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TOP CHAIRMEN ON “THE MANAGEMENT DECISION I MOST REGRET”



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The Management Decision I Most Regret and Why

Dear readers,

The session on regrets at the Management in Radiology congress of the European Society of Radiologists produced some very interesting scenarios which I am sure strikes a chord for many in senior management positions. However one of the themes that emerged from the sessions emphasised the pitfalls in managing people. Radiologists who take up management posts will understand the business of delivering good images and accurate reports in a cost and clinically effective way but are generally poorly trained and equipped to deal with poor performing or disruptive members of staff and inter-personnel conflicts. They are also rarely involved in negotiating terms and conditions of service and pay with unions as this is often done on a hospital, regional or national basis and yet these issues are fundamental to the successful management of a department of radiology. Human resources legislation is complex even at a national level but is often driven by European legislation even up to the European courts. It is therefore impossible for a radiologist in a management positions to be knowledgeable about all the nuances. However it is important to understand some basics to assist through the day to day running of a department. The session highlighted two key areas.

The first involves the process of removing a poor performing and disruptive individual who is dragging down the performance and morale of other members of the staff. This needs to be handled carefully and proactively in order to avoid the need for industrial tribunals and costly settlements. The key is to ensure that all members of staff are given very clear objectives and performance targets which can be easily measured and monitored on a regular basis with face to face discussions held to understand reasons for underachievement. Regular appraisal of staff allows a structures means of reviewing in detail an individual's overall performance as long as proper and relevant outcome measures are available. The views of other staff should also be included in the appraisal process preferably through

a formal multisource feedback process within the department. All these will assist in the process of performance managing an individual who is not delivering or who is disruptive. This is a slow tedious and time consuming process but is essential if you wish to avoid compensation claims. It is important to keep very careful notes of all events through out this process. Consideration also needs to be give to the fact that a negotiated payoff may be less time consuming and disruptive if reasonable terms can be achieved.

The second issue links to the first in relation to the initial employment of staff. There is now considerable legislation in place to ensure a level playing field for all applicants for a job and as a result it increases the pressure on the selection process. As indicated in the presentations it is often easier to promote internally as the individuals are known to the organisation and there should be no surprises. However this may result in individuals being promoted beyond their capability or a lack of insight into the inefficiencies of the organisation which may be obvious to an outsider.

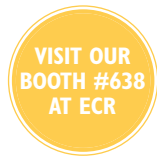
Bringing in new blood is therefore essential but a robust selection process needs to be in place with the individuals shortlisted spending time in the organisation talking to as many people as possible and being assessed by them. In too many situations the choices for key positions are made on the basis of a short interview although psychometric and other tests of ability may also be included. As is suggested careful private conversations may take place with outside individuals and bodies but these should be fair to all candidates and should recognise and exclude interpersonal bias. A robust system for appointments will usually negate the need for performance managing someone out of the organisation at a later date.

Prof. Iain McCall




Prof. Iain McCall

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The Management Decision I Most Regret and Why

This cover story brings you a series of papers based on the winning presentations given at the annual Management in Radiology (MIR) congress, which took place in Mallorca, Spain from 14 – 15 October 2010. Developed in response to last year's well-received forum on "A Management Decision that Affected my Medical Imaging Department", this year's edition saw Europe's top medical imaging chairmen & managers turn the topic around to management decisions they took which they later regretted – and what valuable learning experiences they took from them. Told in their own words, the session threw up key pieces of valuable professional advice applicable for all medical imaging leaders.



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SAVE THE DATE: CIRSE, 10 – 14 SEPTEMBER, 2011



This year's edition of the Annual Scientific Meeting of the Cardiovascular and Interventional Radiology Society of Europe (CIRSE) takes place in Munich, Germany from 10 – 14 September.

Congress Venue

The congress venue is the International Congress Centre München (ICM), a part of the Internationale Messe München, an architecturally fascinating renovation of the "old airport" of Munich. The ICM is one of the most modern and frequently used congress centres worldwide and offers us a space of 350,000 m², made up of numerous lecture halls and rooms of every size that can cater for more than 12,000 people.

Programme Themes

With more than 5,600 participants in 2010, the CIRSE annual meetings have become Europe's largest and most comprehensive forum for experts in image-guided minimally invasive therapies.

CIRSE 2011 will again provide a unique opportunity to showcase your achievements in the field of interventional radiology by presenting an oral paper or a poster.

In 2011, the scientific programme has focused on the following key areas:

- Biliary intervention;
- Bone, spine and soft tissue intervention;
- Clinical practice development;
- Dialysis intervention and venous access;
- Embolotherapy (excluding oncology);
- EVAR and TEVAR;
- Experimental work in IR;
- GI tract intervention;
- Gynaecological intervention (including UFE);
- Imaging;
- Neuro and carotid intervention;
- Oncologic intervention;
- Peripheral vascular disease intervention;

- Radiation safety;
- Renal and visceral artery intervention;
- TIPS and portal vein intervention;
- Urinary tract intervention, and
- Venous intervention and IVC filters.

Further developments will appear in this journal, and you can follow updates directly on www.cirse.org.

CARS CONGRESS 2011



The joint Annual Scientific Meetings of the IS-CAS, EuroPACS, CAR, CAD and CMI societies are scheduled to take place during 2011 in Berlin from June 22 – 25. The CARS Congress Organising Committee invites you to join them in Berlin in June 2011, if you work in the fields of radiology, surgery, engineering, informatics and/or healthcare management and have an interest in topics, such as

- Image- and model-guided interventions;
- Medical imaging;
- Image processing and visualisation;
- Computer aided diagnosis;
- Medical simulation and education;
- Surgical navigation and robotics;
- Model-guided medicine, and
- Personalised medicine.

Congress Format

The four-day congress consists of invited talks by internationally recognised experts, approx. 200 paper presentations, as well as exhibits and posters. Special focus sessions as well as product exhibits in the industrial exhibition are planned to give participants access to hot topics and new CARS-related products. Tutorials, workshops and special events related to the above topics complement the regular sessions of CARS and are organised under the auspices of the International Foundation of CARS. Congress topics include relevant research and development in radiology, surgery, dentistry, com-

puter science, and biomedical engineering and modeling.

Further details can be found on www.cars-int.org

IHE CONNECTATHON 2011 IN PISA, ITALY



The deadline for registering for the IHE Connectathon is fast approaching. To be held April 11 – 15, the IHE Connectathon is a landmark event for health information systems in Europe. During the five-day marathon more than 90 companies will continuously test the interoperability and connectivity of new products. This year IHE Connectathon is attracting a record number of project managers, policy makers and other influential stakeholders from across Europe who are advancing health IT programmes.

With a full programme of daily round-tables and seminars on specific healthcare topics, IHE Connectathon 2011 in Pisa is the event not-to-be-missed. The organisation state that if this is your first IHE Connectathon, you'll find the specially designed Gazelle programme is a fast and easy-to-use tool for signing up for the event. Participants at last year's event can simply enter their user name to speed through registration.

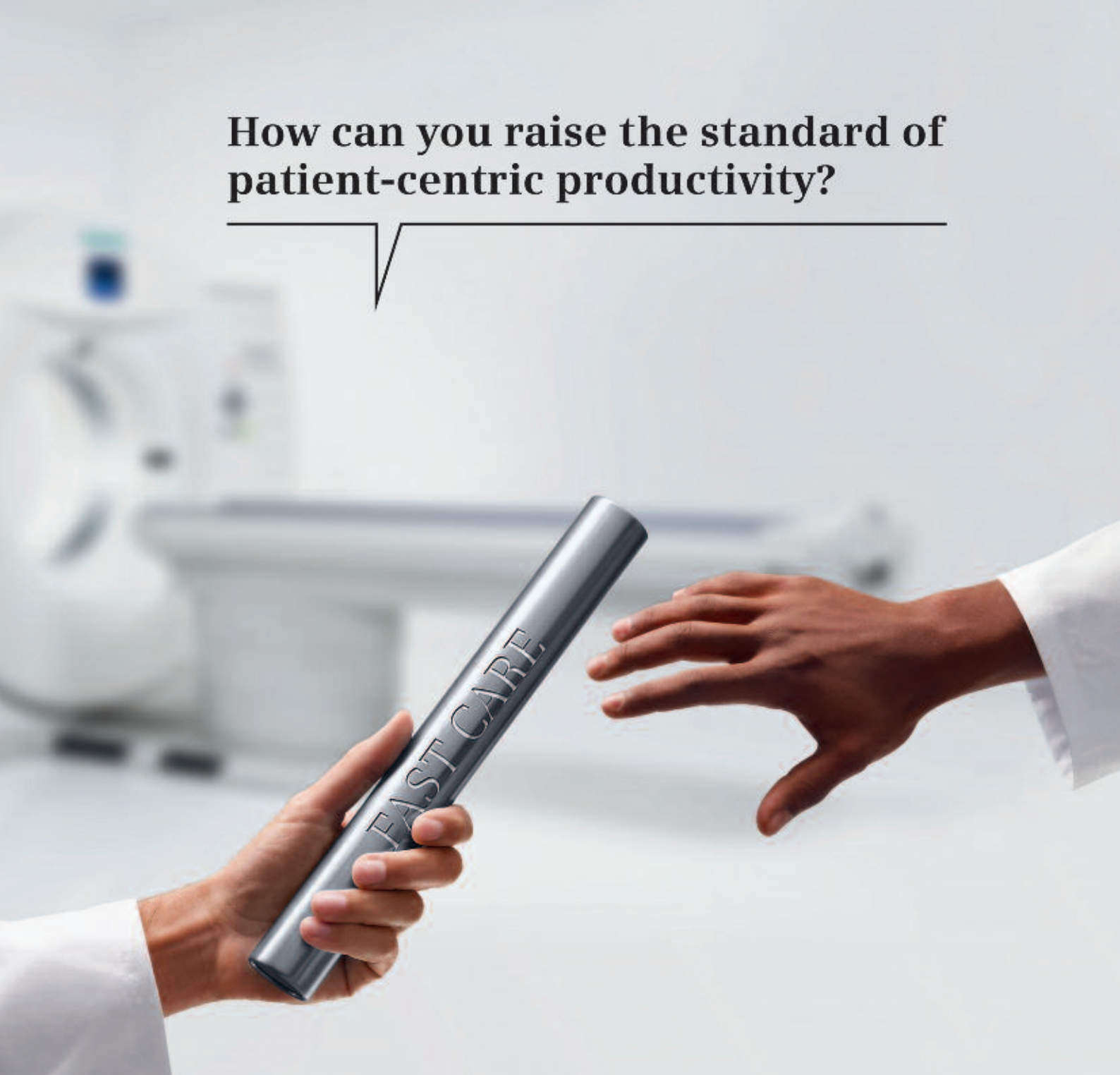
Further information at www.ihe-europe.net

MANAGEMENT IN RADIOLOGY: UPDATE FROM WINTER COURSE



The recently-held Management in Radiology (MIR) Winter Course, providing intensive coaching in the latest business, economic and strategic management trends, was held suc-

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cessfully from Thursday January 20, until Saturday January 22. An interactive and informative settings, the programme is designed to build a practical skill set over a three-day period, in order that each delegate will leave with new insights and practical solutions they can implement immediately.

INSPIRING CHANGE

Two trainers from "Inspire Change" explored the following three key areas:

1. How to communicate successfully and win at negotiations;
2. How to make meetings work for you, and
3. Innovating in practice.

1. How to Communicate Successfully and Win at Negotiations

As part of this session, delegates learned how to:

- Use practical techniques to ensure lasting, successful negotiations at work;
- Build constructive relationships with people, through a variety of different approaches;
- Create and develop your individual action plans for successful communication and negotiation;
- Use a highly rated assertiveness tool to ask confidently for behaviour changes, and
- Understand what you need to do as an individual in order to successfully communicate at all levels, even when the going gets tough.

2. How to Make Meetings Work for You

The theory behind this session was as follows: We spend a lot of our working lives at meetings. Often these meetings seem to be a waste of our valuable time. We often sit there wondering why we came. Do meetings have to be like this? Too often, meetings that we attend suffer from one or more of the following faults:

- No published agenda sent in advance of the meeting or no agenda at all;
- The meeting always starts late, as people drift in well after the advertised start time
- The chair is a forceful, tough individual, who keeps going until the group is worn down;
- Some people never speak up at all;
- Decisions that could quite easily be made today are put off until the next meeting;
- The advertised finished time drifts by and there is no sign of the end in sight;
- People make promises they don't keep, e.g. 'leave that to me, I'll do that';
- Someone comes in late and asks to have the main points of the meeting replayed;
- More time is spent on trivial items, and less time on important ones;
- The same people come to all the meetings, even if it is not quite clear why they (or their department) need to be represented;
- Conversely, people who really should be there are never invited, and
- Great swathes of business are brought up under 'Any Other Business'.

Thus, participants learned practical skills to address these recurrent management challenges.

3. Innovating In Practice

Resistance to change is one of many reactions that are normal, but difficult to deal with effectively. The aim of the Innovating in Practice session was to help those present to learn some practical, easy to use and highly effective tools for asking for a behaviour change and how to successfully make planned changes. The acceleration in the speed and complexity of change brings a new set of problems for both team members and leaders alike. Ranking high amongst these challenges is the urgent need to change workplace culture so that continuous change can be both effective and accepted. This challenge is particularly apparent in today's NHS and across other healthcare structures in Europe. Finally, participants stated that they took home some valuable, practical lessons from these small, intensive group sessions.

To get involved in the activities of Management in Radiology (MIR), please visit www.mir-online.org. All groups of radiologists interested in learning about management and administrative techniques can benefit from their initiatives from junior radiologists who wish to augment their knowledge to advance in their career and take a place of leadership, to existing leaders such as Chairmen, business managers and administrative staff, who wish to refresh their knowledge. An Annual Scientific Meeting will take place later in 2011 and be announced in this journal.

www.mir-online.org

E-HEALTH WEEK 2011

The 9th edition of the High-level e-health conference will take place 10 – 13 May 2011 in Budapest, Hungary within the e-health week together with the World of Health IT Conference and Exhibition.

European healthcare establishments are facing substantial challenges over the next

decade, such as significant demographic changes and reduced human resources, forcing European leaders to re-design the European Healthcare landscape. E-Health week 2011 will not only offer an insight into how our leaders are planning and investing for the future, but will also present an exhibition which

will showcase leading industry partners, offering innovative solutions for our future.

E-Health week is a collocation of the European Commission's High Level Ministerial Conference and the World of Health IT Conference & Exhibition. It was in 2010 hailed as Europe's largest pan-European conference: an

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all encompassing event focusing on leadership and the continuum of care - healthcare from the home to the hospital. The event will also address other related subjects such as pharma and health 2.0.

E-Health week is a platform for all stakeholders in the Health IT community and complements your national conference, by:

- Offering answers by high-level speakers;
- Presenting a modern and wide-ranging exhibition, including an interoperability showcase to demonstrate how data can

travel across different suppliers and borders, and

- Allowing you to network with government- and industry leaders from across the European continent; an opportunity rarely seen at other European conferences.
- When? Tuesday, May 10, 2011: Ministerial Conference (invitation only)
Wednesday, May 11, 2011: E-health week & exhibition opens (open to all)
Thursday, May 12, 2011: E-health week & exhibition open (open to all)

For further information, please visit:

<http://www.worldofhealthit.org>

Learn more about the European Commission - ICT for Health:

http://ec.europa.eu/information_society/activities/health/index_en.html

http://ec.europa.eu/dgs/information_society/index_en.htm

DUTCH STUDY PUBLISHES RESULTS

MRI SCREENING OF THOSE PREDISPOSED TO BREAST CANCER SAVES LIVES

The survival rate of women with hereditary predisposition to breast cancer substantially increases if they are screened using MRI. This scan detects twice as many tumours as a mammogram does and detects the tumours at an early stage. Early detection can in many cases prevent cancer metastasis. This is the result of a large Dutch study by six academic institutions and cancer centres, led by Erasmus MC. The researchers published their findings in the *Journal of Clinical Oncology*. It is the largest and longest running study ever carried out in this area.

About 15 to 20 percent of women diagnosed with breast cancer have a family history of breast cancer. This can be the result of a congenital anomaly (mutation) in one of the breast cancer genes (BRCA1 and BRCA2). Women with this gene defect have a greatly increased risk (50 to 85 percent) of developing cancer. There are also people who may be at an increased risk even though a gene defect was not detected. They are divided into two risk groups: people with a high risk (30 to 50 percent) and women with a moderately increased risk (15 to 30 percent). The researchers tried to determine the best method to detect tumours in these risk groups and which screening tool gives the best long-term results.

MRI scans appear to detect tumours better than mammography in all people (with an increased risk of breast cancer). On average, the MRI scan saw 77 percent of the tumours while 35 percent were detected using mammography. The MRI performed best for women with the breast cancer gene BRCA1. The scan showed tumours in 66.7 percent of these people while mammography only detected a quarter of the tumours. "Particularly for this group it is important that the best detection method is selected at the start as the tumours often manifest at a young age and are more often aggressive",

"On average, the MRI scan saw 77 percent of the tumours while 35 percent were detected using mammography."

says Jan Klijn, Professor of Internal Oncology at Erasmus MC.

Patients live longer with improved cancer detection. Six years after diagnosis, 93 percent of the people who had been diagnosed

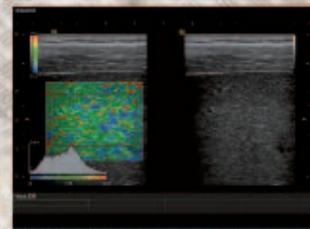
with a tumour were still alive. This figure is almost 20 percent higher than in studies in which people were not screened using an MRI scan. Metastasis also occurred less often. In fact, among the breast cancer patients without a gene defect no one had metastasis and no one died as a result of the disease. The researchers propose that people with a family history should have an MRI screening annually. "For people with the gene abnormality BRCA1 we should even consider having them screened twice a year. They have the greatest risk of a tumour developing between two scans", says Klijn.

A total of 2,157 women with a higher risk of breast cancer were examined for the study. It is the largest study ever carried out in this field. Six academic and cancer centres participated in the research, namely, Erasmus MC, NKI/AvL (Netherlands Cancer Centre/Antoni van Leeuwenhoek Hospital), Leiden UMC, UMC St Radboud, VU University Medical Centre and UMC Groningen. Previous research by these centres had already shown that MRI scans scored well in detecting breast cancer. However, these studies had not looked at mortality rates, chances of metastasis and the results of the MRI scans for the different risk groups. ■

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THE MANAGEMENT DECISION I MOST REGRET AND WHY

Six Top Radiologists Share the Lessons they Learned

Each year, top Chairmen from medical imaging departments across the world get together at a dedicated management congress where an innovative tradition is evolving. Dubbed simply the “Management Forum”, a select number of medical imaging managers gather before the audience to share their unique professional management strategies in an interactive session, which is then opened to the floor. The aim is to highlight and debate what works and what doesn’t, in a practical and experience-sharing way that is useful for other medical imaging managers in their daily working lives.

In this report, IMAGING Management presents the results of the most recent Management in Radiology / MIR congress Management Forum, where leading experts in medical imaging address the topic of “The Management Decision I Most Regret & Why”. Here, in their own words, they offer up the hard-earned pearls of wisdom from errors they made that they feel have enhanced their overall professional experience. In the words of Forum Chair Philip Gishen / UK, “We all learn from experience - most of us only get to our level of experience from the mistakes that we make.” In this spirit, we also publish the results of some of the post-presentation talks and audience comments, which may also be useful for you.

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Jan Schillebeeckx / BE

Hiring & Firing

Carefully research the profile of any new candidate in the department

Stephen Baker / US

The problem I’m going to talk about is not particularly unique, though it is the one that has bothered me the most. Firstly, let me give you some background. Twenty years ago I joined a new institution, the New Jersey Medical School. This was in 1990. I started as Radiology Acting Chairperson for six years before I took the job as Chairman. Twentysix candidates had already turned down the position – it had a reputation as a ‘mediocre’ facility. I accepted the Chairmanship with the realisation that there was no place to go but up. I was given adequate resources for equipment and funding for five new personnel. In my new role I recruited five additional radiologists, did not renew ten and hired their replacements.

I was also given the brief to hire an individual with an international reputation as a clinician, investigator and teacher.



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The idea was to establish a research programme that would be considered up and coming by dint of this individual's decision to join us. Unfortunately, this person turned out to be lazy, had forgotten how to do general radiology, and was a grandiose bigoted malingeringer who declared that he "no longer had research interests"! Needless to say, I regretted the hiring decision.

The situation in the department got worse; he retarded the growth of a section, badmouthed those he didn't like. During his tenure, he suffered a stroke, and was not fully rehabilitatable. When he recovered sufficiently, he resisted coming back to the department for six months. To solve the problem, I offered him a part-time position doing general radiology, but he protested. He attempted to subvert activities

in the department, acting out his anger at his new disability.

The later consequences of this unsettled situation were that he sued the department, and me. In-house legal staff were not able to mount a strong defense, so outside counsel were hired. After a six-week trial, the department paid 100,000 dollars to cover this, although they had won. This was not the end of the matter – for seven years after this, I received two death threats and menacing emails. Then he died. The lessons I learned were:

- Investigate fully before hiring;
- Build the department from below as part of an ethos of faculty development;
- Hire for the department, and not for everyone else, and
- Get a workhorse not a showhorse!

Discussion

Prof. Philip Gishen kicked off the post presentation talks by highlighting the differences in hiring and firing between the U.S. and UK: "In the UK there is an interview process where you are not supposed to know the details of the background of candidates – you just get a CV and that's it. There is much less success in discovering these types of individuals." Prof. Baker responded by stating "I call up about everyone I hire. I found another candidate the other day that is a felon. We do background checks on everybody. It is the opposite of the UK. Even mild crimes are uncovered and we try to get as much information as possible."

Dr. Howard Galloway stated that he has experienced a similar situation where they "... don't have the luxury of terminating people" and asked Prof. Baker what do to with resistant team members when one is not permitted to terminate.

Prof. Baker stated that this is not a situation he finds acceptable, adding "Not being able to terminate employees means

you can't perform one of the functions of your appointment" and that he wouldn't take the job. He added that he has fired over 30 people over the 30 years he has been working. His advice is to "marginalise destructive individuals in some way so they can't harm the department". He added a word of warning to the other Chairmen present: "There are certain statements made that are alarm bells when I hear them said about a team member: "The department is dysfunctional", or "Morale is low here". Usually, this is a fairly reliable sign that I have to get rid of that person."

Prof. Gishen rounded up the discussion by stating that hiring and firing is "A problem throughout the EU. There is little opportunity to terminate people, and it's very difficult". His own advice is "Never go to war with a colleague – it is much better to marginalise that person, put them out of harm's way so the department can continue to run efficiently, otherwise you are left with an intractable problem."

New Building Construction

Consider any long-term consequences from outsourced agreements

Michel Claudon / FR



I was very surprised to receive an invitation to discuss a regrettable management decision - regret is not a word one is used to hearing in management courses! To open, I want to make a definition of the word to elucidate what I am going to speak about. For me, this is a feeling of distress and disappointment about something one wishes was different. Let me also preface this talk by asking attendees, "How can I evaluate my management and why? Who should evaluate regret? Is it a self-evaluation? Should the patients or the institution's manager perform this evaluation? And when should it be done: A day, week or even a year after the decision?"

As we may all have heard, everything happens to you for a reason. Sometimes the reason is very minor – but even



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small decisions can have huge consequences. For example, I didn't note an appointment on my agenda a few years ago regarding a meeting with hospital managers to choose the location for a new CT scanner. It became clear that I should have been there to favour my hospital for the location. On the evening when this meeting was taking place, my mobile phone rang, and it was the Vice Dean of the hospital ringing to ask me "Where are you?" As I hadn't noted the meeting on my agenda, I was very embarrassed - I immediately went to the meeting, apologising to those present. However, the next day I learned that unfortunately the conclusion of the meeting was different to the one I had expected – the location of the CT scanner was not our institution. Our team was disappointed. However, after a few days I tried again to appeal to those in charge in a stronger way than before and won. So, it came out okay and the 'mistake' had a positive ending.

However, my second regret was more serious. It was regarding a vote for the construction of new buildings. In 2007 I was elected by colleagues to represent them at a meeting regarding a decision to construct a new building to allow us to work with different departments. For the other, smaller hospitals, this would surely improve their or-

ganisational efficiency. The final agreement was to be a leasing contract with an external company who would own the building for three years, and who would be paid six million euros a year for the construction. In 2008 our new general manager calculated that the deficit caused by the construction would be to the tune of 20 million euros. He calculated that the financial advantage offered by the construction of these new buildings would save two million euros a year, so by paying six million euros a year to the external company for its construction, we were left with an additional deficit of four million euros per year. Obviously, though I voted for this decision, I didn't know that this would be the outcome. As time passed, restrictions in our financial income prompted the hospital to develop a strategy to include more outpatients with a diminution of 50 percent in the number of beds and increased capacity within all existing buildings. Finally, this allowed us to offset the deficit by generating new income. I would wrap this up by stating that it can be difficult to predict what's going to happen in the future, but that management is an ongoing process and solutions can always be found. In the words of Victoria Holt, "Never regret – If it's good, it's wonderful. If it's bad, it's experience".

Recruitment Challenges

Avoid departmental inbreeding

Luis Donoso / ES



Our radiology service is less of a traditional department, and more of a 'group'. It consists of over 100 radiologists, nuclear medicine professionals, plus 300 other staff, and is part of a big group working in a network with 10 other hospitals. It is quite a 'nice mess'! To prepare for this talk, I asked myself what are the classical questions in decision-making? For me, these are:

- What are the options?
- What consequences might they bring?
- How likely are they?
- How desirable are they?

Searching in the literature, one finds in addition to these important cognitive considerations, that there are strong emotional factors in decision-making. I discovered that the emotion that has received the most research attention from decision theorists, is regret. Why is regret so important in decision-making?

One interesting article states that a bad outcome resulting from action seemed to be less regrettable than the same bad outcome when it was the result of inaction. (Connolly T. and Zeelenberg, M. – Current Directions in Psychological Science 2002 11: 212). Importantly, people that are asked to recall real-life regrets tend to recall omissions more frequently than commissions. Regrettable actions hurt more than omissions in the short run, but when looking back, people experience more regret over inactions. People may regret inactions more than actions in the short term also. To add to this confusion, some people might experience high self-blame and regret even when the outcome is good. For example, suppose that you leave a party somewhat inebriated and decide to drive home rather than take a cab. You arrive home safely (good outcome), but the following morning you are racked with regret as you think back on your decision. What we can deduce from this is that a good outcome is not always the best result in terms of decision-making.

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New Dimensions in Breast Screening

Tomosynthesis Reduces Callbacks & Improves Early Detection

Radiologist Stephen L. Rose, M.D., knows that pairing experienced breast radiologists with state-of-the-art equipment can make a life-saving difference in the early detection and diagnosis of breast cancer. As president and founder of Rose Imaging Specialists, the largest community-based breast imaging practice in Houston, Texas, he has helped revolutionise the way breast imaging is done, using full-field digital mammography, stereotactic biopsies, breast ultrasounds, and breast MRI. The practice's 13 breast radiologists serve eight major hospitals in the Houston area providing women with a full range of imaging services and performing up to 75,000 mammograms annually.

Dr. Rose is part of the national clinical trial to evaluate tomosynthesis technology, working since 2009 with the Breast Care Center at Memorial Hermann Memorial City Medical Center in Texas to install Ho-

logic's Selenia® Dimensions® digital tomosynthesis system.

Tomosynthesis to Revolutionise Breast Cancer Screening

Dr. Rose is impressed with the quality of the technology. "I think tomosynthesis will revolutionise the way we screen for breast cancer," declares Dr. Rose. "The quality of images with Hologic's 2D digital mammography systems is excellent, but the ability to peel away layers with tomosynthesis is a tremendous advance and provides an opportunity to markedly improve what we're doing in breast screening," explains Dr. Rose.

Dr. Rose chose Hologic's Selenia Dimensions 3D system because of its unique implementation of tomosynthesis technology. "I see Hologic as the leader in tomosynthesis," states Dr. Rose. "Prior to

recommending Hologic's Dimensions 3D system I thoroughly researched this technology; talking to other radiologists and manufacturers. I really like Hologic's approach to tomosynthesis – combining 2D and 3D imaging on a single system gives us the flexibility to use both imaging modes. No other vendor offers this combination in one system."

In addition to the Hologic Dimensions 3D system, Dr. Rose and the eight hospitals he serves transitioned to 16 Hologic Selenia Dimensions 2D systems, which will easily convert to 3D breast imaging when the technology receives FDA approval. "At the end of the day, I don't think the cost of tomosynthesis will be all that different from digital mammography, yet it will enable us to reduce our callback rate significantly and increase our ability to find smaller breast cancers. So it really does appear to be a win-win situation, which

Dr. Rose says tomosynthesis is the most exciting tool he has seen in his professional career. He believes this technology will help find cancers earlier with fewer call backs needed for additional studies.





Rose Imaging Specialists performs between 65,000 and 75,000 screening mammograms annually, and each is done by a breast imaging specialist.

very few new technologies provide.”

Dr. Rose considers a screening mammogram the most critical tool for the early identification of breast cancer. “If we don’t see anything on the screening mammogram, then it doesn’t matter what other tools or modalities we have because we won’t look any further.” To date, Dr. Rose and his staff have performed almost 400 mammograms using tomosynthesis. “I think tomosynthesis is the biggest thing to happen to breast imaging in a long time because unlike some modalities, tomosynthesis is easy-to-use and efficient, enabling us to screen almost everyone,” declares Dr. Rose.

Tomosynthesis Greatly Improves Specificity

“Tomosynthesis allows us to look at slabs to see if anything is hiding in the breasts,” continues Rose. “It allows us to be much more confident that an area is ok. We can see more clearly those areas we might have questioned on a digital mammogram and put to rest our concerns on questionable areas that we previously

banged our heads against the wall trying to decide if they were something or not. With tomosynthesis it is pretty obvious, as we page through the area, if what we see is just breast tissue or something more significant. Tomosynthesis will also be a big help with cysts as it allows us to see the margins of the cysts and put concerns about those to rest as well.”

Digital tomosynthesis is a 3D imaging technology that enables radiologists to see ‘inside’ the breast. With Hologic’s Dimensions tomosynthesis system, an x-ray tube rotates around the compressed breast taking 15 images from numerous angles, reducing interference caused by overlapping tissue that can obscure views and hide potential cancers.

Initially, Dr. Rose looked to tomosynthesis as a tool for women with dense breast tissue, but he also has found it to be a valuable screening tool for women with fatty breast tissue. “I had a case recently where I did a digital mammogram and was concerned about an area so I brought the patient back and one of my partners did an

ultrasound. The patient also agreed to a tomosynthesis mammogram, which showed clearly that the area was cancer. This is a situation where we saw something with digital mammography, but we weren’t sure what we were seeing. Using tomosynthesis it was very obvious we were looking at cancer. So even with fatty tissue there are cases where we will find very small tumors that otherwise would have been missed.”

As he looks to the future, Dr. Rose sees a real benefit to having both 2D and 3D imaging functionality on a single mammography system. “There are some cases where you might need to take a 2D mammogram, such as patients with large breasts or with implants. I like having the capability to do both two and three-dimensional imaging with all my systems so tomosynthesis is available for every patient possible.

“Tomosynthesis is the most exciting tool I’ve seen in my professional career,” concludes Dr. Rose. “This technology will help us find cancers earlier with fewer call backs for additional studies.”

The comments included in this article are the opinions and personal stories of the individual hospital and breast center and not necessarily those of Hologic.

The overall feeling of regret at some decision is a combination of these two components:

- The outcome is poorer than some standard (often the outcome of the option you rejected), and
- The decision you made was, in retrospect, unjustified.

If we can anticipate the regret, we may engage in “thoughtful” decision-making. These regrets can be the result of:

- Delays in major organisational changes due to search for impossible consensus;
- Maintaining organisational structures that are not consistent with the current structure;
- Not showing firm commitment to strengthening the role of technicians;
- Overestimating department member’s involvement in management issues;

Discussion

Following his presentation, Prof. Gishen asked Prof. Donoso “How actively do you go out to recruit new staff?” Prof. Donoso responded that there is a “... shortage of radiologists in Spain, especially in Barcelona – we have to act like football coaches, sourcing team members from other organisations that may improve or enhance the current line-up.”

He added that “Informal information from colleagues of a potential candidate when hiring is important. While the hu-

- Insufficient attention to the deployment of quantitative and qualitative methods in the assessment of clinical skills/competence/performance, and
- Paying too much attention to those who complain while ignoring valuable elements in the department. Complaining is good – but we spend too long on it.

The most regrettable one for me is inbreeding in the recruitment of new staff! Why? If you are trying to change your corporate culture, bolster diversity or bring in new skills or talents, it’s harder to do if you’re hiring clones of your current workforce.

Not just doctors, engineers, physicists or biochemists, new staff members in any area of the department can bring new flavours. It’s risky, but the inaction in not doing so was far more regrettable.

man resource personnel won’t commit opinions to paper, they may speak to you over the phone, informally. Informal information is crucial to hiring.”

He added in reference to the previous discussion on hiring that in Spain one may hire someone on a few years contract basis before taking them on permanently, which gives you a great opportunity to view them in action before taking them on for a long-term basis.

Mergers –

Change management

Jarl Jakobsen / NO



During my career, I’ve been through five or six major mergers. In Oslo, we created a new hospital from several public hospitals. The end result included over 20,000 employees spread across Oslo and the surrounding areas. In regards to the merged imaging departments, there were four departments eight different locations of which I was heading two of them.

Resources for the new imaging unit:

- 550,000 visits to exam rooms per year;
- 700 employees – 120 radiologists, 60 residents;

- Budget of 80 million euros;
- Approx. 120 modalities incl. 15 MR, 16 CT, 11 angio, etc., and
- Part of a division consisting of “medical services” – (lab, pharmacology, pathology, microbiology, immunology).

The challenge was to create one homogenous organisation in as horizontal a fashion as possible, given the eight different geographic locations. We were also charged with the job of cutting costs by 2.5 million euros in 2010. Previously we had been competitors with one clear leader in academics. The challenges were that each hospital had different cultures, with different preferred vendors in each entity and demanded the combination of five RIS/PACS systems.

The numbers were getting bigger – we had a lot of patients and employees to take care of and the budget was not big enough. There were also many machines to account for, which now became part of a holistic medical services division, which was being spoken of as a resource. However, behind the theory of mergers, there are several typologies of mergers and becoming part of a medical serv-

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syngo.via and *syngo.plaza* from Siemens

“The combination makes this system one-of-a-kind”

The MR, Nuclear Medicine and PET/CT Center in Bremen Mitte, Germany started using the advanced visualization software *syngo.via* in 2009 and the new PACS *syngo.plaza* in 2010. For users, the major benefits of the integrated Siemens solution are the time savings and the improved quality.

The limiting resource for a radiology practice is the radiologist him- or herself. As a result, the most important thing is to lighten the radiologist’s load if you want to increase the efficiency of the practice,” says Markus Lentschig, M.D. Together with two other radiologists, he runs the MR, Nuclear Medicine and PET/CT Center in Bremen Mitte on the Bremen Mitte Clinic campus. With three MRI machines (MAGNETOM Espree, MAGNETOM Avanto, MAGNETOM Verio) and a PET/CT (Biograph 6), Lentschig and his colleagues cover the entire examination spectrum of a radiology practice.

Markus Lentschig first implemented the *syngo.via* imaging software as a Siemens development partner in early 2009, and from that point on he continued to contribute with his ideas to further optimize the system. A year and a half later, he installed *syngo.plaza*, the first Picture Archiving and Communications System (PACS) from Siemens, which combines 2-D, 3-D and 4-D diagnostics in one workplace.

“Efficiency and quality”

Why *syngo.via* and *syngo.plaza*? Markus Lentschig’s answer is short and sweet: “Efficiency and quality.” The practice sees approximately 20,000 patients every year – an enormous volume for radiology technicians and radiologists, which increases the need for time-saving support. Every minute spent finding and preparing images is a minute taken away from making a diagnosis, and keeps the radiologists from doing their real work. On the one hand, every

radiology office needs a stable PACS that can provide images quickly; this gives the radiologist timely diagnostic tools and intelligent support in order to cut down on time-consuming routine tasks. On the other hand, the office also needs highly efficient diagnostic software. “The combination of *syngo.plaza* and *syngo.via* offers both – and with a largely identical user interface,” says Lentschig. As someone who uses both programs, Lentschig prefers to carry out diagnoses in *syngo.via*. Other radiologists work mostly with the *syngo.plaza* PACS and only rely on the diagnostic software for special cases.

A head examination, for example, shows exactly what is meant by efficiency and quality. The exam procedure varies depending on whether the patient is complaining of pain, getting follow-up care for a tumor or for a stroke. The images are called up from *syngo.via*; any details that are irrelevant for the current diagnosis are automatically removed. The radiologist does not need to process a confusing pile of images first in order to take indication-specific measurements and study the images. The principle behind this workflow involves highlighting the important information and eliminating things that are secondary. This saves time and frees the radiologist from tedious routine work.

In addition, the screen layout for *syngo.via* and *syngo.plaza* can be customized according to the doctor’s personal preferences and the examination requirements. For most of the examinations, Markus Lentschig has created predefined

layouts that his colleagues in the practice can adopt or reconfigure according to their preferences. For head exams, the stroke layout opens automatically because strokes are the most common reason for an exam. If another kind of head exam is required, the radiologist clicks over to the corresponding predefined layout. If needed, the “Patient Jacket” functionality can display all of the previous and new examination results side by side.

Finding and retrieving

But which images do you want to see, and how many? “A decade and a half ago, a stomach exam gave us a hundred and fifty images. Today, a normal exam produces two thousand, sometimes even twice that many. There’s no way I can look at them each individually,” says Lentschig, pointing out a constantly growing dilemma for radiologists: for the greatest possible diagnostic quality, you need as many images as possible – but the flood of images is overwhelming for radiologists. Intelligent selection mechanisms that help them focus on the most important frames can only be a benefit.

The key term here: Findings Navigator. This tool in *syngo.plaza* and *syngo.via* can highlight areas and automatically save them to a list so that they can be called up again with a simple mouse click. “When I show my findings to a colleague, I don’t need to scroll through the entire series,” says Lentschig, praising the user-friendly feature that makes it easier to share the images internally, especially when obtaining a second diagnosis. “The time that my colleagues

and I used to spend searching can now be spent on the diagnosis." This is aided by another application that is also available in both *syngo* programs: the 3-D reference point. With this function, the radiologist can highlight a point on an image that will then automatically be displayed on every level.

Integration of PACS and diagnostic software

Historically, diagnostic software and PACS were two separate systems. In the meantime, the *syngo* philosophy has already allowed Siemens to come very close to creating a uniform user interface with identical functions, as Lentschig confirms: "Anyone who is familiar with *syngo.via* can use *syngo.plaza*, too." As an integrated provider in the public health sector, Siemens combines the elements that belong together – imaging modalities, diagnostic software

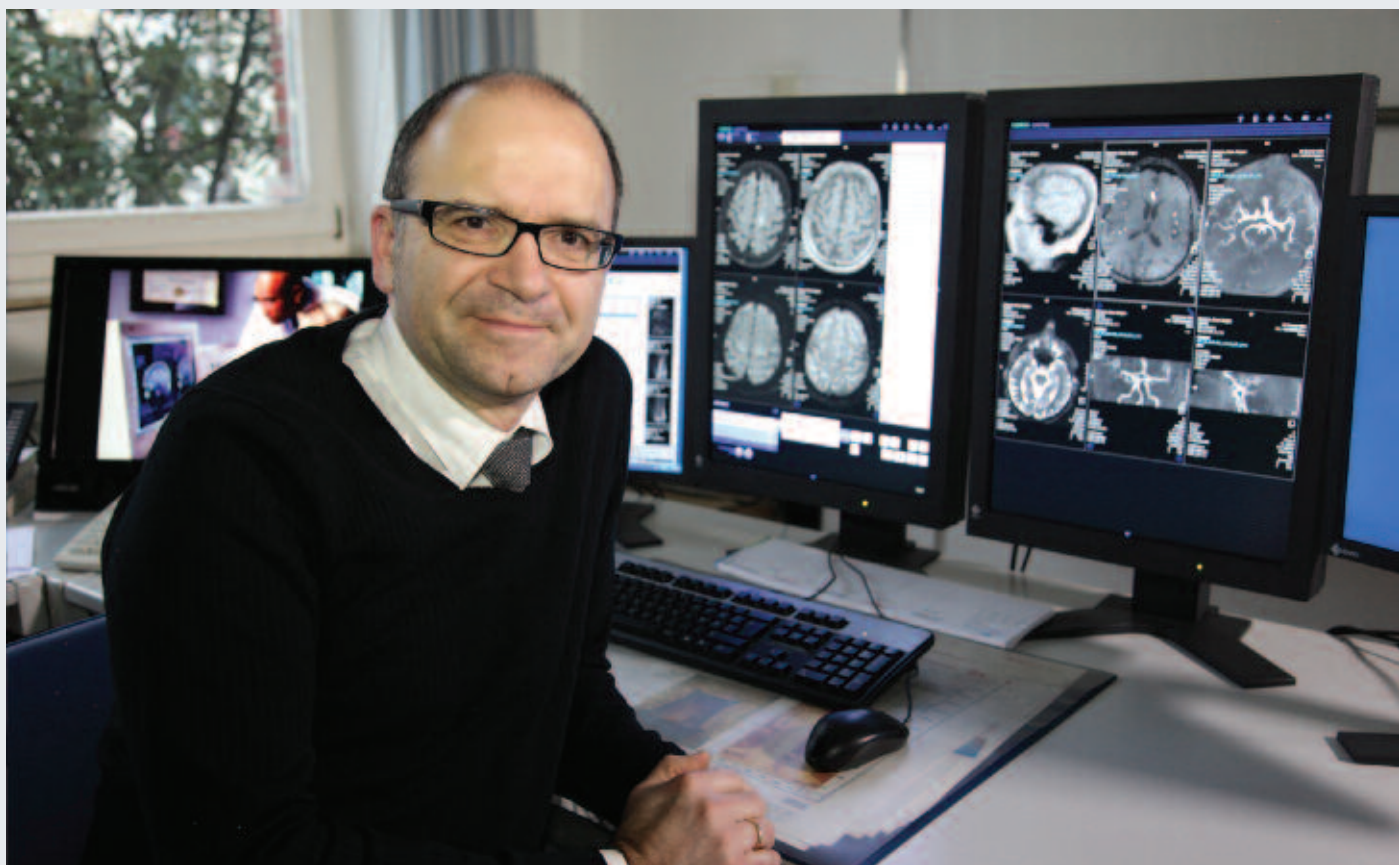
and PACS. But integration is a relative concept, and every development in this direction calls for the next step. "The combination of *syngo.via* and *syngo.plaza* makes this system one-of-a-kind," says Lentschig, emphasizing the value of his diagnostic and PACS solution. "Every integration improvement puts the existing solution farther and farther ahead of the competition." New technical possibilities inspire further desires in the users. A current example of this can be seen with the web applications and availability on mobile devices, which many radiologists have embraced with open arms.

Key concept: Web Options*

In addition to *syngo.via* and *syngo.plaza*, Siemens soon will provide the option to view diagnostic reports and images via a secure internet connection. This will allow the referring doctor to view the patient's

images on the screen even before the CD is sent over from the radiology practice, which improves coordination between the medical offices and increases loyalty to the referring doctor. The simplified communication also supports exchanges between radiologists when they need to get a second opinion. "It gives me more personal freedom because I then can communicate with the practice from home or even look at the images on my iPad while I'm on the road," says Markus Lentschig. "Especially when it comes to iPad use, Siemens demonstrates that this company is driving technical progress with its innovations, while simultaneously keeping up with current trends." So are *syngo.via* and *syngo.plaza* an investment in the future? "Absolutely!"

www.siemens.com/syngo.via
www.siemens.com/syngo.plaza



Markus Lentschig, M.D.: "I don't know anything else that compares."

* The application is not yet available and is not for Diagnostic Use. For iPhone and iPad country specific laws may apply, which need to be considered before using for diagnostic reading/viewing.

ice the division that offers totally unrelated services is more a challenge than a resource.

What happened? My first regrettable management decision was that I agreed to be the new chairman for all of this. I was partly running my own unit while also working as project leader (two full time jobs for a while) for the new organisation in Q3 and 4, 2009. From Q1, 2010, I was formally the new leader for the new department.

This new organisation was up and running from May 2010, in which there were eleven units making direct reports and 42 different units on the lower level, for example sections for neuroradiology. This new organisation chart was debatable and controversial and it was not organised the way I primarily preferred it. My administrative staff became centralised, and my business manager was on a level 'above' me. My formal authority became reduced, and I had no investment or authority in radiological IT, as one example. I also experienced a management culture different to where I come from. What do you do then? I implemented a proper decision-making process. Finally I ended up with two regrettable decisions: Firstly, becoming chairman, and secondly, stepping down.

However, when I examine what happened, I ask myself why I might regret these two actions? In terms of becoming the chairman, there were certain positive experiences:

- I got new challenges that taught me a lot;
- I got more power, more influence, and

- We succeeded with the merger though not in 'my way'.

On the negative side, the tools needed to practice good management were removed. There was incompatibility between our set of human and leadership values. With regards to stepping down as Chairman, my regrets were:

- I made a mistake in the first choice of accepting the job without proper agreements up front;
- I experienced feelings of loss;
- It changed my relationships with colleagues, and
- It changed my working situation with a loss of power.

However, the most important question is: Was it worthwhile and right to make the regrettable decisions I have outlined here? I can say that I felt I was true to my own set of values and experiences. In addition, my own reaction to feelings of loss is something I have to handle myself. You have to take care of your own life and handle what happens to you in the best way. I can still be true to my education, experience and interest in management – I have a degree in management and I am a member of national and MIR organisations, so it was important when I stepped down that these years were not spent in vain. I followed those authentic interests. I am now refreshing my academic radiology and clinical radiology – thus, I have the best of both two worlds. My conclusion? Regrettable decisions may be worthwhile.

Choosing a PACS System –

Ensure the future stability & long-term prospects of the vendor

José Vilar / ES



I feel a certain sympathy with the other presenters. Many of the mistakes discussed sound familiar to me, but I have managed to choose one out of the undoubted hundreds that I have made. Just for background, I work at the Valencia "Hospital Univeritario Dr. Peset", a 520-bed hospital performing 220,000 exams per year, linked to the University of Valencia. During a previous 'Management in Radiology (MIR) congress that was held in Parma, in 2000, we presented our experience in

the development of a local teleradiology network, which we developed working with an external group of informatics specialists, as a complementary tool to be used in the Valencia Community breast cancer screening programme. At that time we had no PACS system and were accordingly very proud of this new IT programme that allowed us to be early adopters of the new means of sending images from one centre to another. A few years after the project gave us this initial experience in implementing teleradiology to share images and data, it was decided that we were going to invest in a PACS for the purposes of improved image management. A tender was initiated for the purchase of a PACS system that would be implemented for the whole community of Valencia within the different hospitals. 1,200,000 euros was assigned for investment purposes for the large hospitals and 600,000 euros for smaller hospitals. We were considering whether to go for one of the large manufacturers of PACS in the European market, versus our own internally developed system.

As mentioned, we had this small group of IT specialists who developed an early system of teleradiology and who had already defined a PACS, so we had to choose between them and a new provider.



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Our own system was a work in progress that was not fully developed – there was no large firm behind it, it had only a few personnel working on it, but they were very enthusiastic. We had to make a decision! The additional problem was that the politicians in power decided that since we already had our own system in development, they would cut our budget by 50 percent - this was certainly detrimental to our hospital. Finally, I went with our own system. It was a mistake. Afterwards, this small group was absorbed by a large IT group in Spain – this large company was again absorbed the next year by a bigger national IT company, which had little specialised experience in healthcare IT such as PACS.

The consequences were as follows:

- We had an unreliable system;
- We were faced with continuous changes;
- Our system was slow with a loss in efficiency, and
- There was a negative influence on our radiologists and other personnel.

So the lesson to be learned when acquiring any IT system is never to choose a product that hasn't been fully tested or confirmed – probably this is very obvious to you but it was not at the time, either to me or my team. We lost a lot of time and now we are ready to buy another system and will decide completely differently.

Discussion

Dr. Maurizio Centonze stated following the presentation that "In Italy, when we have to make a decision about, for example, PACS or MRI, we have to perform a technology assessment as part of process management – the problem with this is that there is insufficient time to really investigate as much as one would like".

Prof. Vilar responded "This is true – radiology is difficult to Chair, not only can it be hard to find the time to make deci-

sions, but despite the experience you acquire you have to be always prepared for new things, with no precedent, and you are not enough prepared for it."

Prof. Donoso then raised an excellent point - whether such a major decision "Should be taken by the Chairman of a radiology department?" Said Prof. Vilar "No, I assumed the decision was mine, however, it should be more than just the radiology de-

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TECHNOLOGY HORIZONS IN THE ULTRASOUND MARKET



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In 2009, the global market for ultrasound imaging equipment was estimated to be worth 4.9 billion dollars; 6 percent less than in 2008, impeded by factors such as healthcare spending cuts and postponed equipment purchasing in Western Europe and North America. The market is expected to grow to more than 5.3 billion dollars by 2016, driven primarily by growth in hand-carried ultrasound (HCU) devices and expansion in emerging geographic and clinical markets. The major growth facilitating trends in this space include aggressive pricing, opportunities in emerging clinical applications requiring point-of-care imaging and specialised hardware and software for cardiology. Overall growth in medical imaging will also continue due to growing populations of elderly people worldwide, accompanied by a concurrent rise in chronic disease rates. Main restraints in the ultrasound market include the slow economy in many countries, reimbursement restrictions and intense competition from MRI and CT.

The wide range of handheld ultrasound devices have been the most significant technological innovation in ultrasound. HCU's allow ultrasound to effectively monopolise a vast range of applications in point-of-care imaging. After Sonosite Inc. first introduced hand-carried ultrasound in 1999, GE Healthcare jumped on board, quickly establishing a broad base in this segment with a wide range of HCU's. The other significant technological innovation has been the advent of additional software capabilities/algorithms that improve the diagnostic efficacy of cardiac ultrasound equipment. Gripping Heart, a cardiology research company based in Sweden, recently came out with a software platform for advanced analyses of the heart and circulatory system. The software is based on the mechanical functions of the heart and is illustrated by simple diagrams. The programme uses databases for benchmarking and validation within different patient categories.

Current Challenges in Diagnostic Workflow

Described below are some of the top challenges faced by professionals when considering the adoption of new technologies.

- **Lack of Experienced and Skilled Technicians** - Technical proficiency of staff poses a major challenge. An aging workforce is also a looming challenge. Most technicians are over 40 years of age and there are fewer technicians to replace them as they retire.
- **Differences in Applications of Nascent Technologies** –

Variability of the application of new technologies tends to create discrepancies in diagnosis as these are non-standardised across centres. This may result in the prescribing of unnecessary tests.

- **Proliferation of More Complex Systems and Technologies** – Innovation has resulted in a proliferation of complex systems in addition to rather than as replacements for existing diagnostic infrastructure. Adding a new feature means an increase in its cost both capital and for training. This also poses challenges in terms of the need for new data structures and reporting templates.
- **Transfer of Data in a Non-Digital Environment** – Accessibility to and management of increasing amounts of data generated by new diagnostic modalities has been an issue especially in a non-digital environment where diagnostic reports are often distributed using couriers and the postal system and could lead to a breach of patient privacy.

Top Trends in the Ultrasound Market

3D and 4D Ultrasound

Compared to the old generation of 2D ultrasound devices, 3D technology has added a dimension of depth, and 4D a dimension of depth and time. 3D and 4D ultrasound devices are becoming increasingly popular in Eastern Europe, especially in cardiology and ob/gyn ultrasound. The market for 3D and 4D is however not yet saturated there, mainly due to financial constraints. In other regions, such as Scandinavia, the reason for low market penetration of 3D/4D ultrasound is lack of acceptance among doctors. Research shows that doctors in Scandinavia do not consider 3D/4D ultrasound to provide more clinical value during diagnosis and are therefore quite reluctant. Convertors of images in older generation ultrasound units were based on hardware, which was built in the ultrasound device. The new generation uses external computers, which perform the scan conversion. This has resulted in an increase of calculation power of ultrasound devices and has led to major improvements in quality.

Integration with PACS Systems

Healthcare facilities can obtain either a PACS system designed exclusively for ultrasound, or a multi-modality PACS system with a special module for ultrasound imaging. Research shows that the latter option is much more popular among end users.

Interoperability with PACS systems is considered to be an increasingly important feature of ultrasound devices. Furthermore, ultrasound manufacturers are increasingly interested in expanding into healthcare informatics. For example, in August 2010, Philips acquired CDP Medical, an Israeli-based developer of PACS systems, a subsidiary of medical device distributor Medtechnica.

Re-Construction of Transducers

Silicon transducers have been recently introduced to the market as a viable substitute to the traditional piezoelectric ones. Silicon transducers are known as capacitive micro-machined ultrasonic transducers (CMUT). They offer higher quality of image, high frequency, wide bandwidth, high sensitivity, ease of fabricating large arrays, low cost and potential for integration with electronics. An emerging trend, manufacturers are already working to deliver such transducers to the market.

Automation of Ultrasound Scans

Advances in ultrasound technology have led to a trend for automation in ultrasound procedures. Automation minimises human intervention in the procedure, as the system is software-controlled. Automated ultrasound is gaining popularity in breast scans. Such systems integrate an automated transducer arm (instead a handheld probe) with a display workstation. With increasing awareness of breast health and multiple social campaigns promoting early detection of breast cancer, the demand for automated ultrasound is expected to increase, especially as this technology is considered to be adjunct to mammography. The first automated system for breast ultrasound was developed by U-Systems. Later, Siemens developed ACUSON S2000™ Automated Breast Volume Scanner.

Incorporation of GPS Technology

Ultrasound devices are being increasingly used to provide visual guidance in needle procedures. Using this guidance improves performance, outcomes and cost-effectiveness. Image guidance is most frequently used in interventional medicine (during biopsies of breast, thyroid or prostate) as well as anaesthesia and vascular access. For example GE launched Venue 40, a compact ultrasound device for use in point-of-care for diagnostics and needle guidance.

Furthermore, one emerging trend is incorporation of the technology similar to Global Positioning Systems (GPS), which allows visual position tracking during the scan, marking points in the body to locate an anatomical structure from a different angle. It also simplifies the counting of masses, lesions and nodules. GPS technology allows for guiding biop-

ses in an efficient and effective manner and is predominantly applicable in cardiology and radiology. Companies such as GE (Logiq E9), Philips (PercuNav) or Ultrasonix (SonixGPS) already introduced devices with this kind of technology to their portfolios.

Highest Growth in Surgical Ultrasound

Surgical ultrasound is the smallest among the segments of the total ultrasound market. Surgical ultrasound consists of the high-end equipment used in operating rooms (OR) to visualise the size and architecture of the various organs such as pancreas, liver, spleen, etc. as well as for examining blood vessels, assisting in vascular applications and precise location of anatomical structures to ensure better planning. It is also used for arthro-sonography during joint surgeries.

The pre-operative uses of surgical ultrasound include evaluation of intra-abdominal and intra-thoracic fluid. This market segment also consists of transcranial Doppler used during surgeries. Furthermore, surgical ultrasound consists of equipment for laparoscopic ultrasound, one of the most important applications of ultrasound in surgery. However, it shows higher growth than any other segment.

In some countries, such as the UK, surgical ultrasound is performed by radiologists. This results in lower installed base of surgical ultrasound. Germany is the exceptional market with the installed base being greater than in any other of the markets attributed to the fact that the technology uptake in Germany is in general very fast and induces replacement processes. Moreover, with high-quality educational programmes, German doctors are well-educated and open for innovative solutions. Relatively fast uptake of surgical ultrasound can be observed in Eastern Europe as hospitals are specialising in this region and require more sophisticated equipment. With the availability of EU funds, it is expected that this trend will continue. With technological advancements, surgical ultrasound is increasingly competitive against other modalities, such as CT or MRI.

Conclusion

Ultrasound is considered to be a modality where technology migrates very quickly. Research shows that features of this modality, which were considered high-end two years ago are now seen as mid-range or even low-end ones. This results primarily from high popularity of ultrasound as a primary diagnostic tool leading to fast maturing of the ultrasound market. High level of price competition leading to reducing prices of this modality further enhances the adoption of new technologies among healthcare facilities across Europe. ■

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APPLICATIONS OF BEDSIDE ULTRASOUND

Protocols Needed for Widespread Adoption



Accurate First Impressions Crucial

Obtaining an accurate initial diagnostic assessment is the goal of every clinician, but has particular life and cost savings in the patient who presents acutely ill or in a remote location. Perhaps due to revealing features unique to the presentation and to optimise patient throughput, our initial patient assessment is typically “front-loaded.” As time and clinical stability permit, we place more effort at the first encounter in obtaining historical data, admission lab testing and imaging as compared to subsequent visits. The provisional diagnosis that emerges from this interaction is therefore often unquestioned and treatment is usually initiated, often with ensuing consultation and confirmatory testing. Early diagnostic errors could have disastrous outcomes both in patient survival and costs, by resulting in inappropriate triage, tests, treatments, or extended hospital stays. Therefore, a more accurate “first impression” of the patient’s illness could reduce time-to-diagnosis, which in turn would minimise costs and medical errors.



Physical exam skills once relied upon for immediate diagnosis have deteriorated over the years, partly supplanted by sophisticated point-of-care lab testing and imaging. In particular, exam skills using the indirect methods of percussion or auscultation for cardiopulmonary or intra-abdominal pathology have been lost or abandoned. Few physical exam findings of these internal regions, other than pulselessness and wheezing, will elicit immediate treatment without more confirmatory testing. In addition, the difficulty of performing auscultation and percussion in noise-filled emergency rooms or intensive care units and the minimal time for patient exam limits the use of time-honoured physical exam techniques. This evolution away from older, traditional practices may be justifiable, as evidence-based scrutiny is lacking for many of these subjective exam techniques when applied in contemporary settings.

What Role Does Pocket-Sized Ultrasound Play?

It is against this background that pocket-sized ultrasound devices have emerged. Amidst other tools that appear simplistic in comparison, such as the sphygmometer, tra-

ditional binaural “stethoscope” and reflex hammer, the ultrasonic stethoscope ultimately fulfills its own definition by allowing us to finally “see” pathology that centuries-old methods such as percussion and auscultation had us infer about the lungs, heart and intra-abdominal spaces. Laptop-sized, hand-carried ultrasound platforms have existed for years and have great versatility, inspiring the bedside use of ultrasound for limited exam and procedural guidance as in the case presented.

However, much like application of an electrocardiograph, these larger, luggable devices must be found in the corner of the department and wheeled by cart to a patient’s bedside that is already cluttered by personnel and equipment. The distinct advantage of the pocket-sized device is the on-the-spot immediacy and convenience of its use as part of the physical exam and not as a separate diagnostic procedure. The limitations of these devices when compared to standard equipment are yet to be fully understood and are likely related to its accuracy during difficult ultrasound applications, including difficult windows in need of advanced image optimisation techniques or in the detection of subtle findings such as wall motion abnormalities.

Getting a Clue to Diagnosis

Despite novelty, appeal and modest costs (less than 10,000 dollars per device), pocket-sized ultrasonography will encounter many challenges to widespread adoption. In order to generalise and standardise use, there will be the need for development of suitable imaging protocols for these smaller devices, akin to the cardiac physical exam. Prior cardiac hand-carried ultrasound studies have been biased by examining advanced imaging by cardiologists or use by highly-motivated noncardiologists and demonstrate limitations in accuracy and performance relative to the complexity of the imaging protocol employed.

The imaging protocol in the case presented, CLUE, is a prototypical application for bedside ultrasound and is well-suited for pocket-sized devices. CLUE is brief, avoids the complexity of Doppler, and provides diagnostic and prognostic information. Although CLUE will miss subtle diagnoses such as endocarditis and isolated wall motion abnor-

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CASE STUDY

Paramedics found a 50 year-old man in his apartment, disheveled and with altered mental status. Mildly hypothermic and hypotensive, he was brought into the emergency room where a brief initial cardiovascular physical survey found no pulmonary rales, wheezing, cardiac gallops or murmurs. The patient was intubated for airway protection.

A three-minute cardiovascular limited ultrasound exam (CLUE) using 2D imaging of six sites was performed at the bedside using a 3MHz transducer. The parasternal long-axis left ventricular cardiac view demonstrated depressed LV systolic function and mild left atrial enlargement, suggesting congestive heart failure. A “four-corner” exam (two apical and two basal views) of the lung, quickly showed bilateral ultrasonic lung comet-tail artifacts (see Figure 1) and pleural effusions, consistent with pulmonary oedema and chronic heart failure.



Figure 1:

Bedside apical lung view using a laptop device and a 3.5MHz cardiac transducer demonstrates the ultrasonic lung comet-tail artifact, consistent with pulmonary oedema or interstitial lung disease.

The subcostal view excluded a significant pericardial effusion indicative of tamponade, but demonstrated right ventricular enlargement, consistent with pulmonary hypertension. A midline abdominal scan showed a dilated intrahepatic inferior vena cava, suggesting ample central venous pressure and found an abdominal aortic aneurysm consistent with advanced atherosclerosis (see Figure 2). The patient underwent head, chest, abdominal and pelvic CT scanning, which were remarkable for subdural hygromas and a 5.5cm abdominal aortic aneurysm without signs of rupture. He was admitted to the intensive care unit where a 5MHz ultrasound venous exam was used to gain jugular venous access in the neck and then exclude subsequent pneumothorax by the presence of persistent lung sliding and comet-tail artifacts. Before venous compression stockings were applied, compression of the deep veins at femoral and popliteal sites was demonstrated by using the same ultrasound transducer.



Figure 2:

Bedside longitudinal view of the abdomen demonstrates an abdominal aortic aneurysm, consistent with advanced atherosclerosis.

malities, the application time (less than five minutes) and training requirements are comparable to that of auscultation, making it suitable for use by all physicians who need immediate bedside data on cardiopulmonary structure and function. CLUE will increase the sensitivity of the initial evaluation for cardiopulmonary disease and, particularly in patients with unexplained dyspnea or hypotension, could result in earlier, more accurate referral for echocardiography, CT imaging, and cardiac or pulmonary consultation.

Once full-body imaging protocols have been developed for pocket-sized ultrasonography, validation of the accuracy and clinical impact of this “ultrasonic physical” upon outcome can be performed, a requirement never fulfilled by

currently employed physical exam techniques. Research, coupled with consensus opinion, could define the accuracy and competency requirements necessary to train a generation of physicians in bedside ultrasound. CLUE instruction can be successfully incorporated into the formal internal medicine curriculum as it has for years at the authors’ institution, despite the recent mandatory reductions in residency hours (see figure 3).

Implications for Standard Studies

In addition to the salutary influence on initial diagnostic impressions, limited or screening ultrasound exams

Figure 3:

Two internal medicine residents, each with a different pocket-sized stethoscope, learn and demonstrate imaging techniques on their chief resident, during dedicated ultrasound training at our institution.



may have profound consequences on referral for conventional ultrasound testing. Multiple studies have been performed to project the diagnostic and cost effects of a “limited” echocardiographic exam upon referral for a standard echocardiogram. These studies suggest that the advantage of more accurate limited bedside exams is in the reduction of unnecessary testing of low-risk subjects. In the utilisation of echocardiography for suspected mitral valve prolapse, a limited echo screening strategy in which only abnormal limited studies would invoke referral for a comprehensive exam projected a 50 percent reduction in echo costs through the elimination of essentially normal studies.

Conversely, the high sensitivity of bedside ultrasound will increase the number of referrals for formal studies for suspected abnormalities that may be purely incidental or asymptomatic. The frequency of incidental echo abnormalities can be significant in certain populations, approaching 80 percent in elderly male inpatients. The cumulative effect on cost, missed diagnoses, and study volume will remain unknown until a screening bedside cardiac exam is formalised and minimal competency requirements are defined. However, the overall effect of an improved bedside exam may support a laudable, cost-neutral goal of shifting conventional ultrasound resources away from a healthy normal population and towards a more ill population with unsuspected disease.

Conclusions

Device application and novel ultrasonic exam “signs” will need to be elucidated in the coming years. Current medical practice is much more circumspect of the cost and effect of any additional diagnostic techniques, particularly those with accuracies that vary with physician skill, and will require evidence-basis for clinical application of these devices. The true determinant of the success of the ultrasonic stethoscope will be in whether it can disseminate into general medicine and not simply be a sophisticated tool for expert subspecialties. Although it seems likely that pocket ultrasound could improve any physician’s immediate bedside impressions, questions remain regarding how the overall diagnostic accuracy and costs of this skill-dependent, subjective technique will integrate with the objective data of conventional laboratory and radiographic imaging. At the present time, further studies are necessary to formulate and test the accuracy of robust imaging protocols suitable for these smaller instruments. ■

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DIAGNOSING PULMONARY EMBOLISM

Clinical Problem or Methodological Issue?



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The clinical spectrum of pulmonary embolism (PE) ranges from asymptomatic to sudden death. PE may be clinically silent (Moser et al. 1994) or may present as unexplained breathlessness, chest pain (central or pleuritic), cough, haemoptysis, syncope, palpitations, tachypnoea, tachycardia (heart rate >100), cyanosis, fever, hypotension (Systolic BP < 100 mmHg), right heart failure, pulmonary hypertension and leg swelling. However, these clinical features are common in patients who subsequently are diagnosed not to have PE (Miniati et al. 1999).

While certain symptoms and signs are more commonly observed in PE than other conditions, it is not possible to confirm a diagnosis of PE on clinical features alone. The diagnosis of PE must be confirmed or disproved on the basis of a conclusive imaging test, due to the inherently high mortality if left untreated. Treatment is also associated with significant risks. Because diagnosis cannot be established solely on the basis of clinical observations or on the outcome of simple investigations such as the ECG, chest x-ray or blood chemistry, imaging tests are required to confirm or refute a diagnosis of PE. A number of imaging tests have been employed for this purpose.

1. Conventional pulmonary angiography (PA), previously regarded as the gold standard.
2. Ventilation and perfusion scintigraphy (V/P_{SCAN}) was for a long time the principal diagnostic method of choice.
3. Multidetector computer tomography (MDCT), frequently cited as the primary diagnostic method for PE diagnosis.
4. Magnetic resonance pulmonary angiography is still at an early stage of development.

What is the New Reference Standard?

A study by Baile, showed that PA had a sensitivity of only 87 percent and positive predictive value of 88 percent (Baile et al. 2000). They concluded that PA as the gold standard can be misleading. Interpretation is complicated by wide inter-observer variability (Schoepf and Costello 2004; Stein et al. 1999). PA is now rarely used in routine clinical practice. Nevertheless, in special cases, PA has a role in centres with highly qualified angiographers. For clinical routine V/P_{SCAN} and MDCT are used. Planar technique for V/P_{SCAN} is still frequently used, however,

several studies show the inferiority of this technique compared to tomographic V/P studies based upon single photon computer tomography (V/P_{SPECT}) (Gutte et al. 2009). Subject to availability, V/P_{SPECT} is generally feasible in nuclear medicine departments. In accordance with EANM guidelines, there is no reason to adhere to the obsolete planar technique (Bajc et al. 2009a, b). In this article the comparison of available methods focuses on the need for immediate diagnosis of PE in all patients, enabling rational, efficient therapy at optimal cost.

Principle of PE diagnosis with V/P_{SCAN}

V/P_{SCAN} is based on the fact that emboli affecting individual pulmonary arteries cause characteristic lobar, segmental or sub-segmental peripheral wedge shape perfusion defects due to the distinctive pulmonary arterial segmental anatomy. Within segment(s) affected by PE, ventilation is usually preserved. This pattern of preserved ventilation and absent perfusion, known as V/P mismatch, provides the basis for PE diagnosis.

The ventilation scan maps regional ventilation and helps define lung borders, thereby facilitating the recognition of peripheral perfusion defects. The ventilation scan may also provide additional information about cardiopulmonary disorders, others than PE. For example, in COPD, the distribution of ventilation is uneven and in aerosol studies focal deposition is often observed in central or peripheral airways. Pneumonias cause regional ventilation defects, usually more extensive than the associated perfusion defects. Combined ventilation and perfusion studies increase specificity for PE diagnosis and allow recognition of alternative pathology. It is therefore recommended that in PE diagnosis, a combined one-day protocol is used (Bajc et al. 2009a, b).

Comparison V/P_{SPECT} vs MDCT

The absence of a satisfactory gold standard for PE diagnosis poses difficulties for the assessment of sensitivity, specificity and accuracy of all diagnostic methods. The best available standard is adequate follow-up of the patient for recurrence of PE or alternative diagnoses. The most rigorous study of MDCT in PE diagnosis is the PIOPED II study, which showed an over-

all sensitivity for PE of 78 percent when non-diagnostic studies were included (Stein et al. 2006). This led to the observation that the false negative rate of 22 percent for MDCT indicates the need for additional information to rule out PE.

In the PIOPED II study the positive predictive value for a PE within a lobar pulmonary artery was 97 percent but fell to 68 and 25 percent at the segmental and sub segmental level, respectively. Freeman stated that the results from the PIOPED II study “do not clearly support the superiority of CT pulmonary angiography over V/P_{SCAN} for the diagnosis of PE” (Freeman and Haramati 2009). A recent study by Bajc et al. and a prospective study by Gutte et al. show that V/P_{SPECT} has higher sensitivity, and specificity and less non-diagnostic findings than MDCT (Bajc et al. 2008; Gutte et al. 2009).

Clinical Utility

PIOPED II as well as the study by Gutte et al. illustrate the limited clinical utility of MDCT (Gutte et al. 2009; Stein et al. 2006). In 50 percent of eligible cases, MDCT could not be performed because of kidney failure, critical illness, recent myocardial infarction, ventilator support and allergy to the contrast agent. Furthermore, six percent of performed MDCT studies were of insufficient quality for conclusive interpretation. In about one percent complications like allergy, contrast extravasation and increased creatinine level were observed. By contrast, V/P_{SPECT} has no contraindications and was performed in 99 percent of patients referred in the study of Bajc et al. (Bajc et al. 2008). No complications were identified, and technically suboptimal studies are very rare. MDCT is available in nearly all medical centres and community hospitals. Service is often available around the clock, seven days a week. V/P_{SCAN} is available in far fewer hospitals and seldom on a 24 hours basis. Obviously the difference in availability affects the choice between MDCT and scintigraphy.

Radiation Dose in V/P_{SPECT} and MDCT

Based on data from ICRP reports (ICRP 1988) the effective dose for V/P_{SPECT} with the recommended protocol is about 35 - 40 percent of the dose from MDCT. According to Hurwitz, the dose to the female breast for V/P_{SPECT} is only four percent of the dose from MDCT even when this is administered with full dose saving methods (Hurwitz et al. 2009). This may have particular importance in pregnant women with proliferating breast tissue. During the first trimester of pregnancy the foetal dose of MDCT is greater than or equivalent to that of V/P_{SCAN} (Hurwitz et al. 2006). The advantage of V/P_{SPECT} increases after the 1st trimester.

Follow up of PE using imaging is essential to assess the effect of therapy, differentiate between new and old PE, where there

is a suspicion of PE recurrence and explain physical incapacity after PE. The demands for follow up are only met with V/P_{SPECT}. Obviously, the same method should be used for diagnosis and for follow up.

Discussion

V/P_{SPECT} has no contraindications, a lower radiation burden, a lower rate of non-diagnostic reports and a higher negative predictive value than MDCT. Chronic PE can only be diagnosed by V/P_{SCAN} (Tunariu et al. 2007). An ever greater requirement on health services is to provide cost effective patient care. The method for diagnosis of PE should be fast. V/P_{SPECT} can be done in one hour, out of which camera time is only 20 minutes (Palmer et al. 2001). It empowers the clinician to choose the appropriate care regime. V/P_{SPECT} allows quantification of PE extension which is essential in order to determine whether home treatment, which is much cheaper and more advantageous for the patient, is appropriate. As PE is present in only 20 to 30 percent of patients with clinically suspected PE, it is particularly important that a negative finding excludes PE. MDCT does not provide this assurance. (Perrier and Bounameaux 2006, Freeman and Haramati 2009).

For follow up and for research, it is essential that a method should be harmless, and capable of both detecting all embolised areas and of quantifying PE extension. The EANM guidelines conclude that only V/P_{SPECT} satisfies these conditions. A common argument in favour of MDCT is that it allows diagnosis of diseases other than PE. However, this applies equally to V/P_{SPECT}. Furthermore, in the presence of conditions and diseases other than PE, MDCT becomes frequently non-diagnostic. Altered haemodynamics, as in pregnancy, leads to grave difficulties. Conditions like extended pneumonia may lead to similar problems while V/P_{SPECT} remains diagnostic for PE (Bajc 2005). As long as V/P_{SPECT} is not generally available, MDCT and V/P_{SPECT} are both indispensable imaging techniques to study patients with suspected PE.

Diagnosis of PE is a major clinical problem. The crucial dilemma is that the ideal method of diagnosis, i.e. V/P_{SPECT} is often not available. Bearing in mind its superiority from a clinical point of view and its cost/effectiveness, V/P_{SPECT} should be the method of choice for the detection of PE (Bajc et al. 2010). Accordingly, it is our duty to encourage the adoption of V/P_{SPECT} as widely as possible. However, in its absence, MDCT is likely to continue to be used as a diagnostic tool for want of the superior alternative. From that point of view, diagnosis of PE is also a very important methodological issue. ■

References are available for this article on request to the Managing Editor at: editorial@imagingmanagement.org

DEALING WITH INAPPROPRIATE MEDICAL IMAGING

Counting the Literal and Figurative Costs



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As technological advances and knowledge progress, imaging techniques continue to grow at a fast pace. Utilisation of different radiology services varies significantly. A study performed in the United States demonstrated that these variations are not totally related to economic development. The costs of medical imaging have been rising steadily in the last decade due to several other factors, especially the evolution of new technologies and population changes. In a study of Medicare spending, its authors concluded that higher spending regions did not have better health outcomes or satisfaction with care.

It is estimated that between 20 and 30 percent of all imaging examinations are not justified. The causes have been thoroughly analysed in the literature, and have been linked to the aging population, defensive medicine, self-referral and radiologist's need for additional certainty in their diagnosis.

Unnecessary Testing Means Rising Costs

The result of unnecessary testing is therefore a rise in costs. These high costs brought the United States Senate Finance Committee this year to propose higher payments for physicians that refer to appropriateness criteria. Aside from higher costs, other negative issues associated with unnecessary imaging studies are an increase in radiation to the population, delays in treating patients and the risk of false positive diagnosis. The rapid technological evolution of imaging makes it difficult to keep clinical colleagues and even radiologists up-to-date.

The good news is that new developments are replacing some previously useful tests such as in the case of intravenous urography being substituted by ultrasound, CT urography and magnetic resonance. The bad news is that quite often, new technologies are added instead of replacing others, summing complexity and costs. PET-CT is probably a good example of the latter as in the case of lung cancer staging where the redundancy of CT and PET-CT should be addressed.

Most authors have proposed recommending specific measures to diminish the impact of unnecessary imaging examinations. The results of these measures, when isolated, have varied, and in general, unnecessary imaging studies have not diminished. In one study, only one third of radiologists used ACR musculoskeletal appropriateness criteria. In a recent

publication, although nearly 80 percent of radiologists knew the Fleishner criteria for follow-up of pulmonary nodules, only 50 - 60 percent of them used these criteria properly.

What can be Done?

Inappropriate imaging must itself be treated in a similar way to the diseases it attempts to diagnose. The steps we must follow are: 1) diagnosis 2) communication and 3) treatment.

1. In order to establish diagnosis, we must have appropriate data collecting (RIS-HIS integration) and adequate internal organisation. The radiology department must be organised according to clinical problems, and be organ-system oriented, to allow more solid grounds for justification of our imaging studies.
2. Communication needs to be able to transmit to the involved parties the specific problem, its consequences and our diagnosis. A good communication protocol is essential as is establishing a common language between clinicians and radiologists. Radiologists have a fundamental role educating clinicians in the advantages, disadvantages, and costs of imaging techniques in each specific situation. In general there is a lack of knowledge of costs and morbidity (including radiation) of different imaging procedures.
3. Treatment combines several steps:
 - A. **Preventive:** Setting clinical guidelines and algorithms with partner clinicians and primary care physicians. ACR guidelines are a good example. In Spain the consensus guidelines of the SEDIA, the abdominal section of the Spanish Society of Radiology (SERAM) have become an excellent tool to avoid unnecessary studies.

Our experience:

 - Primary Care: Relations with primary care physicians are most crucial if we want to avoid excessive demands for unnecessary imaging studies.
 - After local health authorities decided to permit primary care physicians to order imaging studies, including MRI and CT, we organised brief lectures

in seventeen primary care centres in our area. Our objective was to explain the indications of imaging techniques in the most common pathologies encountered in primary care. At the same time we indicated how to communicate with the radiologists and expressed our intention of acting as referral doctors rather than as providers of techniques, especially regarding the utilisation of MRI, CT, ultrasound and interventional radiology. The result has been a containment of the demand of imaging examinations compared to other health departments in our community.

B. Curative: We must know when to exchange one imaging test for another, how to reject a study that is unnecessary and how to communicate these measures to patients and clinicians. Patient safety is mandatory, and therefore hard decisions must be taken sometimes, especially regarding radiation dose.
Our experience:

- Intravenous urography: A well established procedure that has been replaced in most cases by ultrasound, plain abdominal radiographs and CT or MR urography. Yet the traditional use of this technique poses some problems at the time of changing to new protocols, especially with urologists. We elaborated a consensus document based on published data. A significant reduction (70 percent) of intravenous urograms has occurred although we still have some reluctant urologists that should be convinced.

C. Palliative: Agreements with other parties on the implementation of guidelines, and the approach to a progressive elimination of unnecessary exams. Sometimes, especially when the issue is certainty in the diagnosis and may have medico-legal implications, we have to arrive at an agreement with other clinicians.

Our experience:

- Preoperative chest radiograph: A routine chest x ray was obtained in all patients that were scheduled for surgery regardless of age, gender or clinical history. We defined the problem, detected the origin of the demand (anaesthesiologists) and proceeded to negotiate an agreement based on the scientific evidence and the legal implications in Spain. As a result we eliminated 60 percent of all preoperative chest radiographs.

D. Follow-up: Decisions regarding necessary measures must be maintained to guarantee that there is no return to the previous situation. Quite often guidelines change as new technology and scientific evidence appear. We must keep up to date and review our protocols.

Our experience:

- We defined algorithms and protocols for our medical department in 1992 and reviewed them periodically. Despite this, the adherence to these algorithms has been low and has depended mainly on the degree of involvement of our radiologists with other medical departments. We believe that the clue to a proper follow-up of guidelines and algorithms is a well-organised organ-system radiology department, and established systematic discussions of protocols with clinicians.

Conclusions

Ineffective use of radiology increase medical costs may have negative results on the patients' health and creates serious problems in healthcare organisations. Radiologists should know how to detect, prevent and eliminate unnecessary studies using a global approach, consensus and wisdom with all the implicated parties. ■



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MANAGEMENT STRATEGIES FOR EFFECTIVE CLINICAL RESEARCH

Set-up, Organisation and Implementation



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As an integral part of the strategic organisation of a hospital, clinical research in academic medicine has to serve diverse stakeholders and meet sometimes contradictory needs. Without doubt, the benefit and safety of patients are primary goals of clinical research. Other important drivers, such as economic aspects, reputation and quality should not be disregarded (Schilling et al. 2009). Thus, this article explains why clinical research should be understood as a business unit and should be integrated into the structure of the clinic or healthcare entity.

Management Tools in Clinical Research

Although economic teachings are subject to renewal and adaptation, for the development of sustainable clinical research, certain universal tools and methods are elaborated in the tool set offered below, which may be applied effectively in the future.

Business Plan

The efficiency of clinical research is dependent on its seamless integration into the strategy, processes and structure of the healthcare enterprise. A business plan can support this integration process in a goal-oriented way. First of all, a

comprehensive plan for the clinical research business unit establishes trustworthiness, cost-effectiveness and the overall prospect for the planned programme to important stakeholders such as hospital management, clinical and industrial cooperation partners and potential capital providers. A business plan is a highly suitable tool for clinical research as it allows day-to-day control of operations by providing helpful and binding guidelines.

Traceable, Solid Structures Required

The complexity of clinical research requires traceable and solid structures. Everything from basic research and experimental surgery to clinical patient treatment and care should be incorporated seamlessly into every unit (Sarikouch et al. 2010) (see Figure 1). Each individual part of this network and its inherent hierarchies should be aligned with the general strategic focus of the clinical research programme. Information technology solutions should be built upon unified standards and networks across all units to provide integration at an operational level. For scientific success, complete and current data are as decisive as available medical technological infrastructure.

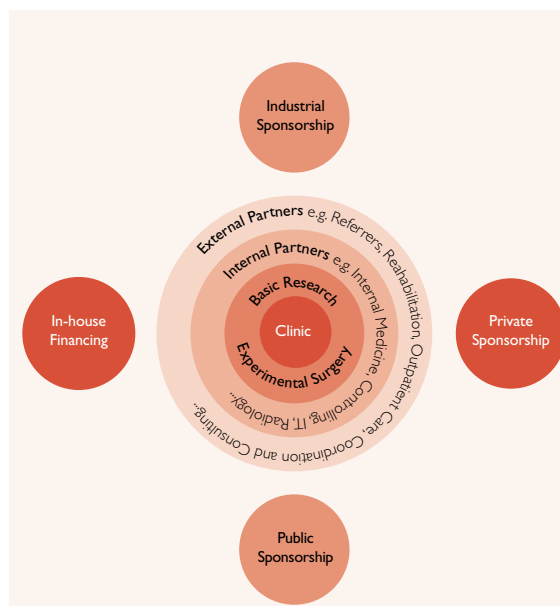
Five Golden Rules for Process Organisation

Healthcare providers must engage in active, multidisciplinary participation in clinical research. Demands on clinical employees are increasing (Rosta et al. 2007). To maximise the efficiency of these interactions, it is important to integrate clinical research into daily routine as efficiently as possible. I outline some possible 'golden rules' for this integrated, holistic approach, here:

1. **Prior to patient admission, clinical and research personnel should begin a dialogue to help identify patients that are suitable for clinical trials.** By this means, any special diagnostics that are necessary can be prepared at an early stage.
2. **Patient consent and briefing can be initiated with an adequate amount of lead time.** Effective selection of patients would reduce costs, save time and prevent loss of motivation of the staff by keeping up progress

Figure 1:

Integrated structures using the example of an academic clinic of surgery



in the trial. The entire process should be evaluated regularly (see fig. 2).

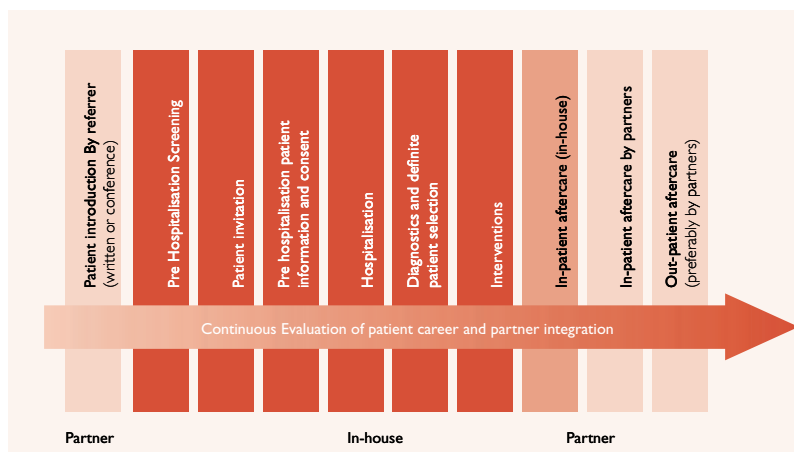
3. Outpatient evaluation and aftercare should be carried out together with corresponding cooperation partners.
4. Any required technical equipment should be prepared in advance in order for medical personnel to fulfill their tasks.
5. Offering special trainings allows referring physicians in clinical trials to be facilitated. Involving clinical cooperation partners such as referrers in this way can be financially beneficial for them. It embeds the partners in an integrated patient care model, while helping to ensure sources for future referrals and business for the healthcare entity.

“Clinical research programme managers should consider establishing a central project management unit to professionalise the organisation of research activities and to relieve scientific staff of this duty”

Human Resources and Development

Student education in university hospitals should be involved in clinical research activities. Selected scientific questions sometimes offer innovative and interesting perspectives on healthcare. Furthermore, illustrated cases certainly abet the recruitment of doctoral candidates.

In addition, proactively training and educating staff for clinical research will result in the improvement of study processes and outcomes. As well as the self-evident, optimal clinical care, the specific tasks of a clinical study should be taken care of with maximum possible accuracy and discipline. In the department of cardiothoracic, transplantation and vascular surgery of Hannover Medical School, we strongly believe that every staff member is able to perform well and can focus on his or her core competencies if optimal working conditions are given. This fundamental principle requires ongoing training and certification initiatives, a sufficient size of staff and the availability of specialists for additional tasks, e.g. for professional project management or assistance for the publication of results (see figure 3).



Clear Definition of Roles & Tasks

The clear and adequate assignment of tasks and responsibilities according to individual qualifications offers a practical way to offset potential feelings of there being excessive demands made on the part of your personnel. Hospital managers can create and re-evaluate tasks with a sense of proportion and in regular staff appraisals. The traditionally established division between nursing and medical staff, including each having separate personnel managers, is still extensively common. The abolishment of this separation in our hospital led to a remarkable increase of options concerning the assignment of tasks and responsibilities.

Thus, nurses may be temporarily or permanently employed in the clinical research unit. The clinic regularly offers a qualification initiative to become a study nurse. Thus, employees who can no longer perform the physically challenging job of patient care due to health issues can still be employed in the hospital. The wide-ranging skills of such employees can be retained and employees' satisfaction increases.

A consequent treatment of the department of clinical research as a business unit also involves the optimal employ-

Figure 2:

Continuous evaluation of patient career and partner integration

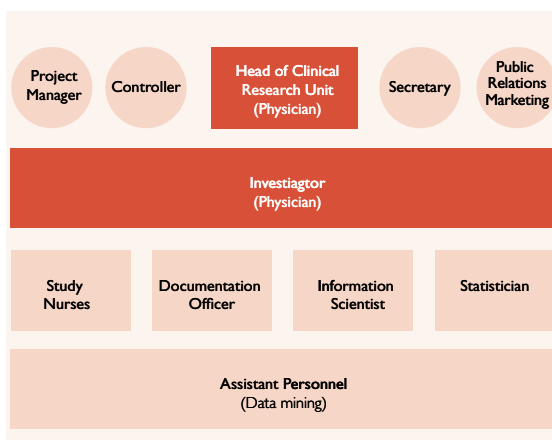


Figure 3:

Involved personnel in clinical research. Red: Personnel immediately involved in research as staff of the own institution. Light red: Supporting functions via potential co-operation partners.

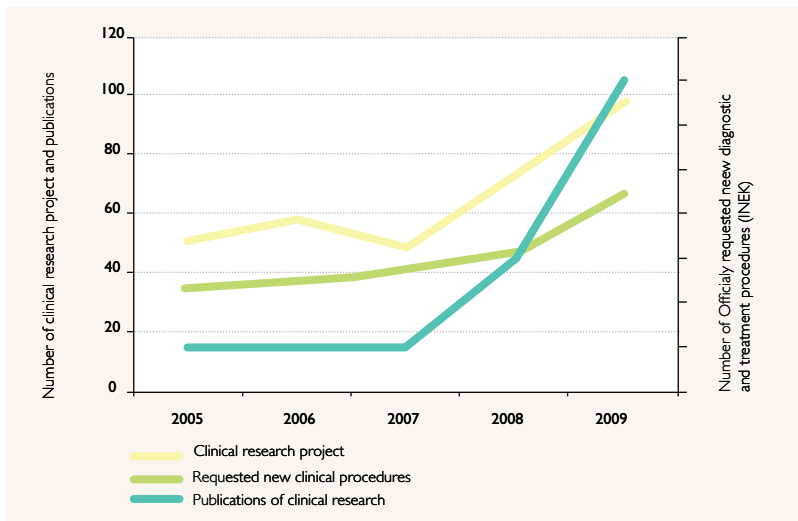


Figure 4:

Development of the number of clinical research projects, publications and number of officially requested new diagnostic and treatment procedures.

ment of an entrepreneurial leader as head of the department. Competencies like emotional intelligence, communication skills and creativity are already required by surgical unit leaders but are at least as important for the leadership of clinical research (Buchler et al. 2006).

Communication and Public Relations

Clinical research requires an especially sensitive integration of referrers, aftercare institutions and patients and their relatives each of whom are primarily interested in the excellent treatment of the disease. A priority task for the study centre is to prove that these demands are not controversial but rather complement one another. For continuous communication with stakeholders, a large number of tools are available: press releases, patient and further education trainings (Dierks et al. 2007), scientific publications, regular information media and the internet. In order to coordinate and implement these communication measures, a management-led staff unit was established in our hospital for corporate communications.

Financial Budgeting

The hospital's global budget should be coordinated by the management for the medical director. This includes the budget not only of the hospital but also of the department of research. It covers public funds, third-party funds, performance-oriented funds, outpatient and inpatient revenues as well as private liquidations. Due to this earmarking of funds for specific purposes, a transfer of funds or a subsidy is rarely possible. Nonetheless, synergies can be identified by the central coordination of budgets.

The clinical research unit is subject to the same principles of economic efficiency as all other units in the medical entity. Investments have to be profitable, and personnel and running costs have to be covered by the revenues accrued dur-

ing the particular project period. At Hannover Medical School, the clinical management team supports the study directors in financial budgeting and controlling and serves as an interface to the central department of strategic control. The advantage is that by monitoring monthly records and analysing trends, unfavourable developments can be detected and counteracted at an early stage.

Quality control

The entire clinical research unit undergoes regular evaluation. This evaluation is initiated by the medical director and supervised by the clinical management team.

Results

Reproducible and comparable data provide standards by which the achievement of objectives can be measured. These can be figures such as: The number of officially requested new diagnostic and treatment procedures or the number of clinical research projects and the number of publications. After having introduced a dedicated business unit of clinical research from 2008 on, we saw a significant increase for all three parameters (see Figure 4).

Discussion

For all stakeholders, clinical research is too important to be dealt with as a mere aside. Facing the demands between patient care, scientific and economic concerns as well as education, clinical research can sustainably exist only as a highly effective business unit.

Clinical research programme managers should consider establishing a central project management unit in order to professionalise the organisation of research activities and to relieve the scientific staff of this duty. Tight organisation and seamless, structured integration of research in clinical processes assures realistic and successful project implementation. Structures and processes that are accepted similarly by staff and patients are key to this success. The results and thus the value of clinical research significantly depend on the medical and non-medical care of study patients. Staff shortages accompanied by excessive demands and resulting in employee's dissatisfaction endangers the reliable and timely handling of clinical research and thereby influences the reputation of the study centre among potential sponsors. Clinical research should be understood and treated as a revenue component at least in the academic context.

Existing results demonstrate this model's sustainability. A detailed evaluation of the results, of the stakeholders as well as the application of a corresponding balanced scorecard for personnel involved in clinical research is currently taking place. ■



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PROFESSIONAL CHALLENGES FOR MEDICAL IMAGING IN BULGARIA TODAY

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Professional Highlights

1976 –
Graduated in Medicine, Medical
University - Sofia
1982 –
Graduated in Radiology
1989 –
PhD
1991–
Professorship
1999 – Present day
Head, Department of Diagnostic
Imaging, University Hospital
"Alexandrovska", Sofia
2000 – Present
Chair, Department of Radiology,
Medical University,
Medical Faculty–Sofia

Professional Appointments

President:
Bulgarian Association of Radiology
(1998 – 2009)
National consultant in radiology
for the Ministry of Health
President-elect:
Bulgarian Union
of Medical Specialists
Editor-in-chief:
Roentgenologia
& Radiologia Journal (Bg)

Editorial board member:
Imagistica Medicala (Ro),
Radiology&Oncology (Slo-H-I),
Bulgarian Medical Journal (Bg)
Member:
ESR European Training
Assessment Programme (ETAP)
Committee Representative:
for Bulgaria in UEMS Council,
ESR National Societies Committee,
UEMS / Radiology section

Our radiology department houses Bulgaria's only university teaching structure.

The department of diagnostic imaging at the University Hospital "Alexandrovska" in our nation's capital, Sofia, is the oldest hospital department of radiology. The radiology department has conserved its unique function as the first university teaching structure in Bulgaria. Today the department employs two professors, 12 radiologists, 24 technicians and 10 other team members. The equipment at the moment includes one MR-unit, two CT scanners (one of them a 64 MDCT), angiography room, several pieces of equipment for conventional radiology that are located close to surgical, internal and paediatric departments, mammography, ultrasound and several mobile units in the intensive care departments.

There is a high concentration of imaging centres in the area: supply outstrips demand.

More than 25,000 patients pass through my department each year. The number of examinations is not as high as one might imagine for a large facility due to numerous external and internal factors. The external factors are the result of the organisation of our healthcare system: such as the type of healthcare and the so-called "health map" in this country. There is a concentration of hospital and diagnostic centres in the vicin-

ity and the offer of radiological services is higher than the demand. That is why today's government strategy is resizing the map, defining the number of hospitals and medical centres and classifying them according to their medical activities and performance. The whole budget for radiology services in the country is relatively low. An important reason for the relatively low number of examinations is also the fact that doctors are involved in teaching activities – medical students, residents and the qualification of specialists. As we are part of a reference hospital, our radiology team ensures 24-hour coverage for all imaging services onsite.

Remuneration for hospital radiologists is low compared to EU averages.

In general, in comparison with other European countries, the remuneration of radiologists, especially hospital radiologists, remains among the lowest. This is the reason why in the last few years, many radiologists are leaving for positions abroad and for the present shortage of radiologists in the country. However, in a few but growing number of cases radiologists are enjoying better revenues in Bulgaria. Very often in such cases, some external factors impact, like private investments, fewer radiologists covering a relatively larger area or a higher patient flow. Many radiologists work part-time in private diagnostic lab-

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oratories and centres, which in the main are owned by non-medical entities. Apart from the abovementioned “health maps”, another factor is that the essential funding of hospitals is based on the model of “clinical pathways”, where the one mandatory national insurance company contracts the hospital and not the radiology department itself. So, subjective factors and turf battles play a role in financing. In the ministry of health strategy, it is foreseen within the next year to begin transitioning to the DRG system and the radiology society in its majority approves of this.

There are no officially recognised subspecialties in Bulgarian radiology yet.

There are no officially recognised subspecialties in radiology in Bulgaria at present. However, the radiology society is at the moment establishing groups (subspecialty societies) within the main radiology specialties. Interventional radiology in particular has well established training rules. Trainees must already have a specialty in radiology before applying. The training includes two years of work under the supervision of a certified interventional radiologist in a hospital with a determined number of procedures per year. It includes as well a number of theoretical lectures and is finished with a final exam. The curriculum is based on CIRSE’s model and adapted to local conditions. The certificate is issued only by medical universities and must be signed by a rector. Still, the number of interventional procedures is low due to economic reasons. Few centres fulfil the requirements and very often they are orientated within the profile of the hospital. There is a pronounced turf battle here, especially between cardiologists and vascular surgeons.

There is limited access to MRI due to low reimbursement levels.

The number of radiology exams is limited due to financial factors. There is very limited access to MRI due to restrictions on the number of exams being reimbursed. Few parts of the population can afford private cover for the more expensive radiological procedures. So waiting lists exist, but they are short and not a real challenge.

Nuclear medicine is a separate specialty in Bulgaria and is strictly regulated.

Nuclear medicine is a separate specialty in Bulgaria and forms separate departments. The supply of radiopharmaceuticals is

OVERVIEW HEALTHCARE IN BULGARIA

Key Health Indicators

Total population	7,693,000
Gross national income per capita (PPP international \$)	10,270
Life expectancy at birth m/f (years)	69/76
Healthy life expectancy at birth m/f (years, 2003)	63/67
Total expenditure on health per capita (Intl \$, 2006)	741
Total expenditure on health as % of GDP (2006)	6.9

Source: World Health Statistics 2006

Bulgaria is one of the newest members of the EU, joining in January 2007, alongside Romania. The population of Bulgaria is estimated at 7.4 million in 2010, nearly 18 percent of whom are aged 65 or over. Funding for healthcare in Bulgaria is principally through compulsory health insurance, operated by the National Health Insurance Fund. The role of the NHIF is to provide a basic package of health services for the whole population. The government is divided on whether to allow private companies to operate in the insurance sector.

Two of the three coalition parties support the idea of removing the NHIF’s monopoly, unlike the senior partner, the Bulgarian Socialist Party. In 2010, the Bulgarian market for medical equipment and supplies is estimated at 237 million USD, or 32 USD per capita. This is a marked reduction when compared with 2007 and 2008, largely due to lower spending on capital items. It is, however, expected that recovery will be quick, and growth will resume to take the market to 344 million USD by 2015.

Management a Growing Concept for Healthcare in Bulgaria

“Health Policy and Management” is the new name of the journal “Healthcare Management”, which was initiated in 2001. It is the only one in Bulgaria in which healthcare is discussed in all its aspects and in connection with the other sectors of public life. The journal is published by the Faculty of Public Health at the Medical University, Sofia in cooperation with the Society for Analyses and Consultations Ltd., Sofia.

The editorial team and editorial board work together to provide as full information as possible in the field of the journal. The conception of the journal “Health Policy and Management” is based on the real need for change in healthcare within the framework of the general reform of public life performed in Bulgaria.

Mission & Goals

The mission of the journal is to stimulate and support professional behaviour and the process of self-actualisation of managers, administrators and professionals working in the field of health and healthcare. In particular, it is aimed at development of an organisational culture in the country as well as to provide adequate training of a new generation of health managers and health professionals. Readers are professionals in the field of healthcare, personnel managers, managers, procurators of profit and non-profit organisations, managers of cooperative organisations, directors of finance, administrators, PR-managers and all specialists taking professional decisions in the field of health and healthcare. Annual issues of the journal are deposited in the “St. Cyril and Methodius” National Library as well as in the Central Medical Library at the Medical University, Sofia. The journal is included in the database “Bulgarian Medical Literature” of the Central Medical Library.

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organised by the Ministry of Health and the strict regulations sometimes has its drawbacks. PET-CT is an emerging modality for Bulgaria. There are two installations for nuclear medicine in the country - one in our hospital and one in the next biggest medical university. There is a memorandum between the radiology society and nuclear medicine society that this equipment is to be run by both specialists in nuclear medicine and radiologists. At the moment ^{18}F FDG is imported from abroad. Our hospital is preparing a project to apply for European funding for establishing a cyclotron that will supply both, and eventually to increase the number of installations.

Accreditation is implemented proactively in Bulgarian radiology departments.

There is a system of accreditation in Bulgaria that is constantly upgraded. It includes several requirements for quality assurance. In the accreditation team a radiologist is included as an expert. Experts are preliminarily trained. Accreditation is based on national standards. The standard in any specialty is elaborated by representatives of the national society, is approved by the national medical council and is validated by the Minister of Health. Teaching activities are accredited by a national agency of accreditation for higher education in a similar way. Accreditation follows different criteria according to the target group – medical students, PhD students, residents, etc.

The Bulgarian Association of Radiology is an active player in education & training.

Representatives of the national society of radiology set the curriculum for training, based on the ESR curriculum and adapted. It is reviewed periodically by the council of educators, which includes all active professors in the country. Teaching hospitals are identified after the mentioned accreditation. The curriculum is for the duration of four years. There is an entry exam to enrol in the programme, 10 ongoing exams and a final exam (oral and written, theoretical and practical) held in front of the states' committee appointed by the Minister of Health. Traditionally, the only place for this exam is at our hospital. Members of the commission include professors from the four medical universities and the three major national specialised teaching hospitals.

Access to the latest technologies is a significant challenge for radiologists.

Radiology in Bulgaria has a long way to go, and much work needs to be done to achieve and attain a level of excellence.

The economic level of the state and the future of healthcare reform will always impact on the radiology community. Access to modern technologies is a challenge for Bulgarian radiologists. In the past decade, the country is well supplied with CT equipment for example, but the majority are supplied second-hand. There is a big difference between the levels of medical services in different hospitals, which depending on the demand for medical services. These

“Today’s government strategy involves resizing the healthcare map and restructuring the number of hospitals and medical centres”

differences reflect as well on the interest of different groups of radiologists. The low level of equipment means only a small number of research and scientific activities. Still, the health system is too centralised. Radiology practice depends very much on general regulations. The Ministry of Health undertakes several activities for renewing the major radiologic equipment at the moment, in the most important district hospitals across the country. Quality standards require such renewal.

Creating small task groups has encouraged greater interest in the success of the department at large.

An oft-encountered issue in management, it’s difficult to motivate people to follow both the common interest of the department and their own personal interests. I have tried to overcome this challenge by creating small task groups within the team to present ideas for resolving specific problems and take responsibility for their achievement. It is my aim to work on including more and more people in teaching activities, reinforcing their self-confidence and motivating them. More of our staff should be included in decision-making.

The second big challenge for me is ensuring adequate financing for the renewal of equipment. In what is quite a centralised system, the issues end in multiple disputes in front of the health authorities as well as expanding education for referrers on what radiology examinations to request. Another interest of mine is motivating radiologists to stay up to date with the modern trends of radiologic practice and teaching. One of the ways that I found very useful is organising international teaching events. Teaching by prominent international speakers who show a different view on a topic or share wide experience are especially motivating to young colleagues. ■

HOT TOPICS

Radiation Safety in Bulgaria

Dr. Jenil Vassileva is a medical physicist working as head of the radiation protection & medical exposure department at the National Centre of Radiobiology and Radiation Protection (NCRRP) Institute at the Ministry of Health in Bulgaria. She is a regular contributor to international meetings on radiation protection and has strong involvement in the development of guidelines, and also lectures medical physics students and postgraduates on the physics of medical imaging and radiation protection. In this interview she shares her concerns about the management of safe and appropriate doses for patients undergoing medical imaging exams involving ionising radiation in Bulgaria.

What drew you to the field of radiation safety?

I am a physicist by profession and taught nuclear physics for more than 10 years. I helped develop the first Masters programme in medical physics in Bulgaria and defended a PhD on the optimisation of image quality and patient doses in radiography. When the implementation of European regulations started in Bulgaria I moved to Sofia to establish a new laboratory for quality control of radiological equipment. I always believed that QC is only an instrument for radiation protection and quality assurance and this became my credo over the next seven years while trying to look more globally at the process.

Tell us about the National Centre for Radiobiology and Radiation Protection (NCRRP)

The National Centre for Radiobiology and Radiation Protection (NCRRP) was established in 1963 as a health research institution dealing with the matters of public health protection from ionising radiation. NCRRP ensures the official control of parameters for working and living environments, assessment and reduction of public exposure to sources of ionising radiation, dosimetry monitoring of staff from external and internal sources, and risk assessment for the Bulgarian population and for particular groups. NCRRP introduces the requirements of European directives in the field of radiation protection in Bulgaria. Research units in the NCRRP support methodological work and development of practical methods of radiation protection. NCRRP carries out postgraduate and doctoral training in radiobiology, radiation hygiene and medical radiological physics. In September 2010 we organised an international conference on radiation protection in medicine, attended by 280 participants from 55 countries worldwide. The proceedings of this conference are to be published as a special issue of the journal *Radiation Protection Dosimetry*.

What research projects are currently underway at the NCRRP?

NCRRP research groups are involved in the implementation of a number of national and international research projects, mostly in the field of the radiation effects of low doses and medical radiation protection: for example, within the Sixth Framework Programme “Safety and Efficacy for New Techniques” and “Imaging Using New Equipment to Support European Legislation” (SENTINEL) we developed new methodologies to guarantee quality and safety of new digital technologies replacing conventional film and fluoroscopy equipment. Our group was involved in the regional “International Atomic Energy Agency on Radiation Protection of Patients” project. One of its latest tasks is on optimisation of paediatric CT exams. The newest project just starting is on “European Population Doses From Medical Exposure” (Dose Datamed 2) financed by the EC, run by a consortium of five partners from Finland, Norway, Greece, Luxembourg and Bulgaria. NCRRP represents Bulgaria in this project.

You are involved in the recent updates of guidelines for radiation safety in Bulgaria –tell us about the work that you did?

National diagnostic reference levels (DRL) were initially set out in 2005, but only a limited number (mostly for conventional radiography) were based on a first national survey. DRLs for most procedures were comparable to European levels, except chest radiography, which has a DRL three times higher, mostly because of the soft beam technique used here for this exam. Last year we completed the next national survey of patient doses in diagnostic radiology, covering conventional radiography, mammography,



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IMAGING Management

fluoroscopy, interventional radiology, and computed tomography. It was performed within the EC supported twinning project with the Finnish regulatory authority STUK as a partner of NCRRP. 1,600 patient measurements in 46 x-ray radiographic rooms were performed and found that doses are reducing compared to the previous survey, mainly due to the introduction of more sensitive image detectors, but there are up to 18 percent variations in doses for the same x-ray procedure between departments. In mammography, measurements were done for 32 out of about 150 mammography units and the conclusion was that doses are comparable to those in other European countries but in many systems, problems in AEC settings and film processing were found to influence image quality. The dose survey in interventional radiology included 15 of about 23 systems in Bulgaria. New DRLs for CA, PCI and LLA were proposed that should support further dose optimisation. Patient doses for altogether 46 CT units have been determined, including almost all multi-slice units. This is about 30 percent of the total number (about 160) of CT units in Bulgaria. A report on the national survey with the new DRLs has been published, and feedback to hospitals sent with recommendations for procedure optimisation. This information is included in training courses for medical staff and promoted during meetings and conferences. We hope these actions will support the optimisation process.

Is demand for CT increasing in Bulgaria, as in the rest of Europe?

The number of CT exams in Bulgaria is lower than in most developed countries – about 30 per 1,000 of population, but this is strongly increasing. CT has only 4.9 percent contribution to the total number of imaging exams performed but 30.1 percent of the collective radiation dose. The rates of CT here – 26.4 per million of population – is one of the highest in Europe – but only 22 percent are multi-slice CT, and the average equipment age is 10 - 12 years. One of the reasons for the increasing number of exams is improved image quality and diagnostic information provided to physicians, but there are two specific reasons for this in Bulgaria; the existing system of clinical pathways requiring examinations to be performed as a condition for reimbursement, and the inadequate number of MRI systems – only 45, forming only 22 percent of the number of CT. Our efforts are directed at alerting the medical society about the risk associated with CT and for strong justification of these high dose procedures, especially in children.

How will you continue to reduce unnecessary imaging exams where radiation is involved?

There is big potential for dose reduction by reduction of the number of unjustified procedures. In this respect, national appropriateness criteria are under development in Bulgaria. Also, dose reduction in Bulgaria would be improved by tackling the unnecessary x-ray exams prescribed as obligatory by clinical pathways and required by health insurance institutions for reimbursement. Radiologists and radiation protection specialists should work to improve awareness of referring physicians on risks associated with radiological procedures. This was in the focus of one of the panel discussions during the international conference on radiation protection in medicine, held in Varna, Bulgaria in September 2010. The recommendations were to educate physicians from university level, to provide easy access to referral guidelines and to monitor this via clinical audit. Our task is to use simple, understandable terms for doses. Mass screening of asymptomatic individuals is of special concern. Many efforts were made in Bulgaria to minimise chest fluorography as a screening tool for tuberculosis.

How are nuclear medicine and other radiation-involved imaging exams organised in Bulgaria? Are they reimbursed by the national healthcare system?

Yes, they are, but reimbursement does not always fully cover the real cost of the exam. Also, it doesn't depend on the quality of the exam, neither on the age of the equipment, and this does not stimulate equipment renewal, or support buying second-hand equipment.

What are the essential components of a successful quality control programme in a medical imaging department?

The quality control programme should guarantee that radiological equipment is set in the best way; that it is optimised and continuously maintained. Many people, however, understand quality control as only technical checks of equipment, often performed by external services. This side of quality control is important but insufficient. Successful quality control programme should guarantee that all produced images are of enough quality and patient doses are kept as low as possible. Medical physicists play a key role in the quality control process but radiographers and radiologists should be also involved. Particularly in Bulgaria, the involvement of medical physics personnel is insufficient both because of lack of enough qualified physicists but also because of the inadequate understanding of their role by medical staff and hospital management. ■

partment involved – PACS is something for entire hospital with an impact on the larger organisation.”

Following this, David Koff / CA asked about the role of Managed Equipment Services (MES) and asked for reactions from those users present. “In Canada we may be first to move to this type of managed solution. To research it, we went to the UK to see how MES is working there to find out if it is of benefit – we have the impression it can be beneficial, since for us under-equipment is a serious problem. This could allow us to have a higher level of equipment and maintenance”.

Richard Fitzgerald / UK responded that “Eight years ago we moved to a new department built under a private finance initiative, using a private provider. The great advantage is that needed equipment is being renewed at seven year in-

tervals so there is no problem getting any equipment one wants. There are two downsides. The first issue is that you are locked into contract for 20 or 30 years – and locked in at a time when you Also, he stated, “Not all manufacturers – no matter how good they are – will be “top of the pops” for every single modality or application you need and that is a downside.

Prof. Jarl Jakobsen added “You will spend lots of your time on SLAs (service level agreements) – be aware that it is not the case that vendors “know your dreams” – you have to put it into writing and you have to keep your competence as a buyer. You can’t just outsource and then switch off so my advice to anyone considering this is to consider the resources you will need for these SLAs and be a competent buyer.”

Setting up a Teleradiology Company –

Ensure you have the support of all stakeholders when setting up a teleradiology service

Jan Schillebeeckx / BE



I’m a consultant radiologist and past Chairman in a big community hospital in Belgium. As this session’s oldest speaker, perhaps I have made the most mistakes of all! However, I have decided to talk about a fairly recent one, which is the one I particularly regret. Let’s talk about teleradiology. In 2001, faced by the ever-increasing demand for medical imaging services, we started up a company providing outsourced teleradiology services in Holland and in Belgium. We had good intentions, because it was a company started by radiologists for radiologists. However, from the day I began working in this company, suddenly for many people I was the big enemy – and if you find out you have this kind of strong opposition, you have to admit to yourself that there must be a foundation for such a negative reaction. I must point out that despite the worries of radiologists that we were unfair competition, we clearly said we would not push our services on those doing a successful job, but to deliver service when there is a need – for example, where there was not enough capacity of radiologists. Here I can add that there is an overcapacity of

radiologists in Belgium, with a total of 1,500 radiologists for 10 million inhabitants. In contrast, there are only 2,000 radiologists in the UK with a population of over 50 million and in Spain there is generally considered to be a shortage.

There were two reasons why I believe it was a bad decision to get involved in a commercial teleradiology company: We were not able to bridge the gap between the reporting radiologists and the management – our radiologists felt they were not paid enough and were overloaded with their work, while the management felt these radiologists were overpaid and not committed to the job.

As a radiologist and manager you feel yourself squeezed between the two parties who both have their rights and wrongs. If you employ radiologists and you work with those colleagues as their manager you come into constant conflict with your colleagues, because their position is that they may feel that they are overworked and underpaid. The lesson is this: competitively the project was very successful financially but the lesson I learned is to never try to make money on the back of your colleagues.

Then there was another problem that cropped up between the company and the local radiologists working cross border – our management felt we were helping the cross border local radiologists – but these local radiologists felt threatened by this new company, that they would be marginalised or that we would somehow ‘steal’ their business. The company and these outside colleagues from countries where we delivered the service did not have the same perception of our role. We were unsuccessful in bridging the gap between the company and the outside family of radiologists. So, finally I have realised that the message is not to start a major project or service such as this, if you don’t have the support of all stakeholders concerned. ■



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KEY INNOVATIONS ON SHOW

INDUSTRY @ ECR 2011

PHILIPS

Where? Booth 102, Expo A

What's on Show? Imaging 2.0, plus solutions across the range of medical imaging offerings

Satellite Symposia of note:

MRI Friday, 4 March

10:00 – 12:30, Room 8, Level 03

MR-HIFU Friday, 4 March

12:30 – 13:30, Room E1, Level OE

PET/MR Friday, 4 March

12:30 – 13:30, Room I/K, Level U2

CT Sunday, 6 March

12:30 – 13:30 Room G/H, Level U2

Advances in Ultrasound Saturday, 5 March

12:30 – 13:30 Room G/H, Level U2

Highlights:

CT Hands-on Workshops

Daily Friday, 4 March, Saturday, 5 March and Sunday, 6 March – Lounge 1, Level 1

Educational CT Hands-on Workshops offer participants new interpretation skills and showcase state-of-the-art clinical software capabilities. Sessions are free of charge for ECR registered delegates.

HOLOGIC

Where? Booth 310, Expo C

What's on Show? 3D Mammography, 3D Breast Tomosynthesis, Breast Biopsy Guidance System, ImageChecker 3D Calc CAD

Highlights:

3D mammography (breast tomosynthesis) and the Hologic **Selenia Dimensions** 3D breast tomosynthesis option are on show. Radiologists can also attend one of three Hologic sponsored 3D mammography workshops to cover the basic concepts and evolution of breast tomosynthesis. Also on show: Hologic **ATEC**, **Eviva** and **Celero** breast biopsy devices, Quantra volumetric assessment tool, **Multi-Care Platinum** breast biopsy table, **MammoSite ML** multi-lumen radiation therapy system and **Discovery QDR** series bone densitometer.

Satellite Symposia of note:

The use of 3D Mammography in Clinical Practice Saturday, March 5

14:00 – 15:30 Room C

HITACHI

Where? Booth 321, Expo C

What's on Show? Computed Tomography, Magnetic Resonance, Ultrasound, Interventional Radiology Tools, Contrast Media

Satellite Symposia of note:

Hitachi real-time tissue elastography (HI-RTE): from the experts, Saturday, March 5

12:30 – 13:30, Room F1

CARESTREAM HEALTH

Where? Booth 210, Expo B

What's on Show? Digital Radiography (DR), Computed Radiography (CR), Healthcare Information Systems (HIS), Women's Healthcare & Digital Output

Industry Workshop:

Digital Mammography Self-assessment Workshop Saturday, March 5 and Sunday, March 6, 09:00 – 18:00, Carestream Health Industry Hands-On Workshop Room, 01 – 1st level

Highlights:

Carestream Health will showcase an optional upgrade for its CR-based mammography and will also announce three new printers including the new CARESTREAM DRYVIEW 6850 Laser Imager and the tabletop CARESTREAM DRYVIEW 5700 Laser Imager plus the new CARESTREAM DRYVIEW CHROMA Imager. Carestream Health will launch a new addition to its portfolio of cloud-based CARESTREAM eHealth Managed Services (eMS).

AGFA HEALTHCARE

Where? Booth 103, Expo A

What's on Show? Integrated Regional Imaging Programme for regional hospital networks, plus scalable CR and DR portfolio, IMPAX Data Center and Viewer, IMPAX 6.5 RIS/PACS/Reporting amongst others

SECTRA

Where? Booth 411, Expo D plus mobile unit on entrance level

What's on Show? Sectra RIS/PACS solutions and Sectra MicroDose mammography

Satellite Symposia of Note:

How new technology can improve cancer detection and lower radiation dose in mammography, Saturday, March 5
14:00–15:30, Room N/O

GE HEALTHCARE

Where? Booth 202, Expo B

What's on Show? CT, Contrast Agents, Interventional Radiology Systems, MR, Nuclear Medicine, Radiography, Ultrasound

Satellite Symposia of note:

Widening clinical capabilities in MRI,

Friday, March 4 12:30-13:30, Room C

X-Ray advanced applications,

Saturday, March 5 12:30-13:30, Room C

Promise of advanced oncology imaging,

Saturday, March 5 14:00-15:30, Room F2

Redefining the rules of CT imaging,

Sunday, March 6th 12:30-13:30, Room C

Highlights:

The ECR "Update your skills: Image-guided Breast Biopsy" - Practical Course
Advanced applications mammography hands-on
The ECR "Update your skills: Musculoskeletal US" - Practical Course

SIEMENS

Where? Gallery, 628, 19 (First Level)

What's on Show? CT, Nuclear Medicine, MR, Radiography, Ultrasound, Therapeutic Radiology

Highlights:

Industry Hands-On Workshop for advanced multimodality reading on the new imaging software syngo.via. Updates on techniques in CT, MR and molecular imaging.

Satellite Symposia of Note:

Shaping the future of molecular and magnetic resonance imaging, Saturday, March 5

14:00–15:30, Room E1

Pioneering innovations in ultrasound,

Sunday, March 6 12:30–13:30, Room L/M

For more information, please visit
<http://www.myesr.org>

“Radiodiagnostics greatly improved for the smallest patients”

In November 2009, the Clinic of Imaging Methods at the University Hospital in Pilsen (Czech Republic) brought a Shimadzu MobileDaRt Evolution radiography unit into operation. It was the first installation in the country. This premium digital x-ray device is known for its operability, mobility and image quality. For Pilsen university, it was equipped with a portable flat panel detector CXDI-60 C suitable for pediatric applications.

The 9 x 11 inch (23 x 28 cm) dimensions of the flat panel detector (FPD) are designed for scanning newborns in incubators for example. The detector can be inserted into a designated area for radiographic cassettes currently used in most incubators. Features like “inch mover” buttons allow a precise positioning at the bedside or the incubator.

At Pilsen University Hospital, the MobileDaRt Evolution is used for examining children in the neonatology department. Children prematurely born and newborns usually have to be placed in an incubator. Often, their weight is just 1 kg. The MobileDaRt Evolution system supports a wide range of radiographic examinations at bedside and easy positioning at standard incubators.

Image quality meets low-dose management

In the past, these children were scanned using an analogue mobile device applying film material. “The result of scanning was often uncertain and

repeated scanning was usually needed, which was very stressful and burdening for the youngest patients”, said Dr. Martin Scheiner, product specialist at AURA Medical company, Prague.

Newborn babies and premature infants in particular are seven to ten times more sensitive to the effects of ionizing radiation than adults. It is therefore necessary to reduce the absorbed dose to the lowest level possible, while at the same time maintaining the quality of diagnostic information, i.e. image quality.

High-quality images available within 3 seconds of exposure

“The images are of high quality; there is no need to re-take, and they are almost immediately available”, said Doc. MUDr. Boris Kreuzberg, Head of Department Imaging Methods at the Pilsen University Hospital. The images are sent digitally via DICOM to the hospital information network where they are made accessible to the physicians and stored in a patients’ database. “This has greatly improved the radiodiagnostic care of the smallest patients, which is highly appreciated and considered by the neonatologists as a great step forward”, added Dr. Kreuzberg.

The MobileDaRt Evolution has a large storage capacity of around 3,500 high-resolution digital images in the onboard computer. Intuitive PC-guided operation allows easy and quick upload of stored images to the hospital network.

Compared with the previous film technology (CR technology) the radiation dose per one examination of a monitored quantity of diagnostic reference levels has decreased by an average of factor of ten. It has been due to the combination of positive factors resulting from the use of more complex technologies (i.e. increasing the voltage by 10 kV compared to film operation voltage) and the highly sensitive flat panel detector.

Instant preview image

Another benefit is the ability to shorten the ex-



MobileDaRt Evolution system in practical use

posure time of 4 ms, thereby preventing motion artefacts due to infants not being able to hold their breath for longer periods during inhalation.

The greatest advantage, especially appreciated by doctors as well as radiology assistants at the University Hospital, is the ability to obtain an instant preview image. The preview reveals whether the image shows everything the doctors need to see and helps to avoid repeated images and repeated exposure. A preview of just 1 Mpix is enough for the physicians to assess the patient’s situation. Radiology assistants can, with minor modifications, tune the image into an ideal result and display it on the high-quality diagnostic station at a resolution of 3 Mpix.

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Dr. Martin Scheiner, product specialist at AURA Medical company, Prague

KEY CONFERENCES & EVENTS

MARCH 2011

- 03 – 07 **ECR 2011 – European Congress of Radiology**
Vienna, Austria
www.myesr.org
- 26 – 31 **SIR's 36th Annual Scientific Meeting**
Chicago, US
www.sirmeeting.org
- 30 – 03 **International Liver Congress™**
Berlin, Germany
www.kenes.com/liver-congress

APRIL 2011

- 03 – 08 **43rd International Diagnostic Course Davos**
Davos, Switzerland
www.idkd.org
- 27 – 30 **GEST 2011 Europe – Global Embolization Symposium & Technologies**
Paris, France
www.gest2011.eu
- 28 – 05 **74th Annual Scientific Meeting: Canadian Association of Radiologists**
Montreal, Canada
www.car.ca
- 30 – 04 **2011 Annual Meeting of the American Radium Society**
Palm Beach, Florida, US
www.americanradiumsociety.org

MAY 2011

- 03 – 08 **43rd International Diagnostic Course Davos**
Davos, Switzerland
www.idkd.org

MAY 2011

- 27 – 30 **GEST 2011 Europe – Global Embolization Symposium & Technologies**
Paris, France
www.gest2011.eu
- 28 – 05 **74th Annual Scientific Meeting: Canadian Association of Radiologists**
Montreal, Canada
www.car.ca
- 30 – 04 **2011 Annual Meeting of the American Radium Society**
Palm Beach, Florida, US
www.americanradiumsociety.org

JUNE 2011

- 06 – 08 **UKRC 2011**
Manchester, UK
www.ukrc.org.uk
- 09 – 11 **Swiss Radiological Congress 2011**
Interlaken, Switzerland
www.radiologiekongress.ch
- 22 – 25 **CARS International Congress 2011**
Berlin, Germany
www.cars-int.org

SEPTEMBER 2011

- 10 – 14 **Annual Meeting of CIRSE (Cardiovascular and Interventional Radiology Society of Europe)**
Berlin, Germany
www.cirse.org

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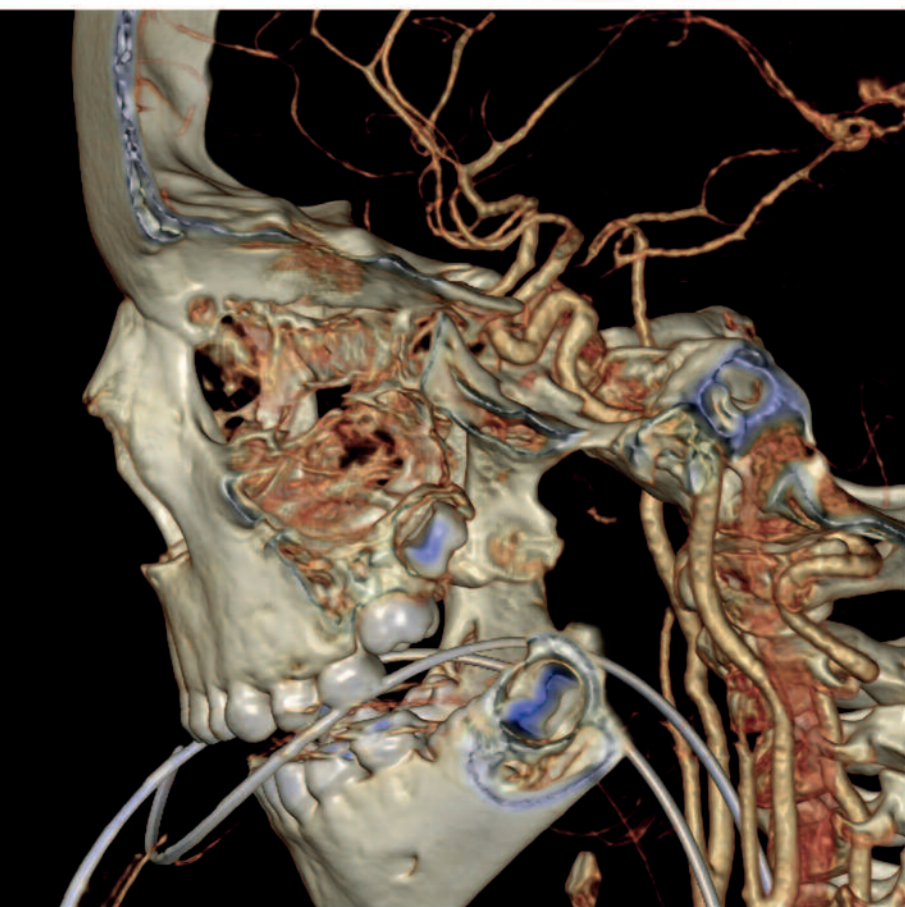


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