'La Ville Rose' (the pink city).

Congress venue and transportation:

The buses and metro in Toulouse are easy to use and are operated by Tisséo (www.tisseo.fr). There are also day and weekly passes, as well as books of 10 tickets available.

You can reach the Pierre Baudis Congress Centre from the airport by taxi or by bus: with the Aerobus which goes directly from the Airport to the congress centre (please note that other fares will apply) or take the busses 25, 70 & 16). A free CITY-PASS will be handed out at the registration desk together with the congress material which will allow to use the public transportation in Toulouse free of charge for the duration of the congress!

Hotel booking:

Our official travel partner Carte Blanche has secured a number of hotel rooms at attractive rates for delegates. The different contracted hotels offer room rates from € 57 to € 213 and give all delegates the possibility to find a suitable accommodation. Please use the online platform for your hotel booking at www.cb.org/info/ESMRMB13/hotel_booking.html

Let's
celebrate
our 30th
congress

Dr Peter Mansfield Lecture

with Gabriel Krestin (NL) talking about: Population imaging for disease prevention

3 Plenary Sessions

on 'Imaging techniques and applications in cardiac MRI', 'Imaging baby brains' and 'MRS: A natural application for high field imaging'

Hot Topic Debates

on 'Is resting state fMRI clinically relevant?' with R.Achten (BE), M.Walter (DE), S.Williams (UK)

Roundtable Discussions

on 'Multi-transmit for body MRI – is it worth the money?' with P.Börnert (DE), J.Hajnal (UK), S.Schönberg (DE), C.Glaser (DE)

Teaching Sessions

8 Teaching Sessions with 24 talks on 'Advanced liver imaging', 'Basic pulse sequences', 'Highly accelerated fMRI', 'Imaging of impingement syndromes', 'Motion and flow', 'MRI/MRS of animal models of neurodegenerative diseases', 'New advances in hyperpolarisation', 'Susceptibility weighted imaging of the brain'

Radiographers' Sessions

6 Radiographers' Sessions will take place on 'Cardiac MRI', 'Diffusion (tensor) MRI', 'Functional MRI', 'Perfusion MRI', 'Susceptibility weighted imaging', 'Whole body diffusion' at the ESMRMB Congress 2013, whereas the first 30 minutes will have teaching character and the second part of the session our industry partners will give tips and hints.

15 Mini-Categorical Courses

Joint ESMRMB/EFOMP Session

Electronic EFOP® Exhibition

Software Exhibition

Paper Poster & Clinical Review Poster Exhibition

See you in Toulouse

MIR Annual Scientific Meeting

October 10–11, 2013
Barcelona/ES

Postgraduate Course

WEDNESDAY, OCTOBER 09

12:45–13:30 MANAGING THE RADIOLOGICAL DEPARTMENT

The new role and task of the leading staff of a radiology department
– from a radiologist for daily work of radiologists

13:30–14:15 MANAGING PERSONAL DEVELOPMENT AND QUALITY

Factors affecting safety of patients
Leadership and personal development

14:45–15:30 HOW TO MANAGE INFORMATION

Basic knowledge about structuring of information – what radiologists should know about lexicon, semantics, ontologies etc.

15:30–16:45 HOW TO DISTRIBUTE YOUR MESSAGE

Avoiding the sins of our fathers – Critically reading and writing for the radiology literature

17:00–17:30 HOW TO CONTROL YOUR DEPARTMENT

Key performance indicators

17:30–18:00 WHAT IS RELEVANT FOR RESIDENTS

All you should know on the ESR curriculum for radiologists and concept for subspecialisation or certification

**Dedicated
Course for
Postgraduates
on October 09**

Annual Scientific Meeting

THURSDAY, OCTOBER 10

09:00–09:30 OPENING

Opening Lecture: Radiology in the time of economical challenges

09:30–11:15 COMMUNICATION

Visibility of radiologists

Communication with patients – building consultation services for patients?

Communication with other physicians – is there a need for structured reports?

Communication in the era of digitisation of imaging: what is changed and what will change in radiology profession?

11:45–13:15 EDUCATION

Undergraduate education in radiology

Research in radiology

Resident training and maintenance of competence in Europe

The UEMS perspective on residents education and comparison with other disciplines

14:00–15:45 APPROPRIATENESS AND DECISION SUPPORT

Decision support for optimal use of imaging: tests: current systems and a vision for the future

ACR Select - the ACR approach for online decision support

First practical experiences with ACR Select in Europe and the ESR position on CDS

Keep your referring physician in mind: Dose control and its role in radiology marketing

Thirty-five years of decision support implementation

Global - Patient-centric – Safe (GPS approach)

16:15–18:00 LEADERSHIP

How to make the right decision?

Leadership for the young generation

Foster research in radiology

The radiology department in the modern, interdisciplinary environment – opportunities and risks

The biggest challenges and funniest mistakes in the first 100 days in a new hospital

FRIDAY, OCTOBER 11

08:30–10:20 INNOVATION AND KNOWLEDGE MANAGEMENT

The perfect storm and the future of imaging innovation

New imaging technologies affecting radiology

Clinical treatment processes under the oversupply of diagnostic imaging methods

Knowledge management in radiology – hidden secrets in our data repositories

10:45–12:45 eHEALTH AND TELERADIOLOGY

eHealth – Patient's perspective

Image sharing for patient empowerment

Intelligent archiving as a cloud service

eHealth and teleradiology – the EU perspective

eHealth and teleradiology – the ESR perspective

13:30–14:15 POSTER SESSION

14:15–16:00 QUALITY ISSUES, PROGRAMMES TO IMPROVE RADIOLOGIST PERFORMANCE

Irish national radiologist peer review and quality assurance programme

RCR radiology events and discrepancies [READ] newsletters

ACR Radpeer: Radiological peer review

Radiological peer review and challenges of automated methods in sub-specialty reading environment

Quality and peer review – The Canadian perspective



COVER STORY: TELE-HEALTH

Including:

- Teleradiology – measuring quality aspects
- Evaluation of medical teleconference setups: telemedicine in the Euroregion Pomerania
- An experience in teleradiology: a Canadian solution for collaboration and quality assurance in radiology
- Quality assurance in teleradiology



IT INTELLIGENCE: MOBILE HEALTH

- Patient Monitoring



IMAGING INSIGHTS

Including:

- Frost & Sullivan: Fusion imaging
- Developments in molecular imaging
- Workload in radiology
- Benchmarking radiation dose indices: the American College of Radiology's Dose Index Registry
- Clinical treatment processes: optimising effectiveness
- Provision of a dedicated radiology service for acute hospital care



INTERVENTIONS

- Interventional radiology and renal denervation



CARDIO SPOTLIGHT

- ECG



MANAGEMENT MATTERS

- Learning from other industries



IN FOCUS

- Oncology



COMPASS

- South Korea

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