Cut prescriptions and choose treatments wisely!

The USA’s cautionary campaign is hitting the global psyche

Prescribing antibiotics for a viral infection with fever, a cold and a cough? There is no point! This is the best-known example of over-use in medicine. There are also numerous examples of diagnostic procedures and therapies that are pointless, yet still being done out in surgeries and hospitals – sometimes even harming a patient. This is set to change, according to the German Society of Internal Medicine (DGIM), which has launched ‘Klug entscheiden’, modelled on the USA’s campaign ‘Choosing Wisely’. That country is not alone. Worldwide, Canada’s campaign runs alongside the USA’s version, and the Swiss, Dutch and Italians have also adopted the concept. A Choosing Wisely campaign is also planned for by Great Britain, Australia, New Zealand and Japan.

The German campaign consists of 3-5-point checklists per specialist medical discipline, aimed at alerting doctors and patients to typical examples of over-use. The attraction of the campaign: ‘First, the doctors are encouraged to compile these check-points with patients and patients’ representatives. Second, the lists are meant to be written in such a way that patients can also understand them,’ explained Emeritus Professor Ulrich Fölsch, DGIM General Secretary and former Director of the Department of Internal Medicine I, at the Schleswig-Holstein University Medical Centre, when introducing the campaign in Berlin this February.

The model for the DGIM campaign was initiated as Choosing Wisely in 2012 by the American Board of Internal Medicine (ABIM), with which 60 specialist medical societies are currently involved. In line with the campaign’s US motto – ‘Five things physicians and patients should question’ – The North American Spine Society, for example, begins its checklist with the statement: ‘Don’t recommend advanced imaging (i.e. MRI) of the spine within the first six weeks in patients with non-specific acute low back pain as part of the treatment of red flags’. Red flags signify, among other things, the presence of trauma history, unintentional weight loss or immunosuppression. However, the above-mentioned example does not fall within the field of internal medicine represented by the DGIM. The German campaign is also still in its infancy. As recently as the beginning of 2015, Prof. Fölsch asked all eleven DGIM member societies representing medical disciplines. This will be further discussed and consented in a conference prepared for early May this year.

The fact that so-called under-use will also be addressed is one of two differences between the German campaign and American trailblazer. The second, more important difference concerns scientific safeguarding. Feedback from the different medical societies is to be checked for scientific verifiability based on existing, evidence-based directives before publication.

The first German organisation to engage with the Choosing Wisely theme, and discuss the relevance and methodical challenges in specific workshops, was the German Network Evidence Based Medicine (DNEbM). Daniel Strech, Member of the Board at the DNEbM, values the DGIM initiative into the German campaign as well as similar campaigns currently being initiated by other organisations. He appeals for the implementation of the campaign in a patient-oriented and science-based manner.

Professor David Klemperer, from the Regensburg University of Applied Sciences, and member of a working group within the Association of the Scientific Medical Societies in Germany (AWMF), which is focusing on the implementation of a Choosing Wisely campaign under the patronage of the AWMF, also hopes for good cooperation with the DGIM. Klemperer assumes that, in coming weeks, it will be possible to integrate the DGIM initiative into the efforts of the AWMF and to develop a joint campaign that all 108 specialist societies within the AWMF can join. Such comprehensive implementation of the campaign would be very significant, also in comparison with the American and Canadian Choosing Wisely campaigns, says Klemperer, who is also a member of the 2014 established Choosing Wisely International Working Group.

Report: Bettina Döbereiner

Choosing Wisely campaigns,’ says Klemperer, who is also a member of the 2014 established Choosing Wisely International Working Group.

Editor’s note: The effects of such a campaign on volumes of laboratory, pharmaceutical, imaging and usage of a multitude of other medical supplies is inestimable, at this stage. In addition, ethical questions must be addressed and debated regarding what is or is not really essential – for example, dip into the debate on cancer treatments at http://consumerhealthchoices.org/wp-content/uploads/2012/10/ChoosingWiselyCancerASCO.pdf

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EUROPEAN HOSPITAL
Hygiene begins between the ears’

Dr Ernst Tabori, Medical Director of the German Consulting Centre for Hospital Epidemiology and Infection Control (BZH), at the University Hospital Freiburg, specialises in building hygiene in hospitals and outpatient healthcare facilities, as well as surgical units. ‘Infection Prevention and Control,’ he says, ‘is a matter of awareness and continuous education.’ As far back as the 19th century, Ignaz Semmelweis was able to reduce maternal mortality rates in Vienna significantly through the simple measure of hand washing.

However, these days this appears to have disappeared from our consciousness, as the disinfectant dispensers visible on all wards do not reduce the contamination of door handles and other surfaces in the hospital with germs. Says Tabori: ‘We have moved along the way a little bit but haven’t quite arrived. Why? Lack of time? Ignorance? Lack of staff? The hospital infection control specialist believes that, even in modern buildings, the hospital pathogens infection rate cannot be further reduced because two thirds of all these pathogens come from the patients themselves.

Therefore the term ‘indirect contact infection’ is impracticable and out-dated. One solution could be for their general practitioners (GPs) to examine patients or refugees before hospital admission, as carried out in the Netherlands. Alternatively, new admissions could be separated from other patients until the results of their infection status are known.

However, even small building-relat ed issues can help, such as installing several, smaller wash basins in different locations rather than central washrooms with many basins for instance. Electronic water installations are susceptible to legionella, and the installation of elbow levers instead of water taps avoids contact with germs. There are many, detailed examples relating to water and air systems.

All new buildings at the BZH can answer all enquiries on these subjects. As so nicely put by Ernst Tabori: ‘Hygiene begins between the ears’.

In terms of their architectural organi sation, few buildings need to be geared towards their occupants as much as hospitals do. This insight is not new, but medical and technical developments call for different building conditions than those that might have sufficed ten years ago. The Nicki Architectural Practice, which specialises in the new build and refurbishment of healthcare, advocates the term ‘healing architecture’ for this kind of design.

originating in the 19th century, the large hospital complexes in Berlin, Hamburg and Munich no longer meet the demands of modern medicine. Whilst the pavilion-type structures of the Rudolf Virchow Clinic in the grounds of Berlin’s Charité Hospital may have been considered exemplary 150 years ago – being copied by hospitals worldwide – modern healthcare needs short distances and central treatment complexes. The Nicki Architectural Practice initially made its name with a new design for the University Hospital Hamburg-Eppendorf. Various pavilions were converted for different types of use and some of the old buildings were demolished to make way for the dominant, main new structure.

However, according to Professor Christine Nicki, ‘many of the old hospitals are beyond a cure because of contamination with pathogens, right down to the sewage treatment and also due to built in materials such as asbestos, at the time of construction of the hospitals.

Her architectural practice is now also in demand abroad. The new build and redesign of Frankfurt’s University Hospital was undertaken based on the healing architecture criteria. The architects developed ten criteria, such as orientation within the building, which create trust in people; the architecture is never anonymous but always personal. There is a need for individual, onched rooms and the appropriate design logistics to connect these individual rooms with one other, creating adaptable spaces between them.

According to Professor Nicki, this is a current issue. ‘We need the smaller spaces between rooms, which allow us to react quickly to changes in hospitals,’ she therefore advocates modular design.

Modular for fast reaction to change

This must not be confused with the type of modular design presented by numerous firms at the specialist meeting on Design and Operation of Hospitals, held at the Management Forum Starnberg, in University Hospital Munich. Fast increases in capacity, refurbishment of old build ings or contingency rooms during renovations – numerous solutions are available at various levels of cost.

Requirements in this field are very individual. Finding a customised solution for restoration or modernisation initially requires analysis of the current building portfolio, so that appropriate investment decisions can be made.

The CalCon Group, founded in 1999 as a spin-off from the Fraunhofer Institute for Building Physics, has developed software called ‘epipag’ for portfolio assessment. The software collects just a few geometric parameters of any building portfolio and assesses only the most important building blocks as to their condition. With the help of statistical projections the system then calculates the material required and the cost of respective structural measures. An acquisition effort of only 20% achieves a data accuracy of 80%.

The results are displayed in the ‘epipag-diagram’ so that the customer can see, at a glance, where building priorities should be. The structural measures and costs database integrated into the system then determines the respective costs the customer can expect once the structural measures have been selected from those stored in the database.

On the basis of the database, everyone’s attention should be on the internal design. As the changed process logistics affect daily routines, infection prevention and control must be a priority during the choice. In the chaos that develops during assumed short-term construction works, medical equipment has been known to have been moved out of operating theatres and stored in hallways. This situation might end up next to cleaning agents in storerooms.

Building hygiene

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Hygiene begins between the ears’

Report: Michael Krasneritz

Vienna is the perfect place for a symposium dedicated to ‘hospital construction and operation because, over the next 15 years, the Austrian capital will radically transform its hospital landscape. In the facilities of the Municipal Hospital Association Vienna (Wiener Krankenanstaltenverbund – KAV) 32,000 employees care for 400,000 in-patients annually, making KAV one of the largest hospital operators in Europe.

The new hospital master plan (Wiener Spitalkonzept 2030) is indeed stunning. Currently the network of 15 KAV sites will be reduced to seven, one new hospital will be built, three existing hospitals are to be demolished and entirely rebuilt on their sites and the three most recent hospitals, erected in the 1970s, will be modernised and expanded.

The old hospitals date back to the days of the Austro-Hungarian Empire and are made up of many separate buildings that cannot be listed. Today, such a structure cannot be operated in an economically viable way’, explains engineer Friedrich Prem, Head of the Technical Division at KAV, during last November’s Best Practices symposium in Vienna. To operate and manage the hospitals according to present-day standards, new buildings are needed. Prem added: ‘The new buildings alone will reduce operating costs by 250 million euros annually. This means building costs are recuperated within two or three years, simply by the lower operating costs.’

A point of departure in the master plan is the concept of having ‘as few buildings as possible,’ which spells an end of the decentralised pavilion system in favour of one central clinical building in a large public park. In line with this new concept, for example, the hospital in the Hietzing district, currently encompassing more than 100 buildings, will be reduced to 20 percent of its present floor area, and the listed pavilions will be converted into apartments.

As Prem explains, a compact central building has a number of advantages: small floor area, small frontage area and small gross floor area.

After the number of buildings is reduced, how would the remaining buildings be used? ‘You separate the clinical from the non-clinical functions – that’s a major step,’ Prem underlines. In Vienna, a separate administration and services building will complement each clinical centre, housing services such as pharmacy, sterile supply, kitchen, laundry, supplies, waste management, facility management and procurement. Non-clinical buildings have very different operating and functional life cycles than clinical buildings that must regularly be adapted to new functional requirements.

To ensure that all clinical departments are available for day to day operations even during construction work, the interior layout should be as flexible as possible – for example, few primary structures and flexible interior walls.

According to Prem, the clinical buildings must comply with a number of strategic specifications, inter alia:

- separate access areas for people and goods/emergency access
- centralised people access (one entrance, one lobby) private and semi-private rooms
- highest possible degree of automation and orientation towards state-of-the-art information and communication technologies transparency and openness – with one exception: where privacy is needed it takes priority over openness.

Implementing such a master plan involves decisions that go far beyond architectural and functional questions. ‘It’s crucial to separate organisational issues – for example, the transformation of the existing operational structure into the new operational structure, separated from construction issues, the new buildings,‘ he emphasises.

Dr Klaus Offner, engineer and Technical Director of the Salzburg State Hospital, totally agrees. Since 2000, his facility has been permanently modernised while still fully functional. Such a project takes at least ten years – and in those ten years your hospital management will change and new management will introduce new ideas. At his hospital,
Support in the transition from paediatric to adult healthcare

**Coming of age with a chronic disease**

Report: Bettina Döbereiner

During the transition from child to adult, many teens with chronic diseases somehow slip through the healthcare cracks between pediatric and adult medicine. Compliance deteriorates, regular check-ups are missed – an international problem, as many studies indicate. A promising programme, launched in Berlin, helps teens to manage this difficult change.

The five-year pilot project began at DRK Kliniken Berlin-Westend, over a two-year period, to make the transition to adult healthcare, professional case managers accompanied adolescents with type II diabetes or epilepsy, who had been patients at various pediatric institutions in and around Berlin.

The successful pilot was turned into the permanent Berliner TransitionsProgramm (BTP), which targets teens in Berlin, and northern Germany, with six different chronic conditions. 140 adolescents are enrolled in the programme, 80 have already completed it.

One major issue is financing, since only a few of the statutory health insurers reimburse costs. This is 'a major limitation', says Dr Silvia Müther, BTP project manager and diabetologist at the Paediatric Diabetes Centre, at DRK Hospital Berlin. Müther would like to see BTP classified as a regular service covered by the statutory health insurers, so that all adolescents could benefit from the programme.

On an international level, the Berlin project is unique; Dr Müther explains, because it targets several indications, is multidisciplinary and envisages reimbursement-based funding. Previously described transition projects have focused on one indication, are tied to a specific institution, privately funded and temporary.

Thus BTP might serve as a blueprint on the national and even European level; expansion scenarios are being developed.

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In the late 1990s, management consultant Julia K Kuark and Swiss communication consultant Hans Ulrich Reina Dobberkau invented the model of ‘TopSharing’ – as in job-sharing but, in this case, of a senior management role. In Germany, Dr Ulrike Ley, who coaches female doctors, considers the TopSharing model, expanded over a decade by Kuark, is a valid management model for hospitals. TopSharing helps male and female physicians to achieve a work-life balance by showing the way to split and share various management and administrative tasks, thus also gaining more time for patient care. Bettina Döbereiner interviewed the two trailblazing women to find out how they made this work.

Female physicians, as well as their male colleagues, struggle to achieve a sound career/family life balance. Reina Dobberkau and Ulrike Ley are among the lucky few who became successful TopSharers in a senior clinical role. Since 2011 the two physicians have jointly headed the cardiology department at the private 80-bed Brunnener MedicIn hospital, a German rehabilitation facility near the border with the Czech Republic.

**The idea of sharing a senior management position**

‘At the same time as my predecessor retired I also wanted to return to the hospital after my extended maternity leave,’ Dr Reina Dobberkau explained. ‘Whilst the hospital was already struggling with a clinical staff shortage, I didn’t want a full-time senior consultancy due to my family situation. Katrin Glass, whom I’d met during my medical training and with whom I had cooperated frequently, headed the cardiology department at a nearby clinic. Her institution also suffered a staff shortage and the workload was extremely high. We jointly developed the idea of sharing the management position and presented our idea to the group’s top management. Their reaction was very positive.’

‘What drew Katrin Glass in the same direction?’

‘I had always wanted to balance my career with my family life,’ she explained. ‘I live in a multi-generation family and, to me, my family tasks are as important as my passion for my profession and my career. Reina Dobberkau: ‘The hospital group was all very keen on us OK very quickly. For the group, having two permanent specialists represented a clear, competitive advantage. By law, the statutory pension insurers in Germany will only fund cardiological rehabilitation if two cardiologists are permanently employed in a facility. Consequently, our department was at risk of being shut down if we had not come up with our sharing scheme.**

**Role organisation**

Katrin Glass: ‘We both work 80 per cent of a full-time position, which means we are both there four days a week and are off for one day. This is a fixed set-up, of which everyone in the hospital is aware.’

‘We discuss and jointly decide all important administrative and clinical issues and we both sign the patients’ discharge summaries. Obviously there are tasks we do not share, such as patient care and certain tasks assigned to us by the hospital management, clinical responsibility for nursing care, for example, or the psychology department. We split human resources issues, such as acquisitions of clinical and non-clinical staff between us and, although we don’t take verbatim minutes that contain each detail and each single word, we always document all relevant statements and decisions in a transparent and comprehensible way. With a bit of experience, that works very well.’

**Necessary preconditions for TopSharing**

Reina Dobberkau: ‘Cooperation is crucial. You can’t just take any two physicians and ask them to share a position. While friendship, as it has developed between Ms Glass and me, is certainly not a pre-condition for successfully sharing a senior clinical management role, similar levels of clinical training are of utmost importance to ensure efficient clinical communication - after all, the two physicians have to stand in for each other. In addition, similar levels are necessary to avoid competition.’

Katrin Glass: ‘Another important issue is the employer’s support – he has to be willing to consider the idea of TopSharing in the first place, and you have to be able to convince him; you have to present a clear, well thought-out concept.

‘Then, when you do share your job, you need to organise your work well and you need discipline. The latter includes the fact that decisions, once made, are accepted and not questioned. What else is important for TopSharing? Openness, trust and the willingness to negotiate compromises.’

**Big TopSharing advantages**

Reina Dobberkau: ‘One major advantage of TopSharing opens up family time, your private life. When we’re in the hospital we work long hours, which in fact means we work more than 80 per cent of a full-time position – but we still have more time for the family. When we are off, we are off not only physically, but also mentally, because we can be sure that our patients are well taken care of by the colleague.’

Another issue, which I consider very important, is the fact that there is another professional with whom I can discuss and exchange ideas. We have our patients and when questions arise there is always the other cardiologist next door to turn to for feedback.

Katrin Glass: ‘One of the major advantages I see is that we share responsibility. Obviously, we do have different opinions from time to time, but we always manage to find a consensus, and before we “go public” we’ve come to an agreement. TopSharing is, no doubt, not always easy. There are difficult days, but there are difficult days in any clinical environment, particularly when you have a tough workload. However, summing up, the advantages of our work model far outweigh the problems!’

**Women in neuroradiology**

She is a neuroradiologist, professor, researcher and now the Medical Director of the Department of Neuroradiology at Dresden University Hospital. Her objectives are ambitious – be it in patient care, research or teaching. Professor Jennifer Linn MD wants to increase the quality of care, drive breakthroughs in research, ignite enthusiasm in students for their future profession and last, but not least, ensure job satisfaction for her team. Dr Linn is a rare breed: next to Professor Ulrike Erenmann, currently she is the only second woman in Germany to be a medical director of neuroradiology.

Report: Chrissanthi Nikolakoudi

As Head of Neuroradiology at Carl Gustav Carus University Hospital Professor Jennifer Linn has gained a much cherished opportunity to shape the work and position of her neuroradiology department. ‘As resident your responsibilities are limited to a certain clinical area, whereas you have to consider the entire department,’ Linn explains. More freedom, however, means a greater willingness to negotiate compromises, particularly with regard to personnel and budget decisions: Technical but above all human resources are limited. The challenge I have to meet is to deliver top quality. That’s quite a tightrope walk.’ She does not intend to rest on laurels her predecessors earned. The Dresden neuroradiology department is ISO-certified, patient care is considered very good and across the board referring physicians are satisfied. ‘Although at a certain level improvements become more and more difficult, my overarching aim is to drive quality assurance, diagnostics and speed,’ Linn explains.

She knows that a hospital is always only as good as the staff. Increasing job satisfaction, ensuring quality education and planning staff teamwork – for her these are much more than empty phrases: ‘I want my team members to know that they can rely on me.’ Why is that important? ‘You can reach for the sky but when the people around you are dissatisfied, when you don’t manage to create enthusiasm, you will fall flat on your nose pretty quick.

**Important causes of a stroke**

A) 72-year-old patient with recent ischaemic stroke in the area supplied by the Arteria cerebri media (diffusion MRI arrows)

B) Digital subtraction angiography of a 34-year-old patient with intracranial arteriovenous malformation (arrows) causing intracerebral haemorrhage (not shown)

C) 42-year-old patient with many microhaemorrhages (e.g. white arrows) and superficial siderosis (black arrows) education and a personal work climate – for her these are much more than empty phrases: ‘I want my team members to know that they can rely on me.’ Why is that important? ‘You can reach for the sky but when the people around you are dissatisfied, when you don’t manage to create enthusiasm, you will fall flat on your nose pretty quick.
The Far East’s highly international event

Jennifer Linn gained her doctorate from the Institute for Neurosciences at Munich’s Technical University and habilitation at Ludwig Maximilian University, Munich, with a thesis on the differentiation of microangiopathies. The small vessels are damaged by risk factors such as age, arterial hypertension or diabetes mellitus. For a long time we have considered this as a ‘normal’ ageing process. However, more recent research has shown that microangiopathies can indeed cause stroke symptoms and above all impair cognitive capabilities. Jennifer Linn wants to take a closer look at vascular dementia and find out more about the connections between vascular conditions and dementia. At this point, we do know that these diseases are connected but a lot of research remains to be done.

The professor estimates that 60 to 70 percent of her students are female and most of them will indeed get a degree. However, at senior resident level only about 20 percent are women. Albeit, Professor Linn points out that this is not a health-care-specific problem. She is also the mother of a one-year old child and knows that it can be very difficult to find reliable childcare during working hours. ‘Many women who face these difficulties give up too quickly. I firmly believe that children and a professional career can go hand in hand.’
New technologies in health and geriatric care promise great benefits – and risks – all of which were aired this February during Evangelical Academy congress in Berlin. Interestingly, an instrument to address the ethical dimensions of new developments was also introduced, Bettina Dobereiner reports.

If we believe the prognoses on demographic change, deciding how we want to be treated if ill, or in need of care, is a matter of the future. The Academy society agrees on a decisive migration policy to help ensure medical care is available for the future.

Along with the option of implementing selective, work-related migration, the technological advancements, which have developed rapidly over recent decades, offer the potential to take the strain of nurses and carers, or even to replace them. Strongly affected by demographic change, countries such as Japan and Germany are making large investments in development and geriatric care.

### Personalised medicine in ophthalmology

**Report: Michael Krasnitzer**

Nowadays the concept of personalised medicine is usually applied to oncology. However, there are other clinical disciplines in which therapies tailored to the individual patient are within reach, viz. ophthalmology. In the researchers’ lexicon, intravitreal drug delivery is the outcomes of intravitreal injections into the vitreous differ from patient to patient. Ophthalmologists in Vienna, Austria, are working on software to identify suitable therapy for each individual patient.

Intravitreal injections (IVI) are indicated for retinopathies such as age-related macular degeneration (AMD), diabetic macular oedema (DME) and retinal vascular occlusions. Antibodies are injected directly into the vitreous, which serves as a drug reservoir and released to the retina over the course of a few weeks. Thus, for the first time, treatment could be targeted directly – and successfully.

Thanks to intravitreal injections AMD is no longer the prime cause of blindness. However, there is a catch. In order to be on the safe side, the treatment must be repeated at every few weeks – for life. ‘This is definitely possible,’ says Dr Sebastian Waldstein, ophthalmologist at the Department of Ophthalmology and Optometry at the Medical University of Vienna, who is also in charge of the research focus Macular Degeneration at Vienna Reading Centre (VRC). ‘First, most patients simply cannot afford the monthly treatment financially; he points out, adding that it is also too stressful for the patient.’

Indeed, only a minority of patients need monthly treatment, he says. For about two thirds of patients much longer intervals are entirely sufficient – in fact, some patients need only a few injections! Even better, ‘The course of retinal disease and the best treatment strategy can be predicted with a probability of ninety-nine percent probability using optical coherence tomography (OCT), a diagnostic procedure largely developed in Vienna, that has revolutionised ophthalmology within a few years. In OCT, hundreds of scans are combined to produce a 3D image of the retina, which in turn allows reconstruction of the macula within seconds. However, the computing power behind this contactless procedure also poses a problem: the data volume generated in OCT is so huge that the ophthalmologist can no longer interpret it. To eliminate this quandary, Dr Waldstein is developing innovative computer-based methods to analyse large clinical image data sets.

To provide his research with an institutional framework, he initiated the Christian Doppler Laboratory for Ophthalmological Image Analysis, which he currently coordinates under the supervision of Professor Ursula Schmidt-Erfurth. The first results are already available: ‘The algorithms we developed need three exams to reliably predict the retinal status at the next scheduled exam and to predict whether the patient will suffer a relapse in the course of treatment,’ Dr Waldstein explains. These preliminarily tested methods must now be applied to larger patient cohorts. ‘We delivered the proof of principle and expect prototypes for the large-scale evaluation to be available in one to two years.’

It may well be that the physician will not be able to comprehend the calculated results based on the algorithms. The parameters that lead to the predictions might be highly complex.

Ambient assisted living systems

New technologies in health and geriatric care promise great benefits – and risks – all of which were aired this February during Evangelical Academy congress in Berlin. Interestingly, an instrument to address the ethical dimensions of new developments was also introduced, Bettina Dobereiner reports.

If we believe the prognoses on demographic change, deciding how we want to be treated if ill, or in need of care, is a matter of the future. The Academy society agrees on a decisive migration policy to help ensure medical care is available for the future.

Along with the option of implementing selective, work-related migration, the technological advancements, which have developed rapidly over recent decades, offer the potential to take the strain of nurses and carers, or even to replace them. Strongly affected by demographic change, countries such as Japan and Germany are making large investments in development and geriatric care.

### Ambient assisted living systems

The talk is of Ambient Assisted Living Systems. These aim to create an ‘intelligent’ environment that can adapt independently, proactively and situation-specifically to the needs of the elderly. The idea is to need healthcare in their own homes for as long and as independently as possible. The range of AAL systems already available along with those currently in development is huge – from help to turn off automatically after a period of time, to shoe soles equipped with GPS to help track dementia patients, to patients-lifting systems, and even to robot nurses.

Four of these AAL Systems, primarily designed for use in geriatric care, were introduced at an Evangelical Academy congress in Berlin. Two are already in use; SAMDY and Care-O-bot 4, the others still in development.

**Networked Living – SAMDY**

SAMYD stands for Sensor-based Adaptive Monitoring System for behavioural analysis of the elderly and, following a development and pilot phase in 2013, is now used on a regular basis by the Social Network St. Georg, a regional care provider.

To help enable old people to live at home for as long as possible, their flats and houses are fitted with a range of sensors that register their daily movements and actions. These motion and contact sensors are fixed to external doors as well as to fridge and oven doors along with tracking systems and fed sensors. The latter can analyse automatic movements during sleep and different depths of sleep, as well as monitoring the heart rate.

As soon as the sensors register a breach of the norm, specified as deviations from pre-defined, normal behaviour(s), a wireless warning system alerts members of the (nursing) care service to take immediate, appropriate measures.

**Care-O-bot 4 – the Service and Care robot**

Development of the 4th generation Care-O-bot, a robot developed by a Working Group at the Fraunhofer Institute for Manufacturing Engineering and Automation in Stuttgart, was completed at the beginning of 2015. The system will be introduced his April, during the 8th AAL Congress.

As a mobile service and care robot its purpose is to assist the user in the household and, just like SAMDY, enable the user to live at home as independently as possible. Care-O-bot safely moves around people, recognises typical household objects, can grip them and take them to certain locations, can set the table or open doors and drawers. With respective programming, it also reacts when someone has fallen and is lying on the floor, immediately establishing contact with an emergency service provider.

Completed in 2008, this interactive Service Robot Care-O-bot 3 can collect and deliver objects, opening and closing drawers for this purpose. Its interactive touchscreen provides a multitude of entertainment and communication functions. Voice telephony, for instance, facilitates communication with relatives and friends. The robot can also remind the user about appointments or, for example, taking a medication. If a user falls, the Care-O-bot can move towards them, simultaneously establishing a video link with an emergency control centre.

### Conclusion

Today, the fit among us should answer the question of how we would like to be cared in the future, and should establish procedures that will enable us to live a truly self-determined life to the end.

**Date for the diary**

29-30 April 2015
The 8th AAL Congress
Messe Frankfurt
Frankfurt am Main, Germany

**MEESTAR – the ethical evaluation instrument**

He developed a tool to evaluate ethical issues that result from a study initiated by the Federal Ministry of Education and Research (Ethical Questions around Ambient Assisted Living Systems) that collects and evaluates the advantages and disadvantages of new technological approaches and developments and all their aspects (legal, economic, social and moral). Since 2012, there has been a recommendation that all AAL projects promoted by the Federal Ministry of Education and Research should carry out a Model for the Ethical Evaluation of Ambient-Assisted Living Technologies (MEESTAR) in the form of two-day workshops.

**Ambient assisted living systems**
Chest pain units in Germany

The German care system for patients with acute and unspecified/undifferentiated chest pain is unique in Europe, Bettina Döbereiner reports. The closely knit and countrywide network of accredited Chest Pain Units (CPUs) ensures fast and targeted diagnosis of acute cardiac events. The German CPUs may soon serve as a blueprint for other European countries. The German Cardiac Society (DGK) has already accredited the first institutions – others will follow suit.

Trauma specialists in the USA pioneered modern chest pain care. In the early 1980s, the first Chest Pain Centre (CPC) was established in the emergency room at the St. Agnes HealthCare Hospital in Baltimore, Maryland. The main objective was to increase survival rates of patients with acute myocardial infarction, unstable angina or acute coronary syndrome by offering fast diagnosis and targeted treatment. Today there are approx. 3,500 chest pain centers in the USA, 826 of them accredited according to the Society of Cardiovascular Patient Care (SCPC), the responsible body.

In Germany, Dr Thomas Münzel, professor and head of cardiology at University Hospital Mainz, was instrumental in launching and driving CPU development and quality assurance. He and his team established the third German CPU at University Hospital Mainz in 2005. In 2007 Münzel also initiated a task force within the German Cardiac Society to draft quality criteria for CPUs, develop an accreditation procedure and lay the groundwork for more CPUs in this country. Just one year later DGK accredited the first CPUs and today Germany has 215 accredited CPUs.

CPU standards have been continuously adjusted and improved, although the core elements have not altered. The foremost objective of a CPU is to provide a definite coronary angiography and, if necessary, a percutaneous coronary intervention (PCI).

Whilst in the USA several randomized controlled studies have shown the effectiveness of chest pain centres, Germany has no such comprehensive studies on this. Nevertheless, results of the US researchers agree with the results of small-scale German studies, Münzel says. For example, a retrospective, single centre analysis at Mainz University Hospital indicates that, among myocardial infarction patients admitted to a CPU, the one-year survival rate is higher than among those admitted to a conventional emergency department (see illustration). In 2008, DGK commissioned the Institute for Infarction Research in Ludwigshafen to set up a Chest Pain Center register. The initial analysis of 30,000 patient data sets shows that Germany CPUs record a high number of self-referrals. Between 2008 and 2010, 52 percent of the admitted patients were walk-ins and around 30 percent of them presented with acute coronary syndrome – mostly younger people who had a vague feeling that something was wrong, but for a variety of reasons did not call the emergency medical services. Without CPUs, this patient group would not have received help in time but, because of the CPUs they have a better long-term prognosis,’ Münzel underlines.

Similar to the USA’s SCPC, Münzel and his DGK colleagues want to offer CPU accreditation internationally, above all in Europe, where many countries have comparable levels of care and comparable infrastructures. Thus, the recently updated DGK accreditation criteria will also be published for the first time in English (Clinical Research in Cardiology, 2015). DGK has already accredited two CPUs in Switzerland while hospitals in Austria, Turkey and Qatar expressed interest in the accreditation process.

Germany, however, is not the only European country to adopt the US model to set up chest pain facilities. Great Britain, Spain and France follow similar routes. However, unlike Germany, these countries have so far not managed to implement accreditation processes and create a quasinationwide CPU network. Why is the case is a matter of speculation – although it is no speculation that Münzel’s personal and on-going commitment continues to be crucial to the German CPU success story.

Survival analysis. The Kaplan–Meier survival curves in patients with acute coronary syndrome for composite endpoint of death, myocardial infarction, and stroke within one year. CPU: patients treated in the chest pain unit; ED: patients treated in the emergency department.

Map: left - Accredited CPUs. Right: Cardiac cath labs (as per Dec. 2014). The maps indicate that not every cardiac cath lab is complemented by a CPU with these ‘accreditation gaps’ particularly visible in east Germany. Currently Professor Münzel and colleagues on the DGK accreditation committee proactively approach cardiac cath labs in those regions to find out why there are fewer CPUs – accredited CPUs – and how possible barriers to CPU accreditation might be removed.

www.healthcare-in-europe.com
TAVI: Only for hospitals with cardiac surgery and wards

In the future, TAVIs can only be carried out in German hospitals with cardiac surgery departments and cardiac wards, as decided by the German Government’s Expert Panel on Health (G-BA) last January. An interim arrangement in force until 2016 is anticipated for Heart Centres that currently carry out the TAVI procedure without cardiac surgery departments on site. The Federal Ministry of Health is still to confirm this decision, Bettina Döbereiner reports

The interdisciplinary G-BA justified a decision to restrict TAVI procedures to hospitals with cardiac surgery departments and wards by stating that complications following the procedure cannot be ruled out, and that in-patient aftercare provided by heart surgeons is therefore a necessity. The decision was taken in the context of a new G-BA guideline that sets minimum standards for minimally invasive aortic valve interventions in German hospitals. Heart surgeons are therefore expected to assert themselves over their cardiologist colleagues with a demand that TAVIs should only be carried out in heart centres with cardiac surgery on-site, as per recommendations defined in the European Guidelines on Management of Valvular Heart Disease. In a position paper published last year, the cardiologists had argued in favour of allowing heart centres without cardiac surgery departments on-site to continue performing these interventions under certain conditions and in the presence of a cardiac surgeon (see report in EH 2/14 www.healthcare-in-europe.com/en/article/11713- treatment-of-aortic-valve-implantations-tavis.html).

As expected, when the decision was announced Professor Jochen Cremer, President of the German Society for Thoracic and Cardiovascular Surgery (DGTHG), welcomed this move. Professor Christian Hamm, President of the German Cardiac Society (DGK) also views the G-BA guidelines, along with the mentioned quality criteria listed in the DGK position paper, as a positive contribution towards quality assurance for TAVIs in Germany.

According to Hamm, there are currently 11 Heart Centres without cardiac surgery departments on site that carry out TAVIs - treating fewer than 5% of all patients undergoing this type of procedure. According to the definition of the G-BA interim arrangements, the centres are to continue with the provision of cardiac surgery through cooperation agreements until June 2016. As for the indication for treatment, the new G-BA guideline confirms the guidelines as well as national and international recommendations currently in force. For patients with a low risk score, open surgery remains the procedure of choice; TAVIs should only be carried out for older patients and those classed as inoperable.

The Federal Ministry of Health is expected to pass the new G-BA guideline in coming months; only then will it be legally binding.

The United Kingdom’s National Health Service (NHS) offers a two-pronged approach to care, diagnosis and treatment for patients with chest pains, Mark Nicholls reports

Rapid Access Chest Pain Clinics

The University of London’s Rapid Access Chest Pain Clinic (RACPC) provides a quick and early specialist cardiology assessment for patients with new onset of chest pain

Most UK chest pain clinics have adopted an exercise electrocardio-gram (ECG) model of approach, where patients are risk-stratified based on clinical history, examination and exercise ECG.

Within major hospitals, such as University College Hospital London, the RACPC provides ‘a quick and early specialist cardiology assessment for patients with new onset of exertional chest pain thought likely to be angina, and for patients not currently under a cardiologist who have known ischaemic heart disease and worsening symptoms, who need urgent assessment.

This consultant-led, one-stop clinic enables a rapid and definitive assessment of symptoms and investigations and results in either treat-ment initiation or the swift reassur-ance of patients without pathology. Through the RACPC system, all patients are offered an appointment within two weeks of referral by their general practitioner (GP), with letters generally sent within 24 hours.

Viewed as a fast route of entry into cardiology services for patients with suspected ischaemic heart disease, the system allows quick access to appropriate treatment, either medication or invasive procedures and to advice on risk factor modifi-cation and prevention and to reha-bilitation services.

However, patients with suspected myocardial infarction (MI), or acute coronary syndromes, should go directly to A&E and, where neces-sary, undergo PPCI. Patients will have an electrocardiogram (EGG), blood tests and chest X-ray with access to an exercise ECG test while a cardiac technician monitors pulse, blood pressure and heart trace. CT calcium scoring, CT coronary angiogram, stress electrocardiogram, myocardial perfusion scan, 24-hour EGG and coronary angiogram are also available as required.

West Middlesex University Hospital NHS Trust RACPC provides a one-stop service involving clinical assessment and investigations to confirm or exclude acute coronary artery disease and also sets the patients onwards to evidence-based treat-ment (vasorcalisation).

Led by consultant cardiologists and nurse specialists, this clinic is regarded as such a success due to the partnership and collaboration between the GPs, A&E staff, physi-cians who refer patients to the ser-vice, and the specialist nurse who runs the clinic supported by the medical members of the cardiology team and diagnostics department.

Gloucestershire Hospitals states that if the service are to review all patients within two weeks of referral; make accurate diagnosis of a potential cardiac cause; eliminate car-diac cause from those who have non-cardiac pain promptly; perform risk stratification; instigate appropri-ate/stop inappropriate treatments promptly; refer onward for cardiology examination as appropriate.

Referral criteria include typical cardiac chest pain; recent onset or (since onset) sudden change in diagnosis; angina; classic cardiac cause from those who have non-cardiac pain promptly; perform risk stratification; instigate appropri-ate/stop inappropriate treatments promptly; refer onward for cardiology examination as appropriate.

The University of London’s Rapid Access Chest Pain Clinic (RACPC) provides a quick and early specialist cardiology assessment for patients with new onset of chest pain

EUROPEAN HOSPITAL Vol 24 Issue 2/15

Restrictive ruling on cardiac procedure

In the future, TAVIs can only be carried out in German hospitals with cardiac surgery departments and cardiac wards, as decided by the German Government’s Expert Panel on Health (G-BA) last January. An interim arrangement in force until 2016 is anticipated for Heart Centres that currently carry out the TAVI procedure without cardiac surgery departments on site. The Federal Ministry of Health is still to confirm this decision, Bettina Döbereiner reports
Keeping up with an ever-evolving science

Planning for perfect clinical conditions

Made to measure laboratories

In 1995 Claudia and Robert Karl risked self-employment in a sector already dominated by experts. Those manufacturers, however, sold standardised products. The Karls, with backing from a stainless steel producer, decided to produce tailor-made solutions to fit customers’ needs. To that end they attended international medical equipment exhibitions from Dubai through to Malaysia. Today, Claudia Karl believes entrepreneurial thinking and attention to customers’ needs established their success.

In the ‘90s a friendship with a pathologist from Nijmegen, the Netherlands helped to optimise their products. By 1996 their company, Kugel, based in Regensburg, Germany, fully equipped a newly built forensic centre in Budweis, Czech Republic. There was a lot of backing demand after the Iron Curtain fell,” Robert Karl observed.

Their product range contains almost everything for a modern laboratory and the portfolio expansion continues to expand, with a focus on various tables. ‘Our specialists are the integrated exhaust units for dissection and autopsy tables. We also offer a complete range

Continued on page 10
Stainless steel furniture, morgue refrigeration units and transport and storage equipment.’

Robert Karl is increasingly asked to take over the entire laboratory planning, so the firm is not only a supplier but also planner.

Kugel's customers include histopathology labs, forensic centres, universities, hospitals, anatomy institutes and pharmaceutical firms plus veterinary pathologists. The firm has 130 international partners and 95% of its products are exported to 72 countries, including those in Europe, the Middle East, Russia, Asia and Australia.

'This year, Kugel medical celebrates its 20-year anniversary – for which Robert and Claudia Karl issued a statement that it is an anniversary that we are very proud of and which motivates us even more to develop and manufacture state-of-the-art solutions for our customers around the world!'

David Barton is Chief Scientist (Director) of the Molecular Genetics Laboratory at the National Centre for Medical Genetics in Dublin, Ireland, and is Chief Scientist of the Molecular Genetics Laboratory at the University of Cambridge, UK.

'Looking back, the founding fathers of laboratory medicine were doctors who carried out the historic medical practice of uroscopy in the Middle Ages, explains Professor Alain Kohler MD, Director of the Institute for Laboratory Medicine in Oldenburg Clinical Centre at Oldenburg University Medical Faculty. 'They drew conclusions about a patient's state of health by analysing a person's urine – an easily accessible body fluid. The change to the use of blood for this type of analysis, along with improvements to analytics, was decisive for progress in this field, particularly in the last century,' he adds.

'This information carrier is transported to all organs via the circulation and carries out an intensive exchange of substances. Examinations were carried out with increasing sensitivity and extended to more and more physiological and pathological substances with increasing complexity. The ability to determine concentrations on a femtomolar level is no longer sensational, and for cells or genome equivalents the number required for safe quantitative and qualitative analysis can be counted on the fingers of just one hand.'

Where we are today

'These days, the knack of laboratory medicine lies in the ability to process the enormous abundance of information from examinations. The 'omics', the entirety of genes, proteins, lipids, carbohydrates or metabolic parameters can now only be captured with bio-informatic methods. Traditional assessment criteria, such as longitudinal studies or transversal studies, soon reach their limits. 'Going forward, the aforementioned, complex information will facilitate individual assessments along the lines of the much-heralded ‘personalised medicine’ – but only if we also realise that we are dealing with dynamic organisms, with any samples taken only giving us a snapshot of a situation at this very point in time. Last, but not least, diagnostics will be advanced through the integration of clinical-chemical information with imaging procedures – such as functional MRI, PET and so on.'

Having been a member of various national and international committees, associations and societies, among others the Executive Committee of the IFCC Task Force on Paediatric Laboratory Medicine. With roles also including treasurer of the European Communities Confederation of Clinical Laboratory and Lecturer at the European Medical School Oldenburg-Groningen, the professor’s experience is pan-European. How does he perceive this array of countries and cultures? ‘The development of Europe from a plethora of different national states has obviously led to a multitude of developments during the establishment of our discipline,’ he points out. Clinical Chemistry, Clinical Microbiology, Clinical Pathology, Clinical Laboratory Medicine are terms that tend to be used on a mix and match basis. ‘The scope of diagnostic activity is also extremely different. In one country the fields of haematology and microbiology are included, in another they are considered to be separate subjects. The medical degree courses also differ. There is human medicine on the one side and natural sciences, such as chemistry, biochemistry and pharmacistics, on the other. The basic problem of how to deal with this continues to be an issue for the community.’

‘This prevails despite the fact that there are European committees such as the European Federation of Clinical Chemistry and Laboratory Medicine (EFLM) and Union Européenne des Médecins Spécialistes (UEMS), which have agreed on and compiled fundamental documentation and competency descriptions, such as the term European Specialist in Clinical Chemistry and Laboratory Medicine, based on a ‘common platform’ type of catalogue.’

‘The differences don’t stop at European borders, but have to be assessed differently as a matter of principle against the background
of non-conventional drugs for the treatment of pathogens, he points out. Very popular are also presentations on promising drug candidates in late-stage clinical trials, which will be the subject of oral sessions, poster presentations and a pipeline corner.

In the pro-con debate on pneumococcal conjugate vaccines we expect a vibrant discussion of the advantages and disadvantages of an adult vaccination.

Other ECCMID highlights include the lessons learned from the recent Ebola outbreaks, strategies on how to control poliovirus, malaria, multidrug-resistant tuberculosis and respiratory viruses, as well as recent news on the eradication of Hepatitis C, he says.

Clinical microbiology speakers will highlight developments in culture-based, PCR-based and rapid diagnostics as well as current and future challenges in forensic microbiology. Participants will also get updates on whole genome sequencing, on the detection and screening for resistant bacteria, the integration of molecular platforms into the laboratory and the use of digital imaging to assess colony morphology, Prof. Kern points out.

‘Although a quarter of a century ‘old’, clearly ECCMID remains a sprightly scientific leader and opinion shaper.

Keeping up with an ever-evolving science

Continued from page 9

The future is not gloomy

In no way is the view towards international harmonisation gloomy, according to Prof. Kohse. ‘When it comes to the contents of our activities, there are now hardly any national differences. There are procedures recommended by the international specialist associations and societies for the most important determination methods. The subject of quality assurance is basically handled in a very similar way the world over, although subtle differences will continue, due not least to different philosophies (such as target values for reference methods vs. consensus on target values for inter-laboratory test samples).

Standards organisations on a national (DN), European (EN) and international (ISO) level also make significant contributions towards standardisation and harmonisation.

They determine important specifications. For instance, one notable example is the definition of a unified standard for the competency of medical laboratories, which is implemented via accreditation with ISO Norm 15189.

‘All of this only works because these days we can communicate in unbelievably fast and efficient ways. Sharing activities in internet presentations, along with electronic communication, enables international discussions with colleagues.’

The role of laboratory medicine in clinical diagnostics

IT communication fosters unified standards of different legislations beyond the European Union.

The International Federation of Clinical Chemistry and Laboratory Medicine (IFCC) and the World Association of Pathology and Laboratory Medicine (WASPaLM) are also working towards the creation of job profiles that are standardised worldwide and with comparable competencies. Not all partners are always weighted equally, which is partly due to sheer size – the American Association of Clinical Chemistry (AACC), for instance, is only one of 85 specialist associations involved, but it has a huge number of members – and partly also for legal reasons.’
New nanoparticle could enhance MRI scanning

Scientists in the UK have designed a new self-assembling nanoparticle that targets tumours and could lead to quicker diagnosis of cancer, Mark Nicholls reports

Researchers at Imperial College London report that a new self-assembling nanoparticle can adhere to cancer cells, thus making them visible in MRI scans and possibly eliminating the need for invasive tissue biopsies.

The nanoparticle increases the sensitivity and improves the efficacy of MRI scanning by "specifically seeking out receptors found in cancerous cells" – a breakthrough that the research team suggests has the potential to alter the way clinicians diagnose cancer and improve doctors' ability to detect cancerous cells at much earlier stages of development.

"Work is now under way to enhance the effectiveness of the newly designed nanoparticle as a tool to help in the area of MRI scanning, with a goal to test the design in a human trial within three to five years. Under the process, the nanoparticle is coated with a protein that looks for specific signals given off by tumours and, when a tumour is found, it begins to interact with the cancerous cells. This interaction strips off the protein coating, causing the nanoparticle to self-assemble into a much larger particle so that it is more visible on the scan," Dr Nicholls explained. For the study, the ICL team used cancer cells and mouse models to compare the effects of the self-assembling nanoparticle in MRI scanning against commonly used imaging agents and found that the nanoparticle produced a more powerful signal and created a clearer MRI image of the tumour.

Professor Nicholas Long, at the Department of Chemistry at Imperial College London, said the results show real promise for better cancer diagnosis. "By improving the sensitivity of an MRI examination, our aim is to help doctors spot something that might be cancerous much more quickly," he explained. "This would enable patients to receive effective treatment sooner, which would hopefully improve survival rates from cancer."

"MRI scans are found in nearly every hospital and are vital machines used every day to scan patients," he said. "If we get to the bottom of what might be wrong, but we are aware that some doctors feel that the scans are not particularly effective at spotting large tumours, they are perhaps not as good at detecting smaller tumours in the early stages."

"The aim is to improve the design so that doctors can more easily spot a tumour and surgeons can then operate on it. Long: 'We're now trying to add an extra optical signal, so that the nanoparticle would light up with a luminescent probe once it had found its target, so combined with the better MRI signal this will make it even easier to identify tumours.'"

The next research stage will endeavour to fine-tune the size of the nanoparticle, to be even smaller but still produce an enhanced MRI image. However, research indicates that, if the nanoparticle is too small, the body will secrete it before imaging, but if too big it could be harmful. "Getting it just right is really important before moving to a human trial," added Dr Nicholls.

"It's not just about working towards the size of the final nanoparticle, to be even smaller but still produce an enhanced MRI image. However, research indicates that, if the nanoparticle is too small, the body will secrete it before imaging, but if too big it could be harmful. "Getting it just right is really important before moving to a human trial,' added Dr Nicholls.

A pathology workforce fit for the future

The UK pathology sector faces numerous challenges as it strives to create a future medical laboratory workforce.

As in many divisions of the National Health Service (NHS), this area has an ageing population yet must evolve against a backdrop of fast-developing technologies, emerging science, financial constraints and the challenge of working in tandem with the private sector.

Neil Anderson, Clinical Director of Coventry and Warwickshire Pathology Services, highlighted how UK laboratory medicine is at a pivotal point: He is concerned that the ageing workforce profile could present a problem in the future. "Pathology," he explained, "has an age profile that is tending to show the greatest number of staff in the 40-60-year-old category with the 50-50-year-old category, yet must evolve against a backdrop of fast-developing technologies, emerging science, financial constraints and the challenge of working in tandem with the private sector."

"What work has been conducted around workforce profiles, he suggested predictions were often flawed because they looked at simply replacing numbers, rather than analysing what type of workforce will be needed in the future. It is about putting the right people with relevant skills in the posts available and in the right numbers, which the private sector excels, e.g. managing transition and change, and negotiating discounts with diagnostic suppliers."

"Pathology, he explained, has an age profile that is tending to show the greatest number of staff in the 40-60-year-old category with the 50-50-year-old category, yet must evolve against a backdrop of fast-developing technologies, emerging science, financial constraints and the challenge of working in tandem with the private sector."

Neil Anderson is Clinical Director of Coventry and Warwickshire Pathology Services and a consultant clinical biochemist. He addressed the Frontiers in Laboratory Medicine conference: "The significant development is the 100,000 Genomes Project, which will sequence 100,000 whole genomes from NHS patients by 2017, set up a genomics medicine service for the NHS, enable new scientific discovery and medical insights and kick start the development of a UK genomics industry. ‘The staff needed to support that are very different to those currently in place within most pathology laboratories,' he pointed out."

"It’s not just about working towards the size of the final nanoparticle, to be even smaller but still produce an enhanced MRI image. However, research indicates that, if the nanoparticle is too small, the body will secrete it before imaging, but if too big it could be harmful. "Getting it just right is really important before moving to a human trial,' added Dr Nicholls.

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Cancer diagnostics

Figure. A: Protein expression in U87. CD4 tumours as compared to U87.D4. B: whole body T-2-weighted MR image of mouse after injection of 7.5 mg Fe/Kg of pre-aggregated targeted nanoparticles. Red arrows indicate signal loss in the liver and spleen due to accumulation of iron from the nanoparticles.
Labs need quality management systems

All laboratories should utilise quality monitoring systems and systematically work through their workflow processes to identify problem areas, according to Lucia Berte, who specialises in quality management systems in healthcare ancillary services through the Colorado-based organisation Laboratories Made Better. ‘Laboratories in any country do not have unlimited financial resources,’ she acknowledges. ‘Therefore, it’s in the laboratory’s best interest to identify problematic processes that have high failure costs and then solve those problems to reduce the financial drain on the budget. Unfortunately, many administrators do not see the value of using money to prevent and measure activities that ultimately save money by reducing and eliminating failure costs.’

Under the title ‘Understanding and Fixing Recurring Costs of Bad Quality in Your Laboratory’, she told delegates at the recent Frontiers in Laboratory Medicine conference in Birmingham, England, ‘...this is an especially timely topic, as laboratories struggle with adding new methods and technologies while also being asked to reduce cost.’

Acknowledging that patients want quality care at the lowest reasonable cost, as do clinicians and administrators, she said applying the four types of quality costs – prevention, appraisal, internal failure and external failure – across all disciplines within the laboratory is a systematic way to manage a laboratory’s limited financial resources. A key way to do this, rather than use expensive commercially available software programmes to manage quality cost data, is instead to systematically track failure costs using simple spreadsheet software. Prevention entails focusing on areas such as quality planning, work process training, preventive maintenance and quality management activities that help to ensure laboratory work processes function as intended. Appraisal includes conducting on-going competence assessment, performing and reviewing quality control data and conducting internal audits to ensure that work already performed meets quality requirements. Internal failure, she says, incurs costs that include anything from wasted blood components to insufficient or expired reagents or supplies or computer issues while external failures such as misdiagnosis, lost reports, reporting errors, lawsuits or customer complaints result in very high failure cost. The laboratory can use quality measurement and monitoring data to identify problematic processes. These problems need to be prioritised according to the risks of severity and frequency they pose to patients. The prioritisation becomes a roadmap for laboratories to initiate improvement projects.’

Berte believes that laboratories must identify and quantify these costs and then tackle and remove the causes to begin to resolve problem areas that prevent labs from delivering high level services.
U.S. aims to slow the rise of drug-resistant bacteria

One step C. diff testing

Meet Mr Clean Hand

The US’s President Barack Obama released a comprehensive plan in March to slow the emergence of drug-resistant bacteria, a $2 billion-dollar effort that includes getting doctors to stop over-prescribing antibiotics, improving healthcare systems, and adopting new technologies. Obama hopes this initiative will help reduce hospital-acquired infections (HAI), and avoid the worst case scenario of drug-resistant organisms becoming untreatable.

The USA’s President Barack Obama

The Genspeed C. diff OneStep test, a CE-IVD certified molecular diagnostic test to detect nosocomial infections, has been added to the Greiner Bio-One portfolio. The manufacturer reports that the test identifies toxigenic C. difficile by combining the detection of Glutamylhydroxynase (GDH), Toxin A, Toxin B and binary toxin in a single, molecular test — and a complete analysis, including the detection on the Genspeed R2 Analyser takes under 100 minutes (*Time can vary with validated PCR-cycler used). Toxin A, Toxin B and binary toxin in a single sample, molecular test — and a complete analysis, including the detection on the Genspeed R2 Analyser takes under 100 minutes. The new test addresses a leading threat to healthcare systems worldwide: C. difficile infection (CDI), believed to be the most common healthcare-associated infection in the USA. The disease causes antibiotic-associated diarrhoea (AAD) that may lead to pseudomembranous colitis and even to death. In a 2013 published report, the Center for Disease Control (CDC) in the USA categorised C. difficile infections as ‘Threat Level Urgent’, the highest level available, and after contact with the immediate infectious material, after patient contact, for effective hand disinfection: rubbing and compliance confirmation.

The Greenspeed C. diff OneStep test avoids the currently used, sequential, two-step diagnostic test procedures, which combine different test systems and assay principles for GDH and the C. difficile toxins. The new provides conclusive results without the need for confirmatory re-testing and enables inter-laboratory comparisons of test results, the maker reports. ‘Ready-to-use reagents and automated dispensing minimise the number of manual process steps within the workflow.’

*Genspeed products are currently available for sale in the EU and EFTA countries only.

Meet Mr Clean Hand

They call him Mr Clean Hand, Professor Didier Pittet MD, Specialist in Infection Prevention and Control at the Geneva University Hospitals, the ‘Father of Modern Hand Hygiene’. It was Pittet who, in the 1990s, introduced at his hospital the hitherto largest study on the subject of hand hygiene. It was he who defined the ‘five moments for hand hygiene’ before patient contact, before an aseptic procedure, after contact with potentially infectious material, after patient contact and after contact with the immediate patient environment. Additionally, it was he who thought of the ‘steps for effective hand disinfection: rubbing the palms, wrists, back of the hands, the spaces between the fingers, linked fingers, thumbs and fingertips with disinfectant within thirty seconds.’

This March, during the First ECE Conference on Hospital Hygiene and Patient Safety (held in Vienna), Pittet spoke about healthcare associated infections (HAI) and the way to combat these with hand hygiene strategies. Such infections cost around 16 million lives worldwide every year. In developed countries these are the second most common cause of death. Pittet believes, ‘There’s a simple remedy for hospital acquired infections — and it’s hand washing.’

Unfortunately, however, there is one major problem: compliance, which is usually only around 40%. Between 1994 and 1997 the hand hygiene model that he developed substantially increased willingness amongst Geneva doctors and nurses to carry out regular hand disinfection. The Geneva Model consists of two central cornerstones: an awareness campaign as well as monitoring and compliance confirmation. At the time, funny cartoons of nasty bacteria and dirty hands adorned the corridors of the Geneva hospital, and all nosocomial infections had to be reported. As a study in The Lancet confirms, the success of this model was repeated between Johnson and his team to combat infections, including France, Belgium, the USA, Australia, Belgium, Great Britain and Switzerland. A recent adaption of the Geneva Model helped to reduce infant mortality in hospitals in Vietnam by 80%, Pittet reports.

Source: Health & Disinfect KG

CE-IVD certified molecular test added to Genspeed

Obamacare’s multi-year, billion-dollar effort

The USA’s Government Task force and the USA’s Centers for Disease Control and Prevention have been reducing antibiotic use in meat animals since 2006. Johnson also points to recent efforts in the Netherlands where, in 2009, the government directed farmers to reduce antibiotic use in animals by half, and to Denmark, which has been reducing antibiotic use in animals since the 1990s. ‘I think the US has sort of moved into playing catch-up to Europe in handling antibiotic resistance,’ Johnson says. ‘I see the action plan as the US getting back in the game.’

Johnson also worries about what he considers the shortcomings of the White House plan, including the lack of an authority figure at the federal level to oversee efforts to curb antibiotic resistance. ‘Pulling it all together and making sure it all happens — there has been a glaring lack of that in the past,’ Johnson adds. However, the health-care community will likely embrace the effort. Price adds, ‘It seems like the policy consensus is ready for a change here. I think, with reimbursement rules changing and these time-bound quantitative goals, this is going to have a benefit for sure, and the medical community will rise up to the challenge.’

The Genspeed R2 Analyser and Genspeed C. diff OneStep Test

Two plates growing bacteria in the presence of discs containing various antibiotics. The one on the right has a CRE that is resistant to all the antibiotics tested and can grow near the discs.

The isolate on the left plate is susceptible to the antibiotics on the discs and therefore unable to grow around the discs. The one on the right has a CRE that is resistant to all the antibiotics tested and can grow near the discs.
Microbes vs. viruses

Report: Walter Depner

In European acute care hospitals, on any given day, an estimated 80,000 patients – roughly six percent of all patients – receive antimicrobial treatment to fight a healthcare associated infection (HAI), according to the European Centre for Disease Prevention and Control (ECDC).

3.2 million victims a year

Between 2011 and 2012, the ECDC surveyed 1,000 hospitals with more than 250,000 patients from all EU Member States, plus Norway and Iceland. The results indicate that approximately 3.2 million patients acquire a nosocomial infection every year in the EU. The highest infection rates are reported in Portugal (11%), Greece and Spain (9% each), Germany, with its infection rate of 5% (England 8.2%, Wales 6.4%, Scotland 9.5% and Northern Ireland 5.4%). In France there are percentages are considered to be roughly the same as in Germany.

In the United Kingdom the infection rate is almost 9% (England 8.2%, Wales 6.4%, Scotland 9.5% and Northern Ireland 5.4%). In France there are no reliable recent data, experts discuss a prevalence of 3-6%. The same is true for Austria, where the percentages are considered to be roughly the same as in Germany.

According to the study, in Europe around 3.2 million patients die from HAI every year – a figure, the ECDC underlines, which has to be used with caution due to differences in reporting procedures and incomplete or incomplete data. As in many comparisons and surveys of this kind the number of unreported cases might be considerable.

As far as Germany is concerned, the ECDC study estimates 400,000 to 600,000 new HAI cases per year and 15,000 deaths. However, during the German Congress for Hospital Hygiene in Berlin in March 2014, the German Society for Hospital Hygiene said it considers the ECDC figures to be ‘doctored’. According to the Society’s estimates, in 2012 up to 900,000 people acquired HAI and up to 40,000 patients died from a nosocomial infection.

Last, but not the least, in the USA data (most likely from 2006, the exact time frame of the survey is unclear) roughly 1.7 million HAIs were estimated (infection rate of 5.9%) to have caused or contributed to almost 100,000 deaths. More recent data indicate that infection rates are stable.

In the meantime, the ECDC has developed a unified European protocol for so-called point prevalence studies (PPS) and urged all European countries as of 2011/2012 to conduct national PPS on HAI and antimicrobial use. (Rosende, M et al, Deutsche Ärzteblatt 110 (38) September, 2013)

Another important issue has been making headline for about a year: Ebola, above all spreading in West African countries – Sierra Leone, Liberia and Guinea. The figures are frightening – more than 8,200 people have died and about 25,000 people are infected with the Ebola virus. The number of unreported or undetected Ebola-caused deaths is most likely even more significant than the number of unreported or undetected HAI-caused deaths in Europe.

Fortunately there are worldwide initiatives, research and support projects, fund raising campaigns, emergency hospitals and volunteers to help contain the pandemic. In March 2015 a large-scale vaccination campaign was launched with more than 10,000 participants. While the campaign’s success is impossible to predict, it will raise many questions – particularly if successful reports in developed countries the risk of healthcare associated infections is twenty times as high.

‘An awareness campaign on its own is not enough. The key to success lies in the adoption of the entire strategy, Pitter emphasizes. This is what he tried to explain to everyone who, over the years, has asked for permission to use the campaign’s videos displayed at Geneva’s University Hospital. Regular self-assessment is essential to help achieve sustainable changes in behaviour. Hand hygiene is only one aspect of efforts to defeat nosocomial infections. ‘Antibiotics management is just as important,’ emphasizes Prof. Herman Goossens MD, head of the Department for Microbiology at Antwerp University Hospital. There is a clear connection. ‘The more antibiotics prescribed, the more resistance occurs.’

Hospitals are particularly prone to resistant pathogens. At the First CEE Conference on Hospital Hygiene and Patient Safety, Goossens reported on a campaign in Belgium that was introduced to reduce the high prescription rates for antibiotics. This included advertisements on posters, in newspapers, on radio and television as well as information brochures and a website. The key point was a metaphor describing antibiotics as swimming armbands, worn daily on bases or in streets, but which deflate as soon as the wearer actually falls in the water. The success: Around €500 million were saved between 1999 and 2010 because the prescription rate for antibiotics was reduced.

Microbes vs. viruses

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New test identifies early sepsis

A newly launched test enables the quantitative determination of PCT in serum samples. EDTA or lithium heparin plasma samples by latex enhanced immunoturbidimetric methodology. The Stanbio Chemistry Procalcitonin (PCT) LiquiColor Assay was launched by EKF Diagnostics, based in Cardiff, Wales, which explains: Procalcitonin is a marker for bacterial infection and sepsis and has been recognized as an important adjunct marker in the diagnosis of sepsis. The new assay is fast, accurate and convenient. The test provides a precise result, which correlates well with established methodology within 10 minutes and requires just 20 µL of sample. The reagents may be used on almost any liquid-based chemistry analyser with open-channel capability. In addition, the reagent kit, calibrator and control sets are all available separately.

Commenting on the cost-effectiveness and convenience of the Stanbio Chemistry Procalcitonin (PCT) LiquiColor Assay, Ali Blanco, Business Unit Director of EKF Diagnostics Central Laboratory, added: 'This assay can be performed on a customer’s existing chemistry analyser with the same collection tube used for analysis of other chemistry tests. Therefore, it will provide optimised lab workflow by eliminating the need to split a sample, or have a dedicated off-line workstation. These features will provide any lab with a cost-effective solution for PCT testing.'

Products go worldwide

EKF Diagnostics Holdings plc, which includes the EKF Diagnostics, EKF Molecular, Stanbio Laboratory, Separation Technology Inc, DiaSpect and Selah Genomics brands, specialises in the development, production and worldwide distribution of point-of-care blood analysers to detect and manage diabetes, anaemia, lactate and kidney related diseases. EKF Molecular Diagnostics, the firm’s new molecular division, focuses on technology used within the development of companion diagnostics, specifically within oncology. Sold in more than 100 countries, the firm’s analyser range is used in GP surgeries, pharmacies, blood banks, sports clinics, hospitals and laboratories for glucose, lactate, haemoglobin, haematocrit and HbA1c measurement.

Molecular diagnostics

In March 2013, EKF set up a new division to focus on molecular and companion diagnostics following the acquisition of UK-based 360 Genomics. PointMan, EKF Molecular Diagnostics’s technology, can detect mutant genes from tiny biopsy and blood samples and the firm has recently entered a partnership with the world-renowned cancer research centre at Massachusetts General Hospital, USA. Details: www.eukfdiagnostics.com.
with the reference diagnosis for participating pathologists was 75.3%, identical to the initial level of unanimous agreement between the three expert pathologists, wrote Professor Nancy E Davidson MD, director of the University of Pittsburgh Cancer Institute and Professor David I. Rimm PhD, director of pathology tissue services at Yale School of Medicine in New Haven, CT, in an accompanying editorial. They stated that ‘the accuracy of the pathologist's diagnoses is relatively understudied and represents an important knowledge gap at a time when medicine is becoming more evidence-based’.

However, they pointed out factors that may have influenced the inequitable performance. Pathologists only had a single slide to work with, and did not have the option to consult with others. In daily practice, they work with multiple slides and have the ability to consult with colleagues about challenging cases. Additionally, the case mix of slides included a large number of challenging cases that were atypical of what a pathologist would encounter on a day-to-day basis.

However, because pathologists were in low-volume practices and less experienced pathologists made more errors than more experienced pathologists in the cohort, Davidson and Rimm recommended that pathologists should consult with more expert colleagues about challenging cases – and, in cases of ambiguity, a second independent opinion is recommended.

Many uncertainties in breast cancer biopsy diagnoses

Ambiguity calls for a second opinion

Each year, approximately 1.6 million women in the USA have breast biopsies to diagnose or rule out cancer. Pathological diagnosis is considered the gold standard – how accurate are these diagnoses?

A recent study published in the Journal of the American Medical Association that generated national media headlines has shaken the faith of American women and their doctors. 115 pathologists, working throughout the country, independently interpreted biopsy samples of 60 cases. Whilst their diagnoses of invasive breast cancer were nearly 100% accurate, one in five pathologists made incorrect diagnoses relating to ductal carcinoma in situ (DCIS), and half misdiagnosed the presence of atypia – abnormal cells. Accurate diagnosis of atypia is important. Although 87% accurately diagnosed benign tissue samples without atypia, the fact that 52% of atypia cases were misdiagnosed is disconcerting. With a diagnosis of atypical ductal hyperplasia on a core needle biopsy, further surgical excision of the site is recommended to ensure that a cancer is not missed.

According to ductal carcinoma in situ (DCIS), and half misdiagnosed the presence of atypia – abnormal cells. Accurate diagnosis of atypia is important. Although 87% accurately diagnosed benign tissue samples without atypia, the fact that 52% of atypia cases were misdiagnosed is disconcerting. With a diagnosis of atypical ductal hyperplasia on a core needle biopsy, further surgical excision of the site is recommended to ensure that a cancer is not missed as a result of a sampling error. Over-diagnosis of atypical ductal hyperplasia may lead to unnecessary surgery and under-diagnosis of atypia may miss a cancer in adjacent tissue. The study consisted of sending a set of 60 cases with a single tissue sample to each of the 115 pathologists. The 60 cases were a subset of 240 cases: 10% were tissue samples of invasive carcinoma, 50% DCIS, 30% atypia, and 30% benign.

Diagnoses were made independently and subsequently by consensus of three expert breast pathologists. Nearly half of the cases were from women aged 40-49, 28% from women aged 50-59, 12% aged 60-69, and 11% aged 70 and over. Breast density categories from mammograms included all categories, with heterogeneously dense and extremely dense representing 40.4% and 10.4% respectively. Samples were obtained from both core needle and excisional biopsies.

Principal investigator Dr Joann G Elmore, an affiliate investigator at the Fred Hutchinson Cancer Research Center of the University of Washington in Seattle, and colleagues, reported that over-interpretation of atypia was 17% and over-interpretation of benign tissue without atypia was 11%. DCIS was diagnosed as invasive carcinoma in 5% of cases. Under-interpretation was 6% for invasive breast cancer, 13% for DCIS, and 35% for atypia.

“We were surprised by the amount of disagreement among pathologists,” Elmore said in a JAMA website video interview. Should she have been? The individual diagnoses of the three expert pathologists were in agreement only 75%. Only after they conferred with one another did they reach the consensus diagnoses used to compare the diagnoses of the 112 pathologists. The key finding [of the study] was that the overall concordance rate of diagnostic interpretations

For a better understanding of the pathology of cancer cells, medical researchers around the world are using biomarkers. However, before a biomarker test can be performed, the genetic information has to be extracted from the solid tissue and the nucleic acids have to be isolated as carefully as possible. This has been a critical and highly manual step, so far. At the Department of Pathology at Leiden University Medical Center, tissue samples can now be processed twice as fast thanks to a fully automated workflow. This not only saves costs, time, and source material, but most of all accelerates and improves diagnostic testing for cancer patients.

For the complete business case, visit www.siemens.com/healthcare-leiden.

The statements by Siemens’ customers described herein are based on results that were achieved in the customer’s unique setting. Since there is no “typical” hospital and many variables exist (e.g., hospital size, case mix, level of IT adoption) there can be no guarantee that other customers will achieve the same results.

Answers for life.
Scottish NHS group endorses automation

The discipline of clinical chemistry in Switzerland comprises the biochemical and immunological analyses of substrates, hormones, metabolites and blood cells and drugs of abuse in blood and other body fluids, mostly using highly automated equipment. Clinical laboratories that perform more sophisticated chemical techniques are also used, such as atomic absorption spectrometry to copy quantify heavy metals in blood, urine and tissues, chromatography coupled mass spectrometry to quantify drugs, and electro- phoresis to separate proteins. Unlike other countries, coagulation tests, blood cell count and blood smears, are not part of clinical chemistry.

A Masters degree in medical and pharmaceutical sciences, biology, biochemistry, chemistry or a comparable natural science is needed to become a clinical chemist. The Swiss Medical Association issues the curriculum to specialise in laboratory medicine. The Swiss Association of Medical Laboratories, FAMH, represents the commercial laboratories that perform over 1,500 different analyses of blood, urine, stool or other body fluids. They, in turn, organise continuing education in clinical chemistry.

The CentraLink Data Management System drives maximum performance and efficiency

For many years, the clinical chemist has been involved in all aspects of laboratory medicine, mostly in acute somatic hospitals and specialised clinics, according to Dr Bill Bartlett, NHS Tayside Joint Clinical Director of Diagnostics, concludes, lab services are transformed from cost centre to value investment.

The new system can track and manage 3,000 specimens an hour just in circulation. At the touch of a CentralLink system screen, we can also retrieve and drive testing on up to 15,000 more samples stored in the Apito refrigeration module.

Three labs into one

Serving 480,000 people through 22 hospitals/infectories and 69 general practices, Tayside relies on two hospital laboratories that merged three former individual labs onto a single track, fully providing pre- and post-analytical sample-processing modules along with comprehensive analytics.

Aptio Automation, labs of all sizes can transform their operations to harness change and drive maximum performance and efficiency

After passing an entrance exam and a medical interview, the clinical chemist is usually appointed to the respective medical faculties. Basel and Berne universities are the only two universities that offer doctorate programmes in clinical chemistry. Therefore, typically the candidate first pursues a medical degree before specialising in this profession. In Switzerland only pharmacists have mandatory coursework in clinical chemistry. However, the clinical chemist is therefore an absolute need, because this is the best chance to draw students into the laboratories.

In my opinion clinical chemistry is the most fascinating every day, Professor Katharina Rentsch emphasizes, when explaining the need to attract students to this often overlooked but intriguing and varied discipline

Clinical chemistry is becoming a key component of modern healthcare, as evidenced by the increasing demand for laboratory services. With advancements in technology, the role of clinical chemists has expanded, and their contributions to patient care have become more critical. The discipline of clinical chemistry in Switzerland, for example, comprises biochemical and immunological analyses of substrates, hormones, metabolites, and blood cells and drugs of abuse in blood and other body fluids. Clinical laboratories use automated equipment to perform sophisticated chemical analyses, which are crucial for diagnosing and managing various health conditions.

In the era of precision medicine, clinical chemists play a pivotal role in developing and implementing innovative diagnostic tools. They collaborate with healthcare providers, researchers, and other professionals to ensure that patients receive the best possible care. The demand for clinical chemists is expected to grow as the healthcare sector continues to evolve, driven by advancements in technology and an increasing awareness of the importance of preventive care.

Moreover, clinical chemists are integral to the development of new treatments and therapies. They work closely with pharmaceutical companies to conduct clinical trials and analyze results, helping to advance medical science and improve patient outcomes. In summary, the discipline of clinical chemistry is not only fascinating but also essential in today's healthcare landscape, offering countless opportunities for growth and innovation.
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The CentraLink Data Management System is a proven data management solution that empowers labs to deliver timely, accurate results efficiently.
Are medical apps a waste of time?

Among 28.8 million mobile telephones sold in Germany in 2014, 82% were smartphones. For this reason, the apps market has also increased exponentially. A survey by health insurer IKK showed that 22% of Germans already use these apps and a further 24% intend to install them on their smartphones or tablets. We asked Professor Norbert Gäsler, Head of the Centre for Laboratory Diagnostics at the St. Bernward Hospital, Hildesheim, whether medical apps on private smartphones are worth having.

Interview: Walter Depner

“The most popular apps are those with the most diagnostic information on diseases and their symptoms, or those with different types of remittances,” says Professor Norbert Gäsler. For skin diseases, such as malignant melanoma, photographic documentation is very helpful to assess the progression of the disease.

There are also apps available for 

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Taking medication, doctor’s appointment etc. Of particular interest are the medical-diagnostic apps used to control blood pressure, blood weight, body temperature, pulse, blood sugar levels and other laboratory results,” laboratory diagnostics expert Professor Norbert Gäsler believes. For skin diseases, such as malignant melanoma, photographic documentation is very helpful to assess the progression of the disease.

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Depner: This implies they are not

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Not suitable as diagnostic tools. However, could they be used differ-

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ently, for example, as a plastic for 

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Should you be put over the 

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other alcohol level before driving home? Prof. G: Yes, this has already been 

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trumped, but the blood alcohol con-

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tent shown on the display is not 

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precise enough, so we can only advise against this. Generally, the 

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advice should be not to drive at 

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all after alcohol consumption. Your conclusion that “diagnostic” apps are not (yet) suitable should be looked at with a little more dif-

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ferentiation. Simple measurements of 

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blood sugar and lactate levels are already becoming quite precise. However, unfortunately these apps were not compared or validated with the methods used in precise laboratory medicine.”

Urine testing

Cystitis is a very common prob-

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lem. An app currently available makes it possible to take a picture of a urine test strip, which can be purchased in pharmacies. The display then detects the disease based on the different colours and patterns of the different test fields. Would this not be useful?

And then maybe another app for 

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medication? No, this approach can only be described as negligent. Clinical symptoms and scientifically sound diagnosis of pathogens are the fundamentals of precise medical treatment. ‘Out of the more than 100,000 apps that promise medical benefits there is only a small num-

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ber of medical applications with measuring functions. These, how-

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ever, make up a large percentage of the turnover of these apps (in 2012 it was around €350 million world-

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wide). As shown using the example of the diagnostic procedure for cystitis, additional products such as urine test strips are often required.

Some apps don’t require additional 

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products and can be directly used with the smartphone functions. This includes hearing and eye tests to determine responsiveness.’

External sensors

Certain external sensors can be 

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connected to the smartphone, for instance to measure electro-

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currents in the heart via ECG, measure blood pressure (with 

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BP cuff), pulse (with finger sensor), current blood glucose concentra-

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tion, as well as more specific diagnostic markers.

The latter include measuring 

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TSH to diagnose thyroid prob-

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lems, measuring HIV to diagnose AIDS, and measuring syphilis to diagnose sexually transmitted diseases. What do you think of this development?

The portfolio of such apps seems to be unlimited. In the USA, a first prototype to measure blood sugar concentrations without taking blood was introduced in February 2015 in the shape of a tattoo that can be applied to the skin. The continu-

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ously measured glucose concentra-

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tion levels are wirelessly transmitted to the smartphone and then docu-

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mented. The boom in these medical apps is mainly occurring in the USA and Asia, but we must assume that this rapid growth will soon also reach Europe.

Pro and cons

Security

Should we not scrutinise the issues of data security, patient protection, ethical and legal problems and many more at this point?

Yes, correct! These apps are often heavily promoted, but with how much reliability does the provider deliver the diagnostics, or other services, remains a bit of a grey area. Can we also trust them to safeguard our personal data? This requires much reliability the provider delivers.

On the other hand, certain apps really can be very useful for special applications and situations. Specialists in tropical diseases, for instance, have been working for years on using smartphones with special camera add-ons as micro-

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scopes. There is currently a field trial in Tanzania, where a modified smartphone is being used as a detection system for parasites, and particularly worms, in stool samples. This earlier mentioned detection of HIV, but also of Malaria and other diseases, could be a major argument for the use of such apps in third world countries or other areas with a lack of infrastructure.”

This market will boom

The turnover in POCT diagnostics will continue to increase substantially according to participants in the ‘In Vitro Diagnostic Products’ meeting held in Toronto, Canada last October. Sponsored by the German Institute for Standards in Medicine, the event included participation by the DIN Standards Committee Medicine (Na 063-05-11 A1) and the Canadian Committee on Point of Care Testing (POCT) (NA 063-05-11 A).

In Canada, in the USA, turnover for products used to diagnose glucose levels, infections, heart disease and cancer, for instance, in the most important conditions, was around US$25.2 billion. The forecast for 2018 is estimated at US$75.5 billion, an increase of around 9.3%.

Robert L Michel (Editor-in-Chief of The Dark Report) spoke of the particular poignant diabetes occurrence in the US. 29.1 million Americans are diabetics, i.e. roughly 9.5% of the population. 21 million people were found to have diabetes following a specific diagnosis. 8.1 million people had no diagnosis. 75 million people are estimated to have pre-diabetic symptoms already.

The number of POCT tests and their applications is growing expo-

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nentially. Many experts in Toronto particularly saw technological pro-

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gress leading to distinct changes. Classic areas of application, such as chemistry, toxicology, haematocol-

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ogy and microbiology, are using more specific test procedures and 

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are being developed forPoint-of-Care. For example, the latest trends include additional modules for smartphones, such as those used for glucose and thyroid stimulating hormone (TSH) diag-

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nosis. The number of Point-of-Care DNA tests being used, some highly complex, is also increasing. Another interesting trend revolves around ‘smart’ nappies with an integrated, specific urine test for babies and other patients.

Based on examples from Australia and Canada (more specifically from the Ontario region) diagnostic networks to treat HIV, and also cancer, disease, were introduced at the event. This emphasised the clear advan-

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tage of comprehensive POCT diagnostics, particularly regarding their analytical quality.

Ana Stankovic, Vice President Laboratory Diagnostics at the St. Bernward Hospital, Hildesheim, Germany

So, there’s a pleon in favour of apps after all?

‘Users and manufacturers of these apps should definitely work together with medical specialists and diagnosticians on the development of “useful” apps. Furthermore, interdisciplinary discussion should develop sensible workflows from the capture and transmission of measurements to the resulting diagnostic and therapeutical consequences.”
Radiologists are doctors first

Delegates were asked an increasingly vital question during ECR 2015: do they want to be photographers or doctors? ‘This is probably one of the most interesting sessions of this meeting and, after the congress, maybe even your career,’ declared Jim Reekers, professor of interventional radiology at the University of Amsterdam, the Netherlands, when he faced a packed auditorium and kickstarted the eponymous Professional Challenges session.

Medical imaging practice has changed profoundly and extremely rapidly, and this has had huge consequences for radiologists, interventional radiologist Professor Jim Reekers explained. ‘In the old days, we were called the photo department, still something that sticks today. A survey made by the ESR, which was never published, asked patients whether they thought the radiologist was a doctor or not... and they had no idea,’ he said. ‘So the question of this session really is: how to stay relevant for the future of radiology?’ he added.

According to Nicola Strickland, a consultant radiologist at the Imperial College Healthcare NHS Trust, Hammersmith Hospital, London, UK, radiologists must first realise they are not future proof. ‘We can only protect ourselves by making ourselves indispensable to patient care and to our clinical colleagues,’ she said.

Radiologists must show their additional value to the team by emphasising that they are doctors first. ‘We are both photographers and doctors, but we are doctors first. Compared with non-medical people, such as radiographers or nurses, we, as radiologists, can add value by showing we understand the pathology, physiology, and disease processes affecting that particular physiology, and apply that value to the clinical scenario,’ she said. ‘We can tailor our report to a particular clinical scenario.’

Any doctor can read an image nowadays. To maintain their lead in image interpretation, radiologists must remain at the forefront of knowledge in clinical intervention, imaging modalities and digital informatics and software, Strickland added. ‘We have to maintain our clinical expertise, and keep abreast of technologies and rapid changes in our specialty. We must remain ahead of the game, and be as good as, and in fact better than, our clinical colleagues. For instance, I have to be able to interpret an ankle scan better than an orthopaedic surgeon,’ she stressed. ‘Inevitably, there has to be some subspecialisation and, she recommended, it is vital to attend multidisciplinary meetings on a weekly or daily basis.

Reekers wondered if subspecialisation could be the answer in the following presentation. Most specialties have an undisputed place in clinical practice, he argued. However, that is not the case for radiology. ‘There is no surgeon who will do his or her own anaesthesia, so there is really this undisputed knowledge: Radiology is not undisputed and this is the problem.’

He quoted a survey unveiled at RSNA in 2009, in which 90% of interviewed clinicians said they were comfortable interpreting X-rays in 55.5% of all of the time and 35.8% some of the time. Half of the interviewees felt equally competent at interpreting CT exams and, depending on the type of exam, 40% admitted they did not read the entire radiology report. ‘Imaging has become the most important diagnostic tool over the past few years and many medical specialties now include it in their curriculum. We have to be aware that we are not alone on the planet anymore. Image interpretation without clinical knowledge is not possible anymore, you have to know the whole package,’ the expert said. ‘The radiologist 2.0 should be part of this decision-making and be an active clinical partner with up-to-date knowledge about a medical specialty. Reekers recommended joining different medical specialty societies to acquire further skills. ‘You have to have broad knowledge otherwise you will not be seen as an expert anymore,’ he concluded.

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- 5 year warranty

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MRI is increasingly relevant to cancer management, especially to detect breast carcinoma. Professor Christiane K Kuhl from the department of diagnostic and interventional radiology at the University of Aachen, Germany, strongly advocated in favour of MRI in breast cancer screening during a dedicated Satellite Symposium organised by Bracco at ECR 2015.

‘If one thing has been proven by screening mammography, it is that early diagnosis of a malignant disease does indeed translate into improved survival. This concept justifies the use of screening in general and specifically for breast cancer. We have indeed seen a decrease of mortality rates over the past decades,’ said radiologist Professor Christiane Kuhl, opening her presentation during a Satellite Symposium at this year’s ECR.

However, regardless of the benefits, a number of issues still call for improved cancer screening methods. Mammographic screening, just like PSA screening for prostate cancer, may pick possibly irrelevant diseases, which even if left undiagnosed would never progress to an actual life-threatening condition. Early publications on over-diagnosis through mammographic screening claimed that one out of three breast cancers represented over-diagnosis. However, it is currently, and probably more realistically, estimated that about 10% of breast cancers do belong to that group, Kuhl pointed out.

Mammography in fact has technology-inherent bias to detect slowly growing cancers. ‘What we really depict is pathophysiological changes that reflect regression changes such as hypoxia, necrosis, fibrosis, calcification and architectural distortions. Another challenge with mammography is under-diagnosis. Surprisingly enough, this is not discussed so much by the scientific community, although it’s clear that mammography screening has a limited sensitivity for prognostically relevant disease,’ she pointed out. Despite decades of studying breast cancer in epidemiologic studies, it continues to be the leading cause of cancer death in women and the most common cause of death in women under 50.’ Over-diagnosis is not our main problem. If it were, no one would die. Both over and under-diagnosis are shortcomings of mammographic screening,’ she said.

Other screening candidates have been studied, starting with digital breast tomosynthesis (DBT). A study that was conducted in over 400,000 women and published last year in JAMA showed that DBT presented with a 30% increase in detection rate compared with mammography alone. Another side effect was an improved PPV; in other words a higher specificity in distinguishing pathology alterations and benign changes.

In 2008 another study, also published in JAMA, compared the use of hand-held ultrasound with mammography and found an additional cancer yield of 4.1 per thousand. Acquisition time, on the other hand, was considerable, as it took over 20 minutes to complete a bilateral screening examination. Two years later, the authors published an update, in which they compared a single round of screening MRI with mammography. They found a 14.6 per thousand additional cancer yields with MRI.

Kuhl is a strong advocate for MRI in breast cancer screening. Fifteen years ago, she and her team published the very first paper on the topic, in which they highlighted MRI’s high sensitivity and specificity.

Her presentation during a Satellite Symposium at this year’s ECR.

MRI also set out to tackle critics about MRI’s supposedly high false positive rates in her presentation. MRI has often been reported to offer low specificity, which is certainly not true. Again, that is something that can be avoided with experience. More recent multi-centre trials, such as the EVA trial, showed that MRI had higher specificity than mammography,’ she confirmed.

MRI can also be used as a screening tool for women at average risk. In an upcoming paper, Kuhl will show that, in those women, MRI has a 20 per thousand detection rate and an acceptably high PPV.

Finding more cancers with MRI should not be a problem, the researcher believes: ‘More diagnosis is not more over-diagnosis, because, even today, too many women die of breast cancer. ‘We still have a problem. We don’t have to detect all the cancers but we should detect the ones that kill.’

The main issue facing MRI today is that economic considerations are driving its use for screening. One reason for high costs is the fact that the same (extensive) pulse sequence protocols have been used for breast MRI screening as the ones that have been used for diagnostic purposes.

To make breast MRI a real screening tool, Kuhl introduced the concept of abbreviated breast MRI (AB-MRI). ‘AB-MRI means to strip down the pulse sequence protocol to its very essence,’ she explained. Her corresponding study (published in Journal of Clinical Oncology, 2014) used such an abbreviated protocol, which consisted of one pre- and one post-contrast acquisition, equalling a magnet time of about three minutes. Conducted between 2009 and 2010, the study compared the diagnostic accuracy and cancer yield of this abbreviated protocol against that full breast imaging, protocol. Kuhl found that this was sufficient to help diagnose the same number of additional cancers, with similar diagnostic accuracy. Moreover, she found that the radiologists reading time of just three seconds was enough to exclude the presence of breast cancer with a negative predictive value of just under 99%. Establishing absence of breast cancer on a negative MRI image is done in the blink of an eye,’ she said, ‘and, in a screening setting, the vast majority of women are not cancer. By comparison, for a negative screening ultrasound study, a radiologist needs to work for minutes.

Accordingly, AB-MRI actually has the potential to make breast MRI a real screening tool, she argued. ‘AB-MRI offers an additional cancer yield of 18.5 per thousand in women who have been pre-screened by digital full-field mammography and physician-performed breast ultrasound. It may be the ideal screening tool for women because it is conceivable to conduct on a population-wide scale, has high sensitivity for biologically relevant cancers and high diagnostic accuracy — and there’s no radiation involved.’

Kuhl pointed out that, just like prostate MRI, breast MRI is relatively blind for low-grade disease, especially low-grade DCIS. Replacing mammography by breast MRI, rather than adding MRI to mammography, may therefore be the way to proceed, she said.

Radiologists must understand that the aim of breast cancer screening is not to detect all breast cancers and their precursors by all means, she insisted. ‘Rather, the goal must be to develop imaging methods that combine a maximum sensitivity for prognostically relevant disease with a desirable lack of sensitivity for disease that is prognostically unimportant.’
Driving proton and carbon therapy worldwide

A global collaboration to expand access to advanced particle therapy worldwide was agreed this April between Belgian firm IBA (Ion Beam Applications S.A.) and the Toshiba Corporation.

In Japan, Toshiba Medical Systems Corporation will distribute Proteus ONE, IBA’s compact single-room proton therapy solution, and IBA will be the agent for Toshiba’s Carbon Therapy Solutions outside Japan. The two companies will collaborate on activities such as customer education for both systems. Additionally, the collaboration will enable both organisations to gear up their Operation and Maintenance (O&M) services.

Proton and carbon therapy
Proton Therapy is considered an advanced and targeted cancer radiotherapy treatment due to its superior dose distribution and fewer side effects, IBA reports. ‘Protons deposit the majority of their effective energy within a precisely controlled range, directly within the tumour, sparing healthy surrounding tissue. Higher doses can be delivered to the tumour without increasing the risk of side effects and long-term complications, thereby improving patient outcomes and quality of life.’

‘Carbon ions not only have similar physical characteristics as protons, they have also a higher radiobiological effect compared to photon and proton, which could lead to shorter treatment courses and improved patient outcomes.’

Olivier Legrain, Chief Executive Officer of IBA, which produces universal full-scale proton therapy centres as well as compact, single-room systems, sees the partnership as important to take both therapies worldwide. ‘Carbon ion therapy is particularly suitable for treating radio-resistant tumours and allows for dose escalation, which is recommended in a number of clinical applications.’

According to Satoshi Tsunakawa, Chief Executive Officer of Healthcare Company, Toshiba Corporation, proton and carbon therapies are ‘...among the most exciting technologi-cal advancements in the treatment of cancer’. Quoting the firm’s motto “Committed to People, Committed to the Future” he added that the collaboration ‘will give both our companies an enhanced set of tools to provide the best cancer treatment technologies’.


*PICTURE CREDIT: Source IBA*
Communication with the neurologically impaired

Tips to eliminate barriers

Manuela Messmer-Wullen awoke in her hotel room one morning, during a business trip, and realised she was hemiplegic. There were also cognitive impairments and she could not articulate. Diagnosis: Stroke. ‘In the very first period after the stroke, contact with radiologists was very strange and mysterious for me.’ Messmer-Wullen became a board member of the European Federation of Neurological Associations (EFNA), which campaigns on behalf of people with neurological diseases. In March, at the European Congress of Radiology (ECR 2015), she spoke during a session of the ESIR Patient Advisory Group, which focused on particular communication problems between radiologists and patients with neurological diseases. ‘Communication between the radiologist and patient can be quite challenging – and is even more complicated if the patient has a brain disorder,’ explained Donna Walsh, Executive Director of the EFNA. Neurology patients can suffer language disorders (aphasia), motor speech disorders (dysarthria) and difficulties with coordination (dyspraxia). Communication with the patient is made more difficult when they have problems with their short-term memory or personality disorders, such as aggressiveness or paranoia.

A survey amongst patients with multiple sclerosis and their neurologists has shown that both groups are surprisingly pleased with their communication. More than eight in ten patients who saw a neurologist in the past year said they felt comfortable talking about their MS with their neurologists, characterising their relationship as honest, open, comprehensive and helpful. Nearly all neurologists (96%) felt that they had an open dialogue with their patients, and 90 percent indicated that they have a good understanding of all aspects of a patient’s disease. When asked if his or her neurologist is accessible and spends enough time with them, close to three-quarters of surveyed patients responded positively. However, the survey also uncovered some less positive facts: 47% of doctors stated that they did not have enough time for communication with their patients. Interestingly, though, only 21% of patients shared this view. Doctors were also more cautious when it came to the subject of communication barriers: 15% felt there were no barriers with patients at all, whilst the figure rose to 37% among patients. ‘But that means 60% feel barriers exist,’ Walsh emphasises. ‘How do I know if my patient is satisfied with communication?’ she asks, quickly following with her answer: ‘Ask!’ She also offers three more tips for communication between doctors and neurological patients:

- Give the patient at least 30 seconds to speak uninterrupted and during that time minimise note taking and maintain eye contact.
- Touch the patient; touch makes them feel that the conversation is about something real.
- Involve family members – but don’t ignore the patient. The patient is the person you are treating and should not be dismissed or ignored.

Often this is not easy. ‘The radiologist is usually considered to be a poor communicator,’ admits Dr Lorenzo E. Derchi, Head of Emergency Radiology at San Martino University Hospital in Genoa (Italy). ‘It’s possible that some medical students choose radiology because they’re afraid of close contact with patients.’ Derchi believes there should be more emphasis on communication in medical training.

‘Let’s work as a team!’

Report: Marcel Rasch

Dr Gerald Antoch, professor of radiology and chairman of the department of diagnostic and interventional radiology at Düsseldorf University Hospital and active member of several scientific societies, delivered the prestigious Wilhelm Conrad Röntgen Honorary Lecture at ECR 2015 on ‘Hybrid imaging: Let the combination of therapy and diagnostics, which requires accurate hybrid interpretation by specialists as a basis. New standards and comprehensive training’ for ‘Theranostics’ to be implemented properly, Dr Antoch said, it must be clear who is responsible for scans and who provides them but, even more importantly, who reads and interprets hybrid F-FDG PET studies.

Often, today, two specialists – a radiologist and a nuclear medicine physician – cooperate on each scan and to ensure that the images were read correctly and to avoid misinterpretation.

‘We need to adapt the workflow to real life,’ Antoch said – with ‘real life’, meaning ‘limited resources’. He proposes the implementation of new training programmes where nuclear medicine specialists familiarise themselves with necessary radiology knowledge and vice versa, depending on the local or country-specific regulations.

What we need for the future

Antoch’s vision for the future is very clear: ‘We must move from separate departments towards one imaging centre. We need new training programmes, a flat organisation, interlinked reimbursements and no turf battles. Let’s work as a team.’
Ultrasound presents an alternative to radiation

Injecting toxic chemicals into the body to kill cancer cells is a physically and mentally brutal experience for patients, and is financially ruinous for healthcare systems. Yet, often after six months of differential diagnosis in Europe, doctors say their goal is now to win approval in the USA, where the contrast agent has recently been approved. ‘We can provide the oncologist with the results of the assessment in real-time – no one is able to do this with either a CT or an MRI Scanner!’ Key to her work has been a collaboration with Toshiba Medical Systems – the dynamic contrast-enhanced ultrasound system manufacturer to provide the clinical trial data and aggregate the calculations and analysis of tumour response to chemotherapy.

Today, major ultrasound manufacturers have opened their systems to enable this breakthrough technique.

It has also attracted the interest of pharmaceutical companies, as seen by patients who know if their therapies are effective.

‘Cancer has become a chronic disease’, said one. ‘This means that there are many drugs to treat carcinoma. It’s possible that a patient will start with one drug, then be switched to another drug, and so on. In my institution, a single patient may be tested across six different drugs.

If a patient’s doctor is following the current international standards, then the doctor will perform a Response Evaluation Criteria In Solid Tumours (RECIST) evaluation, which uses CT. This means the patient is being exposed to radiation to evaluate the effectiveness of the chemotherapy, she pointed out. ‘There is a strong association, supported by articles in leading medical journals, that shows there is a risk for inducing a secondary cancer through the radiation of the patients with CT.’

Performing a CT perfusion exam to see whether chemotherapy is working means exposing the patient to 20 millisieverts (mSv) of radiation for each exam. ‘I don’t know about other countries, but I know that, in France, 20 mSv is the maximum dose allowable for one patient during a full year. With cancer patients there is a risk of scanning them every two or three months,’ Lassau explains.

Some people might say that if a patient is dying from cancer, then the risk of creating a second cancer with radiation is not as important. This is a sylvian view,’ according to Lassau. ‘There has been significant progress made in chemotherapy for many types of cancer and the life expectancy of patients is greatly increased.’

Patients are especially concerned about the risks of radiation exposure, and she said patient advocacy groups are helping to increase the awareness that there is a non-radioactive alternative way of learning if chemotherapy is working.

‘We can provide the oncologist with information that will reduce over-dosage of chemotherapy and avoid patients being exposed to unnecessary treatments.’

When I log into Touch’s system, it knows the way I like to drive it. This customisation will really simplify workflow.

We also tackled the issue of sterilisation. The Touch’s smooth, sealed surface makes it effortless to clean.

‘We listened to customers differen-
ty from your competitors, with their longer history in this field?’

‘Not having legacy products allowed us to start with a clean slate and look at what’s challenging in depart-
ments from a use-of-ultrasound per-
spective. What are the features and functionalities people are looking for, but cannot be found in today’s solutions?’

‘If we introduced a product that was the same as everybody else’s and wanted to become an ultrasound supplier, we could have just bought any of the small companies that have products.

Andrew J. Hartmann, General Manager, Global X-Ray & Ultrasound Solutions, Carestream Health, Inc, Rochester USA

When purchasing for a hospital, economic constraints often have the last word. How do you address this issue?

‘The economic component is cer-
tainly a big part of the conversa-
tion. Carestream intends to design a family of systems from premium high-end to point of care, covering a variety of disciplines. All will use the same transducers and have the same user interface and the same architecture. This will allow facilities to maximise their return on investment by lowering training costs, as well as being able to share transducers across equip-
ment and across departments. We are also developing a service strategy that will reduce overall cost of ownership and will make it easy for the facility to have high uptime and low maintenance costs.

www.Healthcare-in-europe.com

Easing ultrasound operation

Carestream Health, the medical imaging and healthcare IT spe-
cialist, presented its latest innova-
tions at this year’s ECR. This system offers a configurable all-touch control panel, a powerful proces-
sor, plus other innovative tools.

Daniela Zimmerman and Mélisande Bouger, from European Hospital, interviewed Andrew J. Hartmann, the firm’s General Manager of the Global X-ray & Ultrasound Solutions division, to explain how the new platform promises to improve user experience.

What do you think makes Touch so special?

‘One of the key differentiating fea-
tures is the sleek, modern, all-touch control panel. The only button on the system is the Power button. The primary controls have the tactile feedback of traditional keys, via distinct etched patterns, while the unique design has the additional flexibility of configurable soft controls.

‘We like to think of ultrasound as a modality in which the user and the procedure define how the sys-
tem should be set up – a little like adjusting the driver’s seat in a car. When I log into Touch’s system, it knows the way I like to drive it. This customisation will really simplify workflow.’

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with ergonomics in mind. There are multiple user adjustments to help minimise injury risk factors and also increase the user’s efficiency and convenience.

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When we step into a modality our intention is to become a major play-
er. When we presented our mobile X-ray system, the market was satu-
rated and dominated by two or three vendors. We now own 25-30% of the market share – because we innovated and do things differently.

Along with radiology, ultrasound is used in internal medicine, cardiol-
ogy and other medical disci-
plines. Does Carestream have a position in those?

‘Our first entry will be for a premium product for general imaging in radiology. We have plans to expand the portfolio using the same archi-
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Many of today’s smartphones have sensors such as accelerometers and pulse monitors. Wearables are a new class of device that are moving into mainstream healthcare delivery, and are currently worn on the body and always switched on to ensure a continuous data stream. In her lecture ‘From Sensor to Health-Tracking Platform – Technological Concepts for Online Provision of Health Data,’ Monika Pobiruchin, research associate at the GECO Institute for Medicine, Informatics and Economics at Heilbronn University, tackled issues surrounding innovative technologies, uninformmed users and the slow legislative process.

“There are currently different types of health-tracking platforms on the market - for instance interfaces such as ‘Google Fit’ and ‘Apple Health Kit’ – platforms on which Developers and manufacturers run their own products on (such as tracking-apps). Platforms such as dасaсoo take this a step further. The issue here is not just around pure fitness, i.e. tracking the distance covered, calories burned and pulse rate. These are in fact fitness and health platforms. These are interfaces that allow a health score calculated on a scale between 0 – 1,000, which states how healthy one is in fact fitness and health platforms. These are interfaces that allow a health score calculated on a scale between 0 – 1,000, which states how healthy one is based on certain parameters, such as body type, age, sex and other criteria. These scores are then made available in return for bonuses, vouchers or other benefits. Quite rightly, this makes one wonder: ‘Where is the point to all this?’ Health informatics specialist Pobiruchin explains. A very different approach is taken by the EU-subsidised research project DAPHNE, which aims to integrate wearables and other device classes to record and display data. Here, safe data storage and data protection are a priority.

Ethical and legal implications

Health-related data are very personal and deserve particular protection. However, apparently every third person is currently prepared to make their data available in return for bonuses, vouchers or other benefits. Quite rightly, this makes one wonder: ‘Where is the point in protecting data when patients themselves make the data available online?’ In the first instance, health informatics specialist Pobiruchin does not see a problem: ‘In principle, I think it’s great that people are doing this. Everyone should be at liberty to post their data on the internet.’ The advantages of wearables, apps and smartphones are obvious: ‘Why should a patient keep a diary of symptoms on paper when they can do the same thing with a smartphone - which they carry with them at all times, anyway?’ Everyone can also use apps to make their emergency contacts available, so these can be accessed as and when needed. Furthermore, patients can also make data available directly to their doctors (GPs) by showing them their smartphones and saying: ‘Take a look at this. I’ve measured my blood pressure and pulse – what do you say?’

However, this scenario also has a downside: there is no guarantee that the doctor will actually accept this information in the same way as a traditional blood pressure test or a surgery, for instance,’ Pobiruchin explains. She also has an eye on an even more fundamental consideration: ‘because these technological developments could not have been foreseen five or six years ago. Most of them have completely different ideas as to what can or can’t be done with their data.’

According to Pobiruchin the legal implications need to be given particular consideration: ‘A German provider of a fitness-app who wants to store their customers’ data in a storage facility in the cloud provided by a third party is only permitted to do so if they have specifically entered into a data processing contract with the third party. However, the decisive question is: Where is the third party based and what are the laws on data protection in this location? In the USA, for instance, data protection is dealt with in a different way to how it is regulated in Germany or the EU. There is quite a lot of friction between global data management and regional legislation. The expert also points to ethical aspects: ‘Through the integration of the data I’ve made available I make myself identifiable. What happens if I have a rare disease, or rare blood group? Even without my name being mentioned, this might make me potentially identifiable. What happens if, for example, insurers can then process this data? Will I receive a bonus if my behaviour is perceived as health-conscious, or will I be turned down if it is not?’

These are the issues Pobiruchin is dealing with, and this expert would like to see an intensive discussion on this subject: ‘Informatics is not meant to stoke fears but to throw light on what can be done with data and to encourage a dialogue about dealing with it. We missed out on creating this dialogue with the development of smartphones and should not repeat this mistake with the wearable devices that are currently trendy.’

The Connected Care Framework

The ‘core idea’ behind the Connected Care Framework, nephrologist Dr Stefan Becker explained, is to develop a patient-centred communication infrastructure that serves as a basis for value-added services. These services can then be integrated into mainstream healthcare delivery. We focus on medication adherence of chronically ill patients, because this is a big challenge. Studies identified that only one-third of patients who have undergone transplantation adhere to their medical regime. Non-adherence, on the other hand, can jeopardise the success of the procedure.

“We developed the Connected Care Framework including an app for patients, which is designed to help them to better comply with the medication regime and hence increase patient outcomes.”

The app uses technologies and data security concepts already implemented in the electronic patient record as an interface between physicians in the outpatient and in-patient field and their patient. It’s a system that allows adapting single modules to patients’ needs. We created a personalised app that permits doctors to give feedback in an unstructured way, such as asking ‘How are you? Do you feel good or bad?’ Medical data is processed using a token-based system, permitting the patient to authorise those users with whom he or she wants to exchange information.

How does the apps benefit patients?

‘It involves the patient in the treatment process. Via a memory function, for example, it reminds patients to take their medication, or measure their vital parameters at a designated time. It also allows patients to record their moods as well as to look at the medication plan compiled by a doctor.’

Where is the app used?

German health insurance Techniker Krankenkasse (TK), the leading public state health insurer by number of insured, is the first to deploy the app in a newly created adherence program, which supports telephone coaching. Apart from the insurance field, the app will be rolled out in the nephrology department of Essen University Hospital and, sometime later, in an out-patient practice. We are also preparing further use cases for pharmaceutical companies.

What further developments are planned?

‘The communication infrastructure behind the app was developed as a prototype to then scale it in diverse settings either in term of use cases, such as general practitioners, rehabilitation, or in terms of functionality by adding modules to support certain modifications of behaviour as needed. We’d also like to explore the app as a communication tool in the pharmaceutical industry and are already in talks with some companies. The intention is to offer a complementary service to selling drugs, giving pharma companies a competitive edge. By increasing medi-pharmaceutical firms can leverage drug sales. We’ve seen the first advances in this direction with health insurance companies sponsoring telephone hotlines for individuals who have just received an organ transplant. Nephrology associations are especially very interested in this topic.’
Hacking into healthcare records can kill

It medical records can kill. Hacking into healthcare systems is ready to take on all the types of medical images from radiologists, surgeons and specialists, often do their reporting during the exam itself. DICOM, the de facto standard for image exchange on the radiology PACS, is rare among over 500 of the devices physicians in hospital want to connect.

"Radiology PACS is a proof that management and sharing is clinically meaningful, and on paper it is the solution," he said, but added that there are so many anomalies that a system built for radiologists does not work well. In an effort to determine the readiness of European hospitals for evolving PACS systems the European Society of Radiology and HIMSS have announced a partnership that will, during, evaluate the maturity of health information technology systems with a report expected at ECR 2016.

"Radiology is already more closely tied with information technologies than any other medical discipline," said ESR Past President Guy Frija MD, who described the scope of the partnership as embracing big data, business intelligence, as well as archiving and structured medical reporting to ensure future applications and challenges for radiology will be met.

"We also hope our partnership with HIMSS Europe will create a greater awareness among IT companies for the innovative potential that has always been inherent in radiology and which will continue to shape the discipline," Frija stated in the joint announcement.

In a first step for establishing an imaging IT maturity model for the joint project work group, HIMSS senior consultant for analytics Jorg Studzinski presented an evaluation compiled from a survey of six major Western European countries, with the notable exception of France, where, he simply explained, "we just don't know!"

He also noted the maturity of Nordic countries in health informat- is so advanced that the data for the Netherlands serves as a mirror. Starting with the fundamen- tal radiology information system model (RIS), more than 90% of all hospitals systems in Italy, Germany, Spain, the Netherlands and the United Kingdom reported a system in place, with Austria being the low end of the scale at 85%.

Radiology PACS is nearly as well implemented with Germany and Austria trailing at 80%. A dedicated dedicated PACS has caught on with the UK reporting such a large number of facilities, 90% of facilities in Spain and Austria pushing above half of hospitals, while Germany and Italy saw even fewer at 24% and 14%, respectively. Pointing towards the upcoming assessment is a newly created cate-

cory for an imaging data centre (BDC) that is meant to measure over- all image management capabilities, though in the current evaluation it remains less clearly defined, and evaluation results are highly varied, from 97% in the Netherlands to 41% in Germany. In announcing the partnership with HIMSS that initially will aim to establish an imaging IT maturity model for Europe, the radiology society said the on-going collabora- tion with the joint project group will help ensure that a broad agenda of IT topics are linked to radiology and that they are regularly addressed at the European Congress of Radiology, including e-health, data mining, dose watch, structured medical reporting and enterprise imaging.

Is PACS ready to expand beyond radiology images?

After an inventory at the Santa Maria Nuova hospital, Foracchia said they found 534 imaging and data sources to be added to the tradi- tional radiology network. Of these, 13% create images that are what he called properly managed, and 8% are clearly improperly managed. The remaining 79% of exams are not managed or stored at all.

Unlike radiology exams, he said, image acquisitions on these devices are not scheduled but made on the fly, and reporting is not sequential following the acquisitions, as is the case in structured PACS manage- ment. Instead, physicians, surgeons and specialists often do their report- ing during the exam itself.

"Radiology PACS is a proof that management and sharing is clinically meaningful, and we always have access to the data," he said, but added that there are so many anomalies that a PACS system built for radiology does not work well. In an effort to determine the readiness of European hospitals for evolving PACS systems the European Society of Radiology and HIMSS have announced a partnership that will, during, evaluate the maturity of health information technology systems with a report expected at ECR 2016. "Radiology is already more closely tied with information technologies than any other medical discipline," said ESR Past President Guy Frija MD, who described the scope of the partnership as embracing big data, business intelligence, as well as archiving and structured medical reporting to ensure future applications and challenges for radiology will be met.

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\[Image\] 

| Hospitals face advanced persistent threats to security | 27 |

\[Image\]
The entrance of PACS-Surgery

Picture Archiving and Communication Systems (PACS) were established for managing radiology images. Could this robust and mature technology now become the backbone for creating the digital operating theatre?

In a hospital, the OT is perhaps the most expensive and labour-intensive area and it is expected that standardisation procedures with the help of computer assistance will help to control costs better, as well as ensure that patients benefit from an optimal surgical intervention and treatment.

Yet, the operating room is also one of the most complicated areas in a hospital with complex information processing among as many as 30 to 50 medical devices, many of which do not share data with other systems.

In Barcelona, at the end of June, the Computer Assisted Radiology and Surgery (CARS) Congress will bring together experts from radiology, surgery, medicine, informatics and healthcare management to focus on a range of interconnected factors that are reshaping the operating theatre of the future, an OT with state-of-the-art image processing and visualisation and with model-guided interventions supported by surgical navigation and robotics.

Heinz Lemke, a founder of the CARS congress and the Chair of the CARS Organising Committee, is a leading researcher and authority in the field of computer-assisted medicine. ‘Speaking about surgery generically is not useful,’ he told European Hospital. ‘We need to speak about specific surgical interventions, each of which has a characteristic workflow.’

The schematic approach that outlines each step in a surgical procedure is the fundamental logic for PACS systems, a way of organising the process for a computer. By comparison, PACS for radiology is extremely simple; he pointed out. ‘There are typically five steps of activity for a radiology workflow, and between each step you can go and have a coffee. For one specific surgical intervention we have identified 28 steps. Looking at another, there are 35 steps. For an intervention as complex as mitral valve replacement, there are as many as 480 steps. There are hundreds, even thousands of specific workflows for specific surgeries, each of which needs to be modelled,’ he said.

The goal with PACS-Surgery is not to have all information always available, as it is to have visualisations driven by the steps in the workflow, to only display what is specifically relevant to the specific activity at a specific moment.

According to Elisabeth Beckmann, consultant for IT and PACS at Lamnark, the challenge is more complicated than transcending images from radiology to surgery. Many other forms of information are needed, such as a pathology report at a specific moment, she said. ‘And in the next step, the question becomes not only when to integrate this information, but are they presented in different ways to different types of people.’

Intraoperative mapping is at the heart of this approach being taken by the Innovation Centre Computer Assisted Surgery at the University of Leipzig where Prof Lenke is senior adviser on research strategies.

Funded by the German federal government, to date the Leipzig group has modelled more than a thousand workflows, he said, collaborating with research teams in Japan and the United States and coordinating an international effort to advance the digitisation of the operating theatre.

‘My role, as working as a chair for the IHE (Integrating the Healthcare Enterprise) Surgery Domain, is to bring these three projects together around the table with a focus on developing integration profiles that will serve as the basis for an internationally standardized profile,’ he explained.

Once integration profiles are established, it remains to be seen what specific workflows for surgical interventions, it creates an opportunity for manufacturers of medical devices to implement the profiles in order to assure their diverse devices in the operating room will work together.

The CARS meeting in Barcelona will see the first conference on PACS for the human interface in a session called Medicine Meets Virtual Reality, jointly organised by the NextMed group and the International Foundation for Computer Assisted Radiology and Surgery (IFCARS).

The international scope of work on the operating theatre of the future is reflected in the CARS congress, with dedicated sessions for the European Society of Medical Imaging Informatics, the International Society for Computer Aided Surgery and the International Society of Optics and Photonics.

England’s Florence looks like a winner

The entrance of PACS-Surgery

Engage the increasing focus on telehealth and telecare services aimed at improving long-term patients’ living conditions and save costs, numerous pilots in various countries have been conducted for proof of concept. ‘Among these is the United Kingdom’s ‘Whole System Demonstrator’ (WSD) programme for Computer Aided Surgery and the European Society of Medical Imaging Techniques (IFCARS).’

The schematic approach that outlines each step in a surgical procedure is the fundamental logic for PACS systems, a way of organising the process for a computer.

The国王’s Fund, an independent charity working to improve health and care experience.

All’s well that ends well

As disappointing those results may prove... Additionally, it provided some disease-specific insights: 15 out of 22 studies on heart failure proved that remote monitoring reduced hospitalisation.

Henry Davenport, a professor of Computer Science, Heinz Lemke PhD teaches and supervises research on Computer Assisted Medicine at the Technical University of Berlin. He is also Research Editor at the University of Southern California, Senior Adviser on research strategies at the Innovation Centre Computer Assisted Surgery (ICCAS), University of Leipzig and Visiting Fellow of the Institute of Advanced Studies, Technical University of Munich.

He has been the organiser of the Computer Assisted Radiology and Surgery (CARS) congresses since 1983, and editor-in-chief of the International Journal of CARS and executive director of the International Foundation for CARS.

Significant benefits have yet to be proved... Additionally, it provided some disease-specific insights: 15 out of 22 studies on heart failure proved that remote monitoring reduced hospitalisation.

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Huge telehealth study reveals mixed value, but...