

# Medical Solutions

The Magazine for Healthcare Leadership

May 2012

SIEMENS



## Accessible Healthcare

International Expert Wim Van Lerberghe  
on Improving Healthcare Systems





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**Answers for life.**



**Hermann Requardt,**  
Member of the Managing Board of Siemens AG  
and CEO of the Healthcare Sector

## Making Healthcare More Accessible

Dear Reader,

In the face of growing and aging populations, governments and healthcare providers alike are challenged to push local availability and affordability of quality care. This holds true not only in densely populated urban areas, but also in thinly settled rural regions. Siemens' involvement in this endeavor is twofold, covering the societal and industrial levels.

On the societal level, we offer forums to share and discuss possible directions that healthcare systems can take in order to maintain or achieve access for their residents. You can find two examples in this issue of *Medical Solutions*:

On page 36, Wim Van Lerberghe, an international expert for public health, discusses how healthcare systems in developing regions such as Africa can be shaped – and how those in developed nations can be sustained despite an aging population and economic restraints. His goal is to provide people around the globe with the care they need, when they need it, and as close to home as feasible. To achieve this, Van Lerberghe calls on solidarity and

pooling. He is a strong advocate of patient empowerment via consumer movements and civil society watchdogs, and proposes efficiency gains.

Efficiency gains are also what my fellow panelists and I had in mind when discussing “Transitioning Healthcare Systems” at the World Health Summit, covered on page 12. Investing in prevention and early detection instead of expensive treatments is a step in the right direction. Integrated, IT-assisted healthcare delivery systems that encompass the entire care continuum and reach out beyond traditional boundaries are also an important component. Once healthcare systems shift from their focus on current cost to a focus on long-term patient value and outcomes, sustainable savings will be possible. To achieve this, however, stakeholders and healthcare providers along the entire continuum of care will be forced to adapt their business models.

On the industrial level, we are one of the world's largest suppliers to healthcare and, as such, are a thought leader and

trendsetter, working to make healthcare more accessible. We provide solutions tailored to the needs and financial means of various and diverse markets. For example, 3 Tesla MRI, until recently a domain of universities, with our new system is now becoming available to private practices (page 22). In a similar sense, our products and services are actively responding to the demands of different healthcare providers: local engineers in remote areas need – and receive – thorough training on how to maintain and repair a high-tech cath lab themselves (page 26). And, our solutions fit the needs and resources of different patient groups, for example with a total of eight new ultrasound systems supporting projects of Doctors of the World all around the globe (page 16).

I hope you find this issue both informative and enjoyable.





## Cover Story



### 10 Accessible Healthcare

Read in our cover story how Siemens enables healthcare professionals to provide more accessible healthcare – pushing local availability and affordability of quality care. Solutions tailored to the needs and financial means of different markets enable, for example, the introduction of quality cardiac care in Central Africa, the use of 3-Tesla magnetic resonance imaging beyond research settings, and the continuous access to quality care within the economic crises. Panelists at the World Health Summit and public health expert Wim van Lerberghe also share their views on how to keep healthcare accessible – or make it more accessible.

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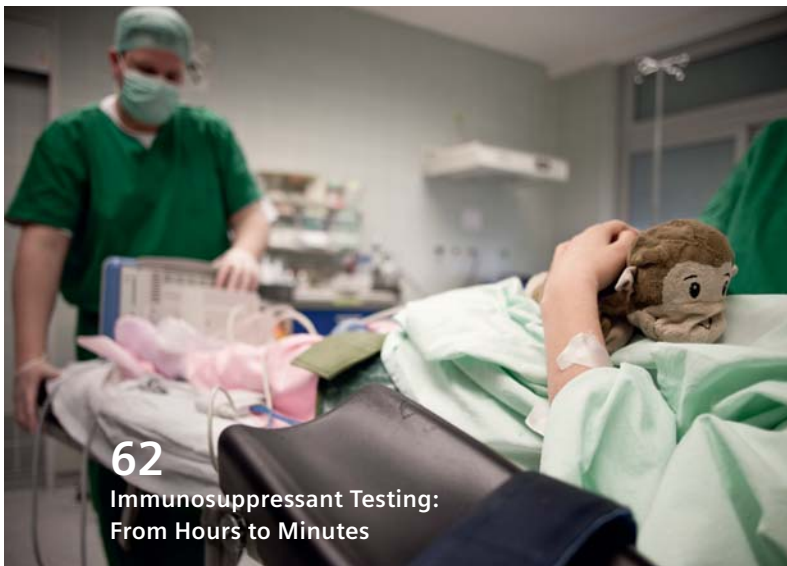
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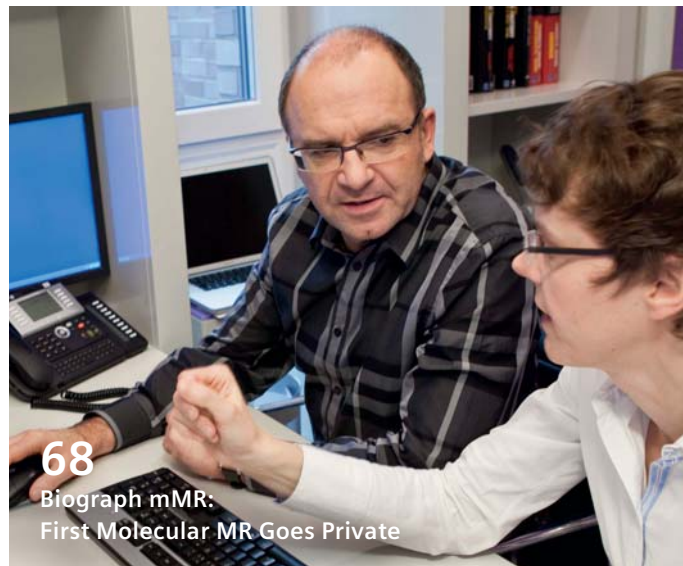
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- 72 Professor Saruhan Çekirge, MD**, Head of the Department of Interventional Neuroradiology at Hacettepe University School of Medicine in Ankara, Turkey, discusses the latest dose-saving and image quality update.



Sinah Scholz from Ansbach, Germany, October winner



November winner Isa Theobald from Saarlouis, Germany.  
Photo courtesy of Annie Bertram.



December winner Jule Kratzsch from Donauwörth, Germany



The January submission from Jasmin Faust, Cologne, Germany

## Women in Pink for a Good Cause

Since October 2011, Siemens has been raising awareness for breast cancer with its global campaign “Turn your city pink!” Participants have been submitting pictures and videos of their awareness raising actions to the campaign’s Website and joining the Facebook page in droves. Mobile users can now also follow their favorite submission and upload their actions through the PinkCity App. Each submission generates a donation of five US-Dollars to a breast cancer organization and every month, the most popular entry wins a pink iPad.<sup>1</sup>

With more than 28,000 fans<sup>2</sup>, the campaign’s Facebook fanpage has proved to be a very successful channel to inform the public about the disease and the importance of early detection – especially for young people. Just like 23-year-old Sinah Scholz, from Ansbach, Germany, who became the October winner. It was through the campaign that she got involved in the topic of breast cancer. She turned part of a train station “pink” by decorating a dark pedestrian underpass with “Turn your city pink” posters.

Siemens is also proud that breast cancer survivors find the campaign especially meaningful as they work to engage and inform the public about early detection. The monthly winners in November, December, and January were all victims of the disease and became inspiring ambassadors for the cause. Isa Theobald, the November winner from Saarlouis, Germany, was 33 years old when she was diagnosed with cancer and had to undergo surgery and chemotherapy. Jule Kratzsch from Donauwörth, Germany, was diagnosed with breast cancer at the age of 28. The geriatric nurse went through surgery, chemotherapy, radiation therapy, and hormone therapy. Both women decided to face the disease head-on with strength, taking striking images of themselves that show the effects of therapy. The January winner Jasmin “Mimi” Faust from Cologne, Germany, wanted her submission to focus on the pink ribbon and its intention, not on her as an individual. This is why she took a picture of a little pink ribbon on her bag. The 35-year-old suffers from breast cancer and is currently receiving therapy. She states that as a victim of breast cancer, she is very pleased to encounter anyone wearing a pink ribbon, as this is a true sign that breast cancer awareness has reached society.

The February winner uploaded a video to the campaign’s Website: The Portuguese national, Ricardo Brito, whose sister-in-law is a breast cancer survivor, made a clear statement: “Join the pink alliance to make a difference!” Through the campaign, Siemens continues to support experts and healthcare professionals to detect breast cancer as early as possible. This is only achievable if an informed public understands and makes use of early detection methods.



Scan the QR Code with your smartphone to download the PinkCity app.  
NOTE: Android App under development.  
Please check your App Marketplace soon.

<sup>1</sup> iPad is a trademark of Apple Inc., registered in the U.S. and other countries.

<sup>2</sup> As of March 14, 2012

[www.siemens.com/pink](http://www.siemens.com/pink)



## Combining MRI Intelligence and Therapeutic Expertise

Siemens is extending its vision and expertise by creating an exceptional solution: Combining the imaging power of MAGNETOM® Aera 1.5T and MAGNETOM Skyra 3T magnetic resonance imaging (MRI) systems with therapeutic demands in neurosurgery, neuro- and cardiovascular interventions as well as radiation therapy.

MAGNETOM Combi Suite<sup>1</sup> will offer MRI intelligence and therapeutic expertise, whether it is for neurosurgery, neuro- and cardiovascular interventions, or radiation therapy (RT) planning. With the latest in

MRI technology from Siemens, therapeutic decisions will be supported at every step, with the goal of offering a new level of confidence. By granting cross-modality access to therapy, MAGNETOM Combi Suite aims to add value to customers' practice by utilizing their MRI system for diagnostics and therapy.

For neuro- and cardiovascular interventions, the solution combines the MRI system with an Artis® zee<sup>2</sup> angiography system. The patient can either be transferred between the interventional room and the MRI suite using the Combi Dockable Table. The same table is used for the MRI scan and the transport, which makes only one transfer onto the Artis zee table necessary. Alternatively, a floor-embedded motorized rail solution for connecting the rooms will also be available. Combining MRI intelligence with the angio lab can provide excellent soft-tissue contrast with detailed anatomic and physiologic information, which may allow for more precise planning and evaluation of therapeutic interventions.

For neurosurgery, MAGNETOM Combi Suite Neuro is comprised of the MRI with an operating room (OR) suite for intra-

operative imaging. The patient can be smoothly transferred from the Combi Dockable Table onto the OR table, enabling seamless presurgical planning and intra-surgical information for real-time decision-making. In addition, this solution will create the possibility for post-surgical MR imaging to evaluate physiological and structural changes.

In the area of RT, the MAGNETOM Combi Suite Radiation Therapy is intended for precise positioning and high-quality images. For RT treatment planning, high-quality images from computed tomography (CT) are needed. These can be further enhanced with MR images; however, it is vital that the patient is positioned accurately and reproducibly. The MAGNETOM Combi Suite, with its patient positioning solution from CIVCO, will allow the patient to be positioned accurately and reproducibly in the CT or MRI scanner, as well as for treatment on a linear accelerator.

<sup>1</sup> The product is still under development and not commercially available yet. Its future availability cannot be ensured.

<sup>2</sup> For any combined solution with an Artis zee system, a project specific analysis by Siemens Healthcare is required. The analysis and solution may lead to additional efforts and costs.



## Siemens' Second European Reference Center Cardiology

Contilia Heart and Vascular Center at the Elisabeth Hospital in Essen, Germany, and Siemens Healthcare are strengthening their joint activities in a strategic partnership by establishing the second Siemens European Reference Center Cardiology, following the Cardio-Thoracic Center of Monaco. The partnership between the Center and Siemens Healthcare is based on a mutual commitment to integrate advanced medical technology into clinical cardiology routines in order to achieve the best possible care for all patients.

The purpose of the collaboration is to improve clinical workflows and promote innovative treatment concepts in non-

invasive and invasive cardiology – for example, in minimally invasive valvular interventions, in the treatment of atrial fibrillation, and through the comprehensive use of cardiac magnetic resonance imaging. The partners will facilitate knowledge-sharing during clinical trainings, fellowships, and visits. They will strive for efficient clinical processes by integrating multimodality imaging in diagnostic workflows in order to ensure sound decisions and safe procedures in clinical routines.

“The founding of the Siemens European Reference Center Cardiology will contribute to further improving our medical capabilities in the areas of prevention,

### Cooperation

European  
Reference  
Center  
Cardiology



diagnostics, and therapy – for the benefit of our patients and the economic success of our clinic,” says Professor Georg V. Sabin, MD, Medical Director of the Elisabeth-Krankenhaus Essen, Head of the Department of Cardiology and Angiology.

# Meeting Customers' Needs Within Their Budgets

Multix Fusion, the newly launched radiography system family from Siemens, provides both radiographers and medical administrators with what they need today:

With Multix Fusion, customers can increase their revenue thanks to higher patient throughput, improved patient and staff satisfaction, low total cost of

ownership, and high system availability. The system supports virtually the full spectrum of clinical applications and also saves time, money, and effort.

With its high-end components, Multix Fusion makes the difference in productivity, patient comfort, and dose reduction. The ergonomic, height-adjustable patient table facilitates patient positioning and can hold up to 300 kilograms (660 pounds). As a ceiling-suspended system, it can reach virtually any spot in the room. Additionally, the system's X-ray tube synchronizes automatically when the detector is adjusted, enabling examinations to be performed quickly and simply.

The tube has a vertical movement range of 180 centimeters (71 inches) – descending to the patient's feet. The detector can be used in the table, in the bucky wall stand, and for all free examinations like standing feet.

This flexibility expands into financial aspects. Customers can choose from several system variants depending on their requirements. The system will fit the needs of a small practice as well as a large hospital. Siemens also offers a Multix DR-Upgrade<sup>1</sup>, which easily upgrades the analogue version of the Multix Fusion to a digital level – whenever desired. Attractive service contracts are configured for customers' individual requirements and reduce operating costs. The system's small footprint facilitates its installation, because less room is needed. Multix Fusion – fits your needs and fits your budget.



<sup>1</sup> Under development. Not available for sale in the U.S.

[www.siemens.com/multix-fusion](http://www.siemens.com/multix-fusion)



## Understanding Medical Radiation: New Information Websites for Patients and Professionals

With two different websites, Siemens Healthcare is further advancing its activities to inform and educate the public as well as medical professionals about medical radiation. As the first medical engineering company, Siemens Healthcare launched a web-based Low Dose Information Center for doctors and clinical personnel, providing tailor-made training and educational materials on dose reduction. The website comprises of basic information on X-ray radiation, technical innovations related to dose reduction and sample applications, and dose protocols from day-to-day clinical activities.

Furthermore, there is a new information website providing basic details about medical radiation for the benefit of patients and the broader public. The site contains fundamentals of radiation physics, along with an introduction of imaging procedures and notes on minimizing exposure to radiation. A glossary explains the most common technical terms in a succinct and readily comprehensible manner.

A survey of 1,000 private households in the U.S. confirmed there is a necessity for public information on the topic of medical radiation. The new website not only addresses interested laymen, but also medical professionals who may find it beneficial for their daily practice.



[www.medicalradiation.com](http://www.medicalradiation.com)  
[www.siemens.com/low-dose](http://www.siemens.com/low-dose)

## Radiation-Free Catheter Positioning for Cardiac Interventions



Siemens' Artis zee® angiography system is now available with the navigation technology MediGuide<sup>1</sup> Technology from St. Jude Medical, headquartered in St. Paul, Minnesota, U.S. During cardiac interventions, a miniaturized sensor integrated into the catheter can be located

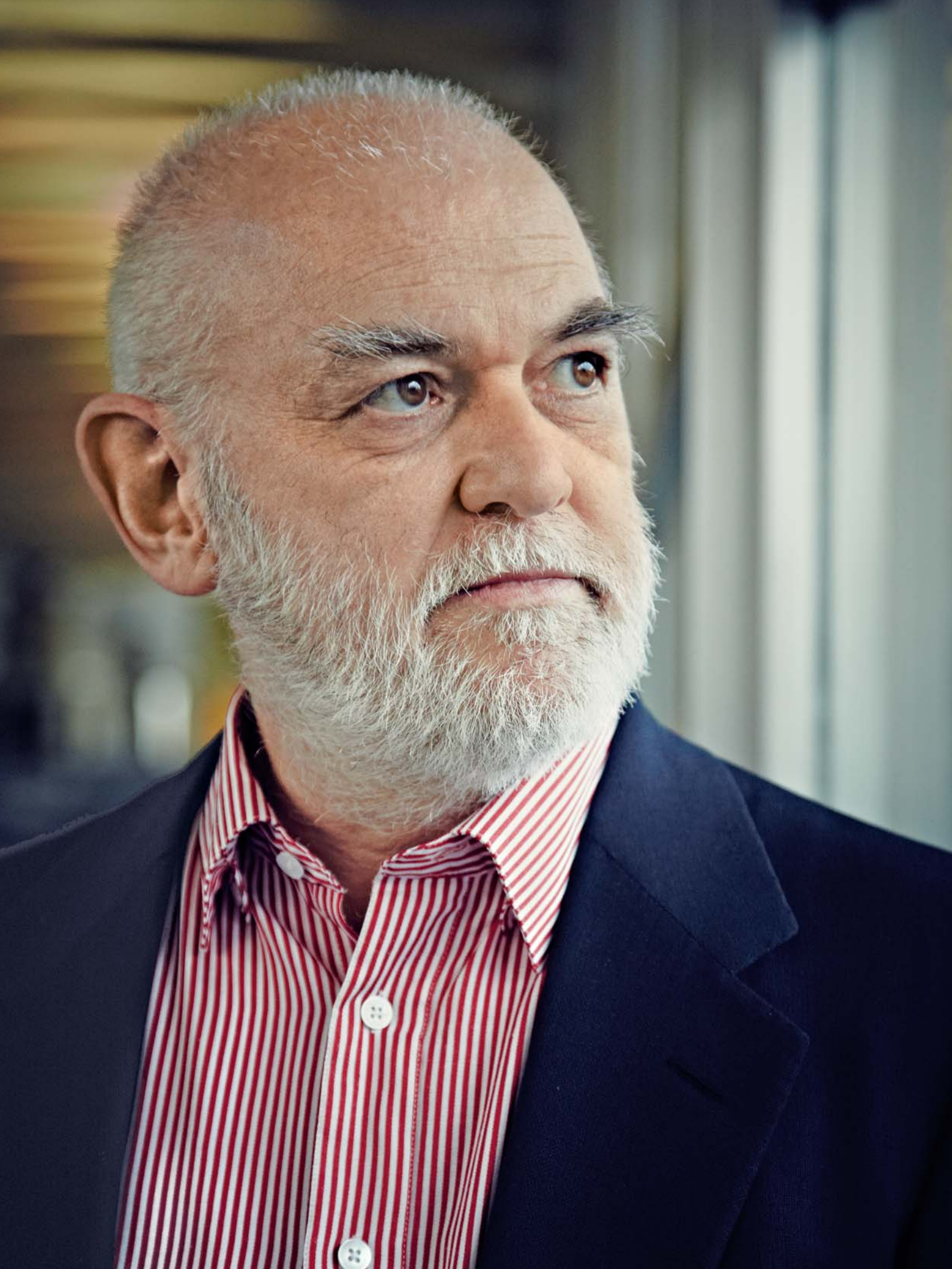
by sending electromagnetic positioning signals to the MediGuide transmitters, which are incorporated into the detector housing of the Artis zee system. The MediGuide Technology then calculates the respective position and orientation of the catheter and displays it in real-time on fluoroscopic images of the patient that were recorded earlier. Since the position of the catheter can be tracked without using X-ray repeatedly during the procedure, MediGuide Technology can reduce radiation dose. It also compensates for patient movement caused by respiration and heart motion.

The Heart Center in Leipzig, Germany, performed the first interventions with Artis zee and the MediGuide Technology. With clinical experience from more than

50 patients, the results indicate where the future of electrophysiology is headed. "The low radiation and the precise localization of the catheter tip onto the pre-recorded fluoroscopy image is the most impressive function, because the system is able to compensate for the motion from the heart beat and breathing," said Gerhard Hindricks, PhD, MD, Director of the Rhythmology Department. "For my team and me, this is clearly the future in electrophysiology."

<sup>1</sup> The products mentioned here are not commercially available in all countries. Due to regulatory reasons, the future availability in any country cannot be guaranteed.

[www.siemens.com/EP](http://www.siemens.com/EP)





“Without a degree of solidarity, many treatments will remain unaffordable to the single individual.”

Wim Van Lerberghe, Director,  
Department for Health System Governance and Service Delivery,  
WHO, Geneva, Switzerland

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# Beyond Traditional Healthcare

Demographic change, an increasing number of long-term therapies for the chronically ill, limited budgets: this is the delicate framework of healthcare in the 21<sup>st</sup> century. Keeping costs in check while at the same time maintaining quality of care is possible when technological innovations are used in an innovative way. A report from the 3<sup>rd</sup> World Health Summit.

By Philipp Grätzel von Grätz, MD



For four days, more than 1,200 attendees from more than 70 nations discussed current issues in global health.

Healthcare has always been and will always be a moral obligation. But in times of aging societies and ever more expensive treatments, it is becoming an economic factor as well. It is easy to see why healthcare is under pressure. The debt crisis will lead to austerity measures. And these will leave less room to further increase healthcare expenditures. The demographic change that most industrial countries are facing is not only resulting in a shift toward chronic diseases; it

also means that, in social security-based healthcare systems, fewer premium payers will have to pay for more patients. In private insurance-based healthcare systems, the very same situation inevitably leads to questions of access to healthcare, particularly in the older age groups. So there is reason to worry about healthcare financing in the long-term. "The system needs a more intelligent expenditure of money," argues Hermann Requardt, CEO of Siemens Healthcare. Requardt was a keynote speaker at the 3<sup>rd</sup> World Health Summit (WHS) 2011 in Berlin, a global healthcare forum driven by eight leading medical universities. The WHS is one of the very few occasions where the healthcare-related challenges of both the developed and the developing world are discussed in one place and by the same participants.

## More Intelligence in Early Treatment Phases

What, precisely, is the main cost driver in healthcare in the industrialized world? The data is pretty clear on this, argues Requardt. It is the ever-broader spectrum of medical therapies that are prescribed or initiated by medical doctors: "What we see in healthcare at the moment is a 'repair shop' expenditure profile. On the

other hand, prevention and early diagnosis are being underconsumed." From a business point of view, healthcare, according to Requardt, could be considered a project business, in many ways similar to, for example, software development: "We have learned from software development that 'after-sales bug-fixing' is a cost driver. This is true for healthcare as well. What we really need to do in order to reform healthcare is to put more intelligence in the early phases of treatment so that we save money later on." Dennis A. Ausiello, Chief of Medicine at Massachusetts General Hospital in Boston, Massachusetts, U.S., and Chief Scientific Officer of the health delivery system Partners HealthCare, has an insider's view on healthcare. And he confirms what the industry manager has observed: "There is data that more than 25 percent of the healthcare budget is spent in the last year of life." Spending a little money earlier on to avoid at least some costly complications toward the end of life could, in other words, be highly cost-effective. But what kind of care concepts could enable a move from the "repair shop" mentality toward more intelligent disease management? Cord F. Staehler, Chief Technology Officer of Siemens







“Only when providers, industry, and regulators team up will it be possible to change entire pathways.”

Farhad Riahi, Head, Healthcare Systems, Novartis International AG, Basel, Switzerland



“We need to put more intelligence in the early phases of treatment so that we save money later on.”

Hermann Requardt, CEO, Siemens Healthcare, Erlangen, Germany



“We need a world health information system.”

Dennis A. Ausiello, Chief of Medicine, Massachusetts General Hospital, Chief Scientific Officer, Partners HealthCare, Boston, Massachusetts, U.S.



“It is a long road, but we are already making progress.”

Hal Wolf, Senior Vice President, Chief Operating Officer, Kaiser Permanente, Oakland, California, U.S.

Healthcare, outlines several scenarios that could be pursued. Patients with chronic diseases and a high risk of hospitalization, for example, benefit from better care management that aims to prevent hospital admissions. Sophisticated blood panel diagnostics could be an important component of this kind of

care management: “They support and enhance decisions by general practitioners and help to prevent avoidable hospitalizations,” Staehler argues.

### The Potential of Diagnostics

A second example that illustrates the potential of diagnostics to increase effi-

ciency without sacrificing quality of care is the use of molecular imaging for treatment optimization in diseases that require rather expensive drug therapies like, for example, biologicals. It is true that molecular imaging does come at a cost. But if it helps to identify patients who will actually benefit from therapy,



the overall result will be fewer misguided therapies, better patient outcomes, reduced hospitalizations, and fewer complications – and thereby, fewer overall costs.

Does that sound too good to be true? Ausiello argues that it all comes down to implementing structures that feed existing knowledge on therapy or outcome-relevant factors into the individual care process. “What is really needed is some kind of assessment science to accumulate billions of pieces of information in order to create relevant knowledge. We need a world health information system.” Earlier and more targeted therapies to avoid costly end-of-life interventions could lead to more balanced and ultimately more efficient healthcare spending. But no single player – neither healthcare providers nor pharmaceutical companies nor producers of healthcare IT or diagnostics – is powerful enough to drive this shift. “Only when healthcare providers, industry, and regulators team up will it be possible to change entire care pathways,” says Farhad Riahi, Head of Healthcare Systems at Novartis International AG.

## New Partnerships

And this is where it becomes interesting from a healthcare economics point of view. In order to eliminate the “repair shop” attitude toward healthcare and move in a direction that is more focused on early diagnosis and prevention, new partnerships need to be established that bring together medical institutions, health insurance providers, the pharmaceutical industry, technology companies, and, ideally, regulators. The way to achieve this, according to Riahi, is to make individual expectations and business models transparent and, importantly, to constantly measure patient-relevant outcomes. Only then will it be possible to compare different care strategies and to prove that, for example, patients who are treated in a care scenario based on molecular diagnostics are indeed better off in the long-term than patients who receive regular care. “When we talk about sustainable partnerships, we have to move toward a discussion about patient

value and away from discussing costs alone.”

The need to advance this multi-partnering approach was also underlined by Hal Wolf, Senior Vice President and Chief Operating Officer of Kaiser Permanente, The Permanente Foundation, U.S. Kaiser Permanente is widely considered to be among the forerunners of a new healthcare philosophy that combines detailed data analysis with an approach toward care that recognizes prevention and early treatment as essential parts of an integrated care delivery system. “It is always costly when new technology hits an old organization,” Wolf says. This, he argues, is why healthcare needs to embark on a change management process that ultimately leads to multi-partnering scenarios and collaborations beyond traditional industry segments.

In fact, this process is well underway already, as Wolf points out. Kaiser Permanente, for example, runs a detailed database of 8.8 million individuals: “It is a fully automated environment that enabled us to identify and put in place several programs which actually lower costs based upon knowing where a patient is in a particular treatment pathway.” Both life science and the healthcare technology industry are regular partners in these projects: “We do share aggregated patient data with industry. But of course we never give away patient-identifiable data,” says Wolf. Partners HealthCare, too, has seen that the introduction of technology can not only increase cost-effectiveness but can also actually save money. “The introduction of a simple talking scale that not only talks to the patient but also electronically records weight in a database that is accessible by the general practitioner has been very successful,” says Ausiello. “It saves us 2.5 million U.S. dollars per year with one small subset of patients.”

## Technology-Assisted Care Scenarios

These examples can only be a first step, of course. More complex technology-assisted care scenarios will be needed in the future to juggle maximum efficiency and best possible medical outcome. Suc-

cess is dependent on actively involving the regulators and health policy experts. Issues such as whether to only approve certain therapies in combination with certain genetic testing or imaging modalities will have to be discussed on a political level. And, in some countries at least, healthcare financing systems will have to be adjusted in order to make it economically attractive to establish care scenarios based on diagnostics and prevention. “It is a long road, but we are already making progress,” says Wolf.

*Philipp Grätzel von Grätz is a medical doctor turned freelance writer and book author based in Berlin, Germany. His focus is on biomedicine, medical technology, health IT, and health policy.*

## Summary

### Challenge:

- Keep healthcare systems working in times of austerity and demographic change
- Maintain or increase patient outcome while remaining cost-effective

### Solution:

- Establish multi-partnering approaches that bring together different industry segments, healthcare providers, and regulators
- Focus on prevention and early diagnosis and avoid medical bug-fixing
- Be transparent about business models and medical outcome in order to make sure that every partner gets its share

### Result:

- Healthcare moves from a “repair shop” mentality toward a concept focused on keeping people healthy
- Patients receive more personalized therapies that improve overall outcomes
- Ineffective therapies, hospital admissions, and complications are reduced and unnecessary costs avoided

# Doctors of the World and Siemens Join Forces in Greece

In the Greek city of Perama, the humanitarian organization Doctors of the World is trying to help a population in need gain access to healthcare. Siemens is supporting the group's clinic by providing an ACUSON X150 ultrasound system.

By Panagis Galiatsatos





Tasoss Grigorios, a mechanic, waits to be seen by a doctor.

The hallway leading to the administrative office and the small waiting room next door are packed with patients – patients with only one option left. Those gathered at the clinic operated by Doctors of the World in Perama are not expecting hand-outs. They are ordinary citizens barred from accessing medical care due to the current debt crisis. Doctors of the World provides them with the access they need – with help from Siemens.

The people of Perama were never rich, not even when the Greek shipbuilding industry flourished and 4,500 workers earned their living on the shipyard, at the dry docks, or in the warehouses just



The clinic in Perama provides free healthcare services and medications to residents. With about 100 patients a day, the clinic can be crowded at times.



Elena Mavropoulou comes three times a week to treat people who have no access to the public health system.



outside the city. In the mid-1980s, the Greek shipbuilding industry went into decline. This structural change did not spare Perama's 25,000 inhabitants. Located just seven kilometers away from Piraeus, the largest port in the eastern Mediterranean, the city has been hard hit by the Greek debt crisis, the austerity measures, and the ongoing recession. According to official figures, unemployment is far above 30 percent in Perama, and in the waterfront areas, called "the Zone" by local residents, the figure is estimated to be at more than 70 percent. Pensions and wages have been cut, along with slashes to social services.

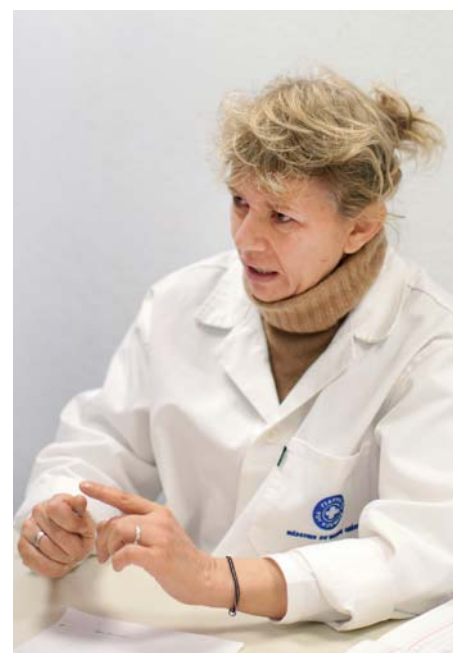
### An Increasing Need for Affordable Healthcare

The clinic, which is operated by the non-profit organization Doctors of the World, first opened on February 7, 2010. Elena Mavropoulou, who works as a cardiologist at the state-run accident hospital (KAT), was part of the activities from the start: "It's my baby," she says softly. Just as with all of the other similar projects run by Doctors of the World in Greece, the underlying idea was to offer medical care primarily to migrants and refugees, who have no access to the public health system. The Lions Club provided Doctors of the World with rooms for a symbolic rental fee of just one euro. "I started with an EKG [electrocardiogram] machine, a sterilizer – the bare necessities. Back then, I had time to sort the medications myself. Only a few people, the very poor, came to the clinic. The city residents had not yet overcome their inhibitions; it was beneath their dignity," Mavropoulou recalls. Nowadays, more than 100 people visit the clinic each day. To the surprise of the practicing doctors, 90 percent of them are Greek citizens. The need for specialists has also surged. Two pediatricians, a gynecologist, an orthopedic specialist, a dermatologist, a pulmonologist, an endocrinologist, and a psychologist volunteer at the clinic, like Mavropoulou: "We come three times a week, but I think we'll have to make it four soon," she says. The soaring demand for the clinic's services is a direct result of the financial crisis, which has caused more and more

**"You can't imagine how useful this ultrasound system is. Now, I can prepare diagnoses and prescribe treatments and medications that lead to successful outcomes."**

Elena Mavropoulou, MD, Cardiologist,  
General Hospital of Attica (KAT), Volunteer,  
Doctors of the World Clinic, Perama, Greece

people to lose their access to the state-run healthcare services. The national healthcare system's founders, who established it in 1983, intended to make healthcare accessible to all of the country's citizens. The state-run hospitals were meant to handle inpatient treatment, while a network of healthcare centers across the country would supply outpatient care, with the costs being covered by the social insurance carriers. The healthcare system has not held up in practice. Political interference, lack of funding, and administrative inefficiencies caused a growing number of Greeks to turn to private healthcare when it became unaffordable. Health economists spoke of the "Greek paradox": a system





“The donation was made at the initiative of Siemens and Doctors of the World in Germany. A positive image of European solidarity.”

Nikitas Kanakis, DDS, President, Doctors of the World Greece



in which the entire population is covered by public healthcare, but which also has the highest rate of demand for private medical services in the Organisation for Economic Co-operation and Development (OECD). Still, the public health system was generally more accessible before the crisis. Then, in May 2010, the situation

changed abruptly. The public hospitals began charging a five-euro consultation fee and no longer performed diagnoses unless the patient was able to provide proof of valid social insurance. And, that is exactly what many patients at the clinic in Perama lack.

### Trade Workers and the Unemployed Hit the Hardest

Trade workers are in an especially tight spot in the crisis, since their insurance coverage is valid only as long as they pay contributions. Many of them, however, were forced out of business by the recession, and while still owing taxes, have no claim to social benefits. “People who owe taxes cannot claim any healthcare benefits. They have to pay their debts first. And, we have a lot of uninsured patients,” Mavropoulou says.

The unemployed face a similar situation. One mechanic who used to earn his living in “the Zone” has been without work for three years. He is not entitled to healthcare and to be entitled for such, he would have to show that he had earned 50-days pay as a shipyard worker per year. “I haven’t been able to get even fifteen days worth of work,” complains the 53-year-old, who has had a heart attack and also suffers from psoriasis. The dire financial situation for these people also worsens the downward trend in healthcare. Many people in Perama come to the clinic only for free medications. Although they are insured, they cannot afford their co-payments. Months ago, the president of the Doctors of the World Greece, Nikitas Kanakis, warned of a looming humanitarian crisis. His remarks were met with derision in Greece, but he was able to convince his colleagues in the Doctors of the World organization. “The donation was made at the initiative of Siemens and Doctors of the World in Germany. A positive image of European solidarity,” he says.

### Help at the Right Time

Siemens donated a total of eight new ACUSON X150™ ultrasound systems to various projects of Doctors of the World, all around the globe. One of them reached Greece and the clinic in Perama.

## Siemens and Doctors of the World

Siemens and Doctors of the World in Germany, a humanitarian organization relying on donations, work closely together. In the fall of 2011, they organized a joint donation campaign in which Siemens donated eight ultrasound systems to Doctors of the World for various projects. There was particular need for ultrasound systems in health projects in Cambodia, Germany, Greece, Tunisia, the UK, and Ukraine. The donations from Siemens have helped to gain sustainable access to healthcare. The projects supported are all long-term programs that also focus on educating local medical staff. To help ensure sustainable support on-site, Siemens offered training with the ACUSON X150 ultrasound systems.

Mavropoulou is elated about the new unit: “I’m thrilled. You can’t imagine how useful this ultrasound system is – especially for us. Here at the clinic, I don’t have the option of ordering a series of hospital tests for the patient. Now, I can prepare diagnoses and prescribe treatments and medications that lead to successful outcomes. That’s the most important thing!”

The ultrasound system reached the clinic in late 2011. Now, it is used several times throughout the day. Mavropoulou recalls a patient whom she had found to be suffering from tachycardia (a rapid heart rate). With the ACUSON X150 system, she was able to perform a scan of the thyroid gland – in which she discovered nodules in the gland – and made the right diagnosis.



The ultrasound system is used several times a day, enabling Elena Mavropoulou to make safer diagnoses and sounder decisions.

## Summary

### Challenge:

- A population hit hard by a structural change in society and the debt crisis, with increased difficulty accessing the public health system
- Forced austerity and gaps in the public healthcare system
- Physicians can hardly keep up with demand

### Solution:

- A clinic in Perama, operated by Doctors of the World, that provides free healthcare services and medications to residents
- A number of specialists who volunteer at the clinic, largely covering the demand for healthcare
- A new ultrasound system donated to the clinic by Siemens

### Result:

- Patients at the clinic regain access to medical care
- More than 100 people visit the clinic each day, 90 percent of them Greek citizens
- The ultrasound system from Siemens enables the doctors to make more accurate diagnoses and prescribe proper treatments

That same afternoon, the ultrasound system was used two more times: First, Mavropoulou examined a pregnant woman with malformations and muscle changes in the uterus. Then, it was on to an obese man who had been diagnosed with an enlarged liver. Mavropoulou used the Siemens system to scan not only the patient's liver, but also his bladder, determining, to her relief, that the patient did not have any greater problems. With more and more people without access to the public healthcare system, the ultrasound system will likely continue to be a valuable tool. "Our central clinic in Athens was actually intended for illegal immigrants. Over the course of just a few months, the share of Greek patients went from 9 to 30 percent. That worries me, personally," Kanakis says.

The ultrasound system, which has made the doctors' work and patient treatment substantially easier, arrived just in time.

*Panagis Galiatsatos was born in Athens and studied political science and history in Germany. He has worked as a journalist since 1996. He is currently the political editor for the Athens daily newspaper Kathimerini and a business correspondent for the Neue Zürcher Zeitung.*

### Further Information

[www.siemens.com/ultrasound](http://www.siemens.com/ultrasound)

# Everyman's MRI

Despite economic pressures, a German radiology practice's key to success is to make life easier – not just for patients but also for staff.

By Eric Johnson





Although Bad Nauheim is only about half-an-hour drive from the modern metropolis of Frankfurt and the Frankfurt Airport, its look and feel is of an entirely different time and place. Gracious cobblestone streets make their way past Victorian villas, parks, and sanatoria, all built when recuperation from an illness consisted of a “cure.”

On the edge of town, the Sports Clinic Bad Nauheim offers housing for the Practice for Radiology and Nuclear Medicine (“Gemeinschaftspraxis Radiologie und Nuklearmedizin”), which is also offering its services in several other practices across the Frankfurt area. The buildings give a whiff of the old television soap opera “Dallas.” Wooden clapboard facades are ringed by planked verandas, and directly adjacent stands an operating stable and show ring for a resident herd of horses. The mood is easy, almost care-free. But looks can deceive. The same cost pressures felt by clinics everywhere and anywhere are also felt here. Reimbursement from German insurers has steadily fallen. Because the system is heavily regulated, movement is ordered, not volatile. But the trend is clearly unidirectional: heading down.

“What we have here is a demographic fact of life,” observes Thomas Maier, MD, managing partner of the Practice for Radiology and Nuclear Medicine, “Ever fewer people are paying premiums to support ever more beneficiaries. This has led to an imbalance of payers and payees, one that is getting steadily worse.” This is actually a gross understatement. Over the past two decades, reimbursements for MRI scans have fallen – in nominal terms, that is, without adjustment for inflation – by about one-half.

Faced with such income declines, physicians are forced to “do the splits,” as Associate Professor Axel Küttner, another of the radiology partners, puts it. “We’re torn between the realities of balancing the books, which of course is necessary to stay in business, and providing our patients with the highest quality treatment.”

The Sports Clinic as well as the Radiology Practice have managed to square the circle by making a clever compromise. While



Faster exams and less patient anxiety lead to fewer motion artifacts and better diagnostic-quality images.

both institutions serve large numbers of patients covered by conventional, regulated insurance policies, they also are the healer of choice for elite athletes. Sporting luminaries – most notably Formula 1 legend Michael Schumacher – are known to rely on the expertise of the Sports Clinic’s founder, Johannes Peil, MD.

For these guests, money is usually not the first thing they worry about. Indeed, their profits most likely benefit from the orthopedic know-how of world-renowned expert Peil and the Sports Clinics’ excellence in trauma medicine, internal medicine, cardiology, and rehabilitative medicine. It is unusual that the private fees of the rich and famous are used to subsidize the care of the less wealthy majority. This clear and simple transfer, says Peil, would be unthinkable in other fields. “Can you imagine a lawyer giving one client a discount, because he was able to charge another client a lot?” he asks rhetorically. “Definitely impossible!”

### Feel-good Factor

Like it or not, this richer-poorer trade-off is a fact, and the Sports Clinic makes the most of it. A clientele of high-octane sportsmen and sportswomen is a solid and increasing part of the clinic’s trade, and not just because Peil is a charismatic orthopedist renowned academically and because of his sporting connections,

often in the media. The Sports Clinic most prominently stands out from its competitors because of its dedicated focus on patient comfort. “Patients don’t really want to be here,” Peil concedes. “They’re frightened, they’re upset, they’re nervous. Of course our number one aim – and their number one aim – is to diagnose and heal their illness, but it makes a real difference if we can improve the quality of that experience.” That is exactly what the Sports Clinic as well as the Radiology Practice do, for wealthy and less wealthy alike. The patient experience is, all things considered, maximally human and minimally hospital-like: sterile, cold, clinical, and impersonal.

Instead, the atmosphere at the Radiology Practice is much closer to that of a private home. Colors are varied and inviting; the facilities are spacious and comfortable, including changing and pre-exam rooms; furniture is more living room and home-office than clinic. And natural light floods the building, with endless, sterile neon-lit corridors only a dim memory. Even the magnetic resonance imaging (MRI) rooms have a human touch. Walls are decorated to blend into the scanners, making the latter less optically imposing. Sizeable windows let in the sun, and allow patients to gaze out upon the horse meadows during a scan. What a contrast to most conventional settings, notes

# Accessible Innovations

Across the globe, economic pressure on healthcare systems and their providers is eminent. Industrialized countries are challenged with an aging population and growing demand for healthcare services. Emerging economies and their growing healthcare systems are increasingly in demand of access to premium patient care. As a result, reimbursement policies across the globe are being adapted toward increasing accountability for quality and cost across the entire care continuum. Providers must demonstrate lower hospital readmissions, high-quality outcomes, and low operational costs to stay competitive. A Siemens initiative named Accessible Innovations meets these demands in the field of medical imaging.

It is no surprise that total cost of ownership (TCO) is an important factor influencing the global healthcare environment. Determining the economic value of an investment is important for all healthcare providers – regardless of their circumstances. Assessing total cost of acquisition, operating costs, and investment protection highly contribute to profitability over time. Profitability may by no means be confused with the responsibility to provide high-level imaging standards that benefit the patient in the end.

Within this context and to serve common goals among the global healthcare landscape, Siemens is introducing a new range of imaging systems. With Accessible Innovations, Siemens is equally improving the availability, quality, and efficiency of healthcare by combining state-of-the-art diagnostic capabilities with a highly sensible TCO argumentation for its customers. Quantifying the financial impact of deploying a healthcare product over its life cycle goes hand in hand with making healthcare more accessible for more people all over the world. MAGNETOM® Spectra<sup>1</sup> magnetic resonance imaging system, SOMATOM® Perspective<sup>2</sup> computed tomography system, and ACUSON S1000™ ultrasound system are proof that Siemens is taking its responsibility seriously – the responsibility to innovate and invest in cost-efficient, premium imaging standards.

<sup>1</sup> This product is not commercially available in all countries. Due to regulatory reasons, its future availability cannot be guaranteed. Please contact your local Siemens organization for further details.

<sup>2</sup> The information about this product is being provided for planning purposes. The product is pending 510(k) review, and is not yet commercially available in the U.S.

Küttner. “Usually scanners are in a windowless room, often in the basement somewhere.”

“Patients feel comfortable here,” Maier says. “Many don’t rush off after an appointment. Often they will stay for a chat with the staff, or a coffee on the veranda.” This comfort policy pays off in patient loyalty: Many travel up to 250 kilometers (155 miles), past many other clinics, to reach the institutions here in Bad Nauheim. Moreover, comfort delivers clinical benefits. “Relaxed, unstressed people move less on the examination table,” Maier adds. “The scans come out with better resolution and fewer artifacts.”

## Plug and Play

So, why did the Radiology Practice buy a MAGNETOM® Spectra<sup>1</sup> MRI system?

Not because its 3 Tesla (T) field strength is new to the market. By the time it was installed, in November 2011, 3T systems had been commercially available for years. But until now, for a practice – as opposed to a hospital – these have been a luxury. Until recently, they have been much more expensive than 1.5T MRIs. MAGNETOM Spectra, agree both Maier and Küttner, is priced more competitively: The clinic expects to see payback in six to eight years.

Second, earlier MRI systems have been much more complex. “Some hospitals employ full-time medical physicists to keep 3T systems in line,” Küttner points out. “They sort out the settings, the planar positioning, and they deal with artifacts, quantum effects, and other negative influences. Practices don’t have the

scale to employ someone like that.” Practices can, by contrast, easily employ the MAGNETOM Spectra’s Tim® (Total imaging matrix) and Dot™ (Day optimizing throughput) technologies. “They organize the work for the MRI operator,” Küttner explains. “Our exams are guided by the system and we always get excellent results.” So what is the combined benefit of MAGNETOM Spectra? A typical cardiac exam on a 1.5T scanner with conventional software takes an hour. According to the customer, with 3T and Tim and Dot, this time can be significantly reduced. And for certain cases, the extra power of the 3T delivers major benefits. For instance, thanks to the hand/wrist coil of MAGNETOM Spectra, the scan is more comfortable for the patient, which may decrease patient movement and thus

“Relaxed, unstressed people move less on the examination table.”

Thomas Maier, MD, Managing Partner, Practice for Radiology and Nuclear Medicine, Frankfurt, Germany



motion artifacts. Küttner recently treated a patient, who, conventionally, would have needed exploratory surgery to assess her possible bone and cartilage damage. With the 3T, only one scan was needed. MAGNETOM Spectra eliminated the need for a costly, potentially risky, and painful procedure: That’s about as user-friendly as MRI can get.

*Eric Johnson writes about business, the environment, medicine, and technology from Zurich. He studied chemistry, and prior to working independently, headed what is now a Thompson-Reuters bureau and corresponded for McGraw-Hill World News.*

<sup>1</sup> This product is not commercially available in all countries. Due to regulatory reasons, its future availability cannot be guaranteed. Please contact your local Siemens organization for further details.

“Our aim is to diagnose and heal the patients’ illness, but it makes a real difference if we can improve the quality of that experience.”

Johannes Peil, MD, Founder, Sports Clinic Bad Nauheim, Germany



## Summary

### Challenge:

- Bringing the power of 3 Tesla MRI beyond the reach of large hospitals to smaller clinics, without incurring excess cost and operating complexity

### Solution:

- MAGNETOM Spectra will open the world of 3T imaging
- Tim and Dot will allow an easy and efficient operation of the system

### Expected Result:

- Quick exams
- Excellent image quality
- Comfort for patients and ease-of-use for staff

“Patients need time and a comfort zone to express specific problems. We as physicians have the time and environment to carefully listen.”

Associate Professor Axel Küttner, Partner, Practice for Radiology and Nuclear Medicine, Frankfurt, Germany



## Further Information

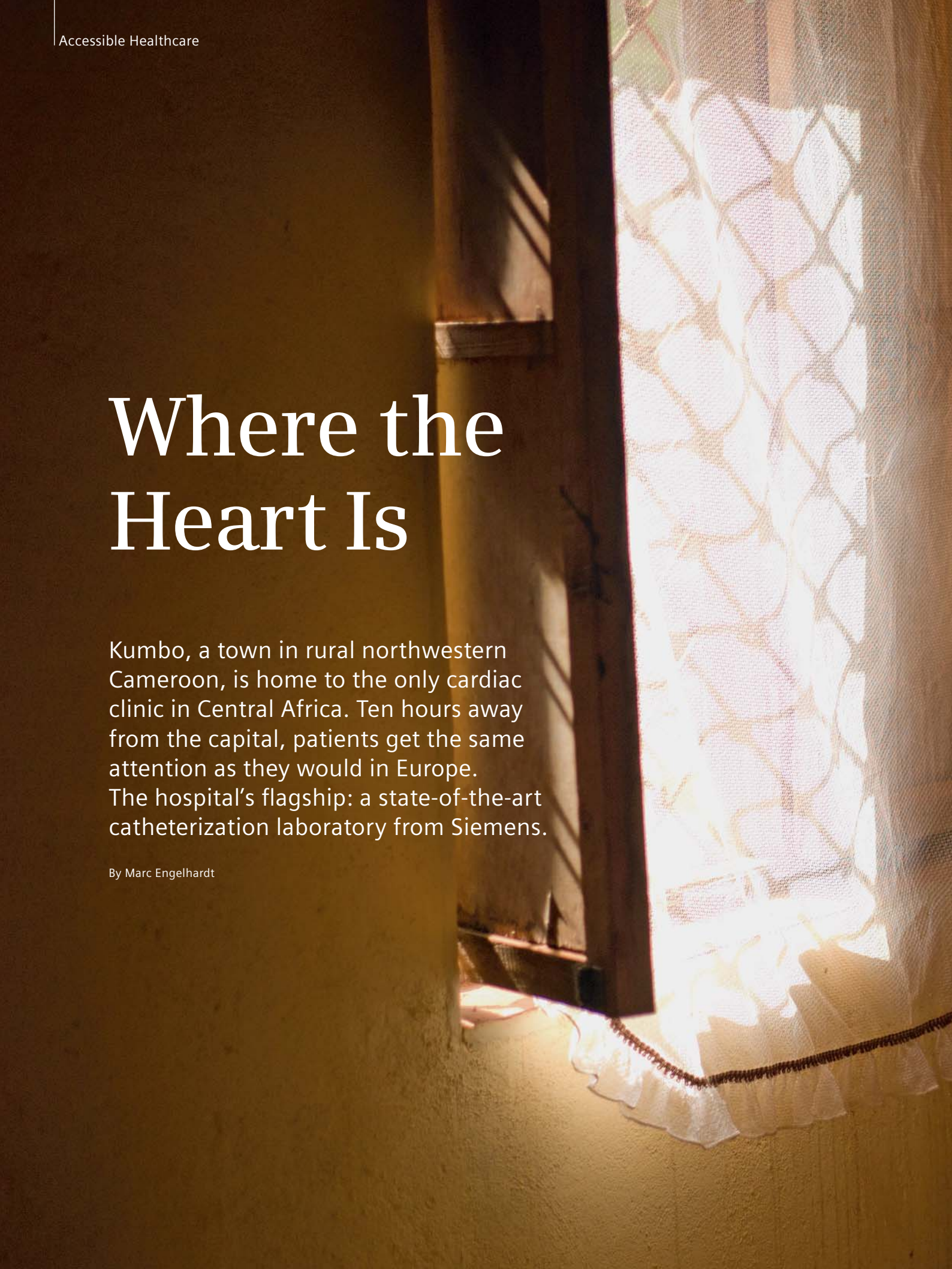
[www.siemens.com/MAGNETOM-Spectra](http://www.siemens.com/MAGNETOM-Spectra)



# Where the Heart Is

Kumbo, a town in rural northwestern Cameroon, is home to the only cardiac clinic in Central Africa. Ten hours away from the capital, patients get the same attention as they would in Europe. The hospital's flagship: a state-of-the-art catheterization laboratory from Siemens.

By Marc Engelhardt







Celina Bonkey is waiting for her 95-year-old husband Henry Tatah to complete bills at Shisong Hospital's Cardiac Center.

Derick Fonyuy was 12 years old when he noticed a pain in his chest. "I didn't know what was happening," says the now 21-year-old Cameroonian. "I had lost all my energy, my nose bled, and I was sick time and again." When Derick's parents took their son to the doctor in a nearby hospital, they soon received shattering news. "They told us there was a problem with the valve on the right side of my heart and that the valve had to be replaced – a measles infection had left it damaged," says Derick. The doctors were clear: Without surgery, Derick wouldn't survive. His parents were shocked – but they were lucky. "At the last minute, they found a charity that paid for me to go to Paris, live with a host family, and have the operation I needed there." Derick, who now studies medicine himself, still remembers how scared he was then. "I was alone in a foreign country, and I thought I was going to die." But Derick lived – and returned home. Nine years after his first heart surgery, the pain returned. The doctors diagnosed a blockage of the same valve. "They told me again that I needed surgery, and fast." But this time, everything was different. Instead of flying abroad, Derick just had to take a bus to the far west of his home country. Here, in a small town called Kumbo, the doctors at the new Cardiac Center of Shisong Hospital took care of him. "All went well, and I feel great," he says, smiling. Three months later, he

returned for a routine check-up. "All this is possible now without paying for horrendously high air fees – it's a miracle."

### Healthcare Off the Beaten Path

If miracles happen in Shisong Hospital, the town of Kumbo with some 80,000 inhabitants gives no sign of it. Small houses of concrete or clay bricks line the dusty unpaved streets. Market vendors display their produce on blankets or in wooden shacks. The sound and smell of rusty moto-taxis fill the air. Getting into or out of Kumbo is the biggest problem: The road connecting the town to the rest of Cameroon is so bad that the 100-kilometer (62 miles) trip to the regional capital of Bamenda could take five hours in the rainy season. If anything makes Kumbo feel like a special place, it's the beautiful location and mild climate: Surrounded by mountains and greenery, and located almost 2,000 meters (1.25 miles) above sea level, it hardly ever gets hot here. As to why the nuns who run Shisong Hospital decided to establish the modern cardiac clinic here must seem a mystery to any outsider. "Our order, the Tertiary Sisters of St. Francis, settled here in Kumbo in 1935," says Sister Appolonia Budzee. They started off with a small maternity ward. Today, Shisong General Hospital has 300 beds, plus 67 in the Cardiac Center. "It's the only facility of its kind in all of Central Africa," Sister Appolonia beams.

“It’s the only facility of its kind in all of Central Africa.”

Sister Appolonia Budzee, Shisong Hospital, Kumbo, Cameroon





Thanks to the cath lab at Shisong, patient Derick Fonyuy didn't have to travel abroad for his second valve surgery.





The road connecting Kumbo with some 80,000 inhabitants to the rest of Cameroon is so bad that the 100-kilometer trip to the regional capital of Bamenda could take five hours in the rainy season.

“People come here for treatment of cardiovascular diseases from all over Cameroon, from the neighboring countries, and even from as far away as Ethiopia.”

The sisters have a reputation for good work. Bit by bit over the decades, they have enlarged and modernized the hospital. So when a priest in Milan was looking for an African hospital to receive donations for a cardiac wing, Shisong was an almost obvious choice – not despite, but because of its location. “When you want decentralization, you mustn’t build all modern facilities in just the largest cities like Yaoundé or Douala,” Sister

Appolonia says. “Yaoundé is Cameroon’s political capital, Douala the capital of trade – and Kumbo can become the capital for medical treatment.”

### **Siemens Technology at the Forefront**

This vision is surely already a reality with regard to the Cardiac Center. The extension to the general hospital was officially opened in 2009, after five years of construction time. Everything inside is state-of-the-art: The intensive care unit and two operating theaters are – like the rest of the cardiac wing – sealed off from the dusty environment outside. Oxygen

and air supply come from tabs in the wall, a rarity in African hospitals. The flagship of the Cardiac Center, though, is its catheterization laboratory (cath lab), which boasts a Siemens AXIOM® Artis dFC all-digital, single-plane, ceiling-mounted C-arm angiography system installed in a specially fitted room that was jointly planned by Cameroonian architects and Siemens. Not only does it look like a set from Star Trek, its technical features also border on the futuristic. The AXIOM Artis enables cardiologists and cardiac surgeons for the first time in this region to offer quick and detailed diagnoses. Sharp and detailed X-rays, intravascular





ultrasound-images, and angiocardiograms are the basis for the microinvasive heart treatment that Shisong offers its patients, while at the same time limiting exposure to radiation thanks to a special Siemens-package called CARE (Combined Applications to Reduce Exposure). While the AXIOM Artis with its three big screens right above the operating table give guidance to the surgeon, all the data is stored simultaneously in real time on the AXIOM Sensis XP Lite data center, an integral part of the cath lab. "In collaboration with the Italian association 'Bambini Cardiopatici nel Mondo,' we decided deliberately to go for the latest model,"

says Sister Appolonia. The nuns of Shisong had always made clear that they wouldn't want to go for outdated technology. "It might seem cheaper in the beginning, but then it gives you trouble later."

The nuns and Siemens agreed early that Siemens would train local technicians and engineers on how to maintain and repair the high-tech machine. "I assisted from day one," says Shisong Hospital's Lionel Djankou. "I am an electronic technician and an ICT-expert by training, so I knew how the machine would work in principle – the concrete bits I was taught by Siemens." And, he learned so well that in the past two years, Djankou has been able to fix all of the few glitches that occurred. If necessary, he communicates with Siemens in Belgium, which is also where Djankou orders those spare parts he doesn't keep in his inventory. Probably the most frequent problem involves power cuts. "We had 4,000 blackouts alone last year," says Djankou. Doctors and patients never noticed a single one of them, though – thanks to two giant batteries that keep the whole Cardiac Center going until the generators kick in.

### Patient Demand vs. Qualified Staff

Jean-Claude Ambassa, MD, is one of the two resident cardiologists at Shisong Hospital. The 44-year-old studied in Romania and Italy, but, unlike many fellow students from Africa, he returned to his home country afterward. "When I came back, I noticed that almost everyone focused on infectious diseases only," says Ambassa. "They said that people have no heart problems in Africa, which of course is not true." The cardiologist soon found that most heart diseases were simply never diagnosed, due to the absence of specialists. When he looked more closely, he found a worrying trend. "Cardiovascular diseases have the potential to become the number one killer in Cameroon if nothing is done," he says. Ambassa blames that fact partly on poverty and late diagnoses, and partly on lifestyle choices. "Whoever is able opts for the European lifestyle – eating more fat, not engaging in sports, and working in offices – that creates lots of heart

**“Cardiovascular diseases have the potential to become the number one killer in Cameroon if nothing is done.”**

Jean-Claude Ambassa, MD,  
Cardiologist, Shisong Hospital,  
Kumbo, Cameroon





Sister Appolonia Budzee with 95-year-old patient Henry Tatah (top).

Dr. Jean-Claude Ambassa is convinced that modern medical technology as used in Shisong has a place in Africa (bottom).







Gray Friar Angelo Pagano on his rounds through the hospital wards (top).  
Newly varnished beds for the women's ward drying in the sun (bottom).







Benjamin Wallon and Bruno Peynshaert installed the cath lab in Cameroon.

## Assembling a Cath Lab in the Bush

For Siemens engineers Bruno Peynshaert and Benjamin Wallon, installing a catheterization laboratory (cath lab) in Kumbo, Cameroon, was special in many ways. In all, 9,000 kilograms (almost 20,000 pounds) of material – an AXIOM® Artis dFC angiography system and an AXIOM Sensis XP Lite recording and information system – had to be shipped to a place where none of these systems had ever gone before. That the 24 large shipping containers reached their destination without any damages was nothing short of amazing, especially given the state of the roads. “But everything was super carefully packed,” says Peynshaert. He and Wallon, who work for the Siemens Healthcare Sector in Belgium, took special care to bring along all of the necessary tools. “I knew that if I forgot so much as a screwdriver, I would have to drive ten hours in order to get a new one,” says Peynshaert. It took the two engineers and their local crew three weeks to put the high-tech puzzle together. “We worked from dawn until dusk every day,” says Wallon. “Everyone was so highly motivated!” When the construction was finally completed, everything worked. And both engineers are convinced it will continue to do so for a long time. “Everyone is very careful with the equipment,” marvels Peynshaert. “In the developed world, a cath lab like this might be used nine years; in Kumbo it could well be twelve given the special care.” Once a month for instance, all the machines are shut down and cleaned thoroughly. “And when a software problem occurs, we are able to connect from Belgium to Kumbo via Siemens Remote Service and fix it,” says Wallon. For most tasks though, Wallon and Peynshaert have trained local engineers and technicians so that only minimal outside help is needed.

problems,” he explains. He reports that since the new Cardiac Center opened two years ago, more than 10,000 patients have come in for consultation, adding, “That shows how big the need really is.” Ambassa is convinced that even more people would have made their way to Shisong were it not for the medical fees. “We don’t have health insurance in Cameroon, and the government is not assisting the needy patients at all,” he notes. But despite the lack of funds, he is convinced that modern medical technology as used in Shisong has a place in Africa. “Microsurgery helps you to operate faster and more accurately, it shortens convalescence, and it’s more aesthetic,” he says. If there is one wish Ambassa has, it’s that he wants to see the Siemens cath lab used more efficiently. “We have problems finding qualified personnel,” he explains. We finally found a resident cardiac surgeon, but we are still looking for an anesthetist who is willing to work here instead of abroad.” Until the team is complete, surgeries can only be performed when physicians from abroad come for surgical missions; for more than half of the time, the valuable equipment remains unused. And that is more than unfortunate, both for the hospital and for the potential patients who could be helped, because with the cath lab’s inherent efficient workflow, doctors could treat 15 patients a day easily, rather than the eight treated within a week right now.

### Finding Solutions for Affordability

Sister Jethro Nkenglefac is aware of this and other problems. The General Manager of the Cardiac Center, a 32-year-old with a master’s degree in business administration, probably has the toughest job in Shisong. “We’re not a for-profit organization, but we mustn’t make losses either,” she says. “Therefore, finance is my biggest worry.” The cost of running a cardiac facility in the middle of nowhere is high. Almost all special equipment has to be ordered in Europe and sent to Cameroon by ship. With the financial crisis affecting most of the suppliers, Sister Jethro has to pay up front for everything the hospital utilizes on a daily basis.

“Since customs procedures in Cameroon are so lengthy, we have to order at least six months ahead – that means quite some money goes into this.” Every day, Sister Jethro says, she struggles to find new ideas in order to keep the hospital going. “That’s how I came up with the outreach screening program, which helps people be diagnosed and helps us find new patients,” she says. Outreach teams go to the more remote areas of western Cameroon, which none of the 12 hospital’s permanent health posts can reach. Once people learn of the Siemens cath lab and the possibilities the Cardiac Center offers for diagnosis and treatment, they are eager to come to Kumbo. “The list of those who need surgery is long,” Sister Jethro knows. “But only every other one on the list can actually go into surgery – not only because of our current lack of surgeons, but also for financial reasons.” Sister Jethro admits that in the past, she sometimes used to cry when she realized not every sick person could be treated because they lacked the funds. “Now, I still have sympathy, but I am using my energy to make things better,” she says. Already, patients like Derick Fonyuy use

the opportunity to pay for their surgery in installments. The clinic has also started a heart fund to subsidize needy clients, adding to the few international charities, such as the Italian “Cuore Fratello” association, Shisong has won over to cover part or all of the cost of many surgeries. Next, Sister Jethro notes, is a blood bank that is needed to supply the Cardiac Center with urgently needed plasma and blood cells. And, after years of nagging from Shisong Hospital, the government has even begun to improve the road. Sister Jethro’s eyes light up when she talks about these things. She knows there is still a long way to go, but eventually, Kumbo will surely become central Africa’s medical capital. After seeing Shisong Hospital, its staff, and the cath lab in action, there is no doubt about it.

*Marc Engelhardt is a long-time Africa correspondent and author of several books. He moved to Geneva recently after having worked from Nairobi, Kenya, for seven years.*

### Further Information

[www.siemens.com/angiography](http://www.siemens.com/angiography)

## Summary

### Challenge:

- Tackle the problem of cardiovascular disease in central Africa
- Provide state-of-the-art cardiac care in a remote place that lacks most infrastructure
- Raise awareness for cardiovascular diseases in a fast-changing, developing nation
- Enable the poor and needy to benefit from this care
- Convince qualified local personnel to work in their home country instead of working abroad for higher wages

### Solution:

- Construction of a cardiac clinic with modern equipment matching developed nations’ standards, i.e., the Siemens AXIOM Artis dFC and AXIOM Sensis XP Lite, linked to an already highly successful general hospital
- Ensure self-reliance through infrastructure such as battery back-up, generators, trained medical technicians, and engineers for repairs
- Provide outreach programs, decentralized health posts and training to help ensure early and correct diagnoses
- Find funding solutions for poor patients
- Offer continuous training and a modern work environment that matches the one in developed nations

### Result:

- More than 10,000 consultations since the Cardiac Center in Shisong Hospital opened in 2009
- Successful hiring of a cardiac surgeon and other highly qualified staff to ensure a high standard of care at Shisong Hospital
- International charities and local donors (through the hospital’s own heart fund) subsidize poor patients
- Continuous planning of extended facilities and services, i.e., a blood bank, to maintain the high standards of the hospital



Shisong Hospital’s Lionel Djankou, a trained electronic technician and an ICT expert, was trained by the Siemens engineers to keep the AXIOM Artis system running seamlessly.

# The Long Journey

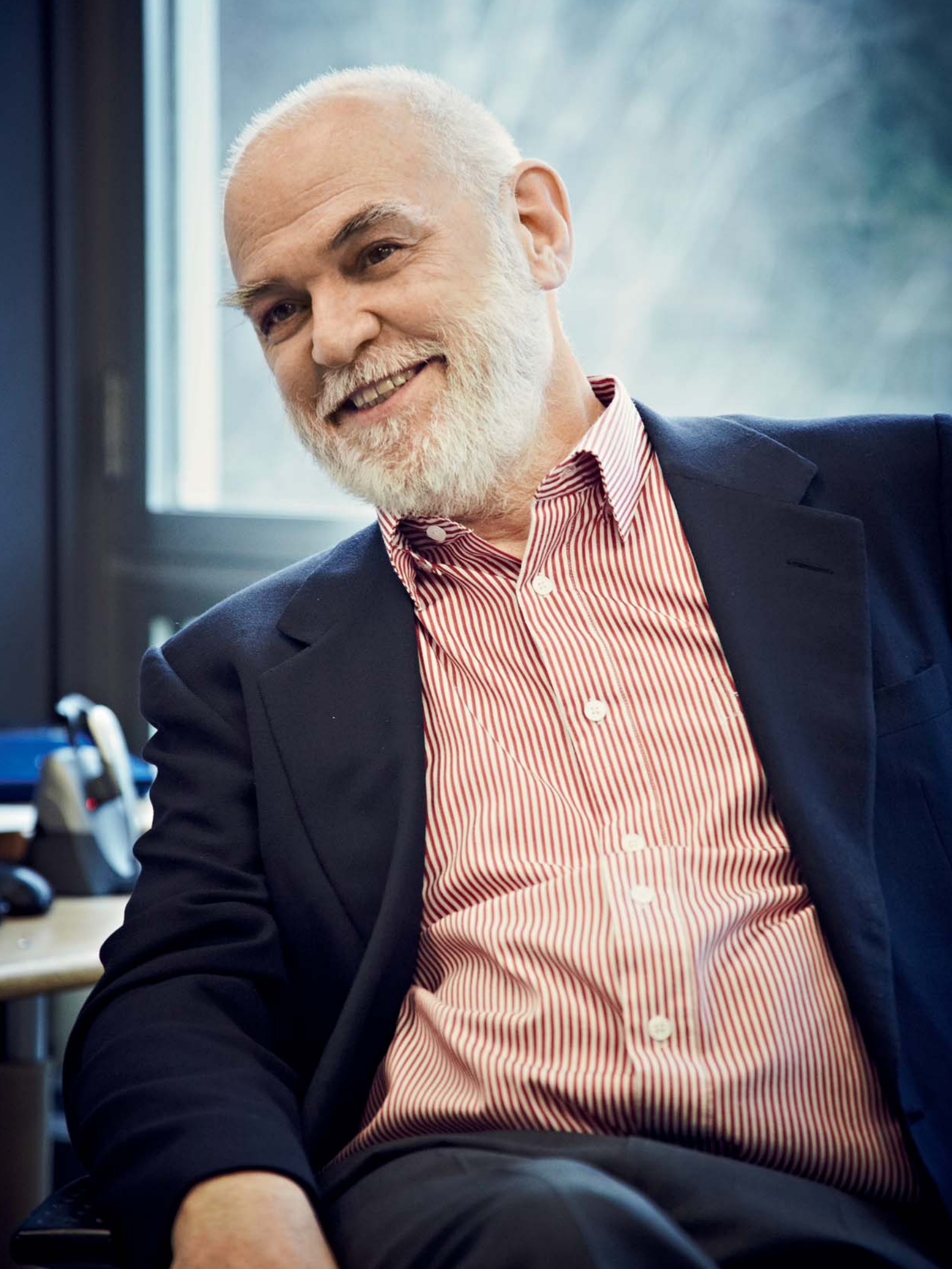
From his office in Geneva, Switzerland, World Health Organization public health expert Wim Van Lerberghe calls on government institutions to steer their healthcare systems in the right direction in order to achieve affordable and accessible care. His goal: People worldwide get the care they need, when they need it, and as close to home as feasible.

By Marc Engelhardt

## Wim Van Lerberghe

Wim Van Lerberghe studied medicine at the University of Ghent in his home country of Belgium. His first job after graduation led him to newly independent Mozambique, where he worked as a district health officer. "The government gave me a district of 400,000 people to show that the health situation would improve after the revolution," he remembers. Several field stations in countries like Morocco and Tanzania followed before Van Lerberghe became head of the department of tropical medicine at Antwerp University. From there, the by-then public health specialist was called to Thailand to assist the government in its healthcare system reform. The aim: Make healthcare accessible and affordable for all. In 2003, Van Lerberghe moved to WHO, where he works on achieving the same target on a global level. Van Lerberghe lives in Geneva. He is married and has two children.









WHO employs some 7,800 people representing more than 150 nationalities working in more than 140 countries. It is headquartered in Geneva, Switzerland.

**You work with governments to help them improve their healthcare systems. How big a priority is that for most of them?**

VAN LERBERGHE: You just have to look at present-day-Tunisia after the Arab spring. The dissatisfaction with the inequality in health services and the generally bad quality of care is a huge issue. Many people complain, which is why the government has asked us to assist very soon in organizing a public debate and deciding on the policy options needed for the future. The main question is: What needs to be fixed, and how can it be done?

**But surely, there are other, more important priorities?**

VAN LERBERGHE: Recently, there was a survey done in Russia. People were asked, "What causes frustration or anxiety in your life?" Number one on the list was the high cost of living, but number two

was the low quality of health services – 53 percent said that. And Russia is not an exception. Similar surveys in Poland and Ukraine have seen the quality of healthcare services as the number one concern. In Mexico, 40 percent of the people say it's their biggest worry, in Bangladesh 60 percent, in Uganda even more. So it is a major political concern, and politicians are often more acutely aware of that than health technocrats.

**What can governments do to make health systems more accessible and affordable?**

VAN LERBERGHE: Generally speaking, if a government lets the health system develop on its own, in a purely market-driven approach, it's not going to work. Healthcare in this scenario becomes a commodity that is sold like a repair for your car. The comparison is not as absurd as it may sound – with a car problem, you

have to rely on your mechanic because you just know something is wrong, but not exactly what and not how to fix it. It's a matter of trust. In healthcare it's the same: A patient knows he's sick, but he has to rely on the healthcare provider for a solution. Now, if financial incentives for the providers influence the decision-making of the patient in the wrong way, you might end up not getting the care you need, or getting care that you don't need and paying too much for it.

**Is that a concern?**

VAN LERBERGHE: Mostly in low- and middle-income countries, yes. In highly industrialized countries, it is mitigated by the prominent role of the state. In many low-income countries though, we have seen a devolution towards an unregulated and uncontrolled commercialization of healthcare provision, both in the private and public sector. The situation has dete-



# The World Health Organization

The World Health Organization (WHO) was founded in 1948 as a specialized agency of the United Nations. Its objective is “the attainment by all people of the highest possible level of health.” Health, according to WHO, is defined as a “state of complete physical, mental, and social well-being and not merely the absence of disease or infirmity.” WHO has 194 members: all UN member states with the exception of Liechtenstein, as well as two non-UN-member states. Mostly known for its engagement in the eradication of communicable diseases such as smallpox (declared eradicated in 1980) and polio (expected in the upcoming years), but one of the organization’s foremost tasks is to support Member States on public health policies. WHO’s public health agenda is outlined in the 1998 strategy “Health for All in the 21<sup>st</sup> century,” based on the Alma Ata Declaration of 1978. WHO is based in Geneva, Switzerland.



riorated in Asia for example, and in the urban areas of Africa, where commercial healthcare has become the rule.

**That sounds like affordability is a goal that is almost impossible to reach.**

VAN LERBERGHE: The key to success is to go for prepayment and pooling. A system where you have to purchase your healthcare at the very moment when you’re sick is never going to be affordable. Without a degree of solidarity, many treatments will remain unaffordable to the single individual – or at the very least they will lead to personal financial catastrophe. So you have to make sure people pay into the system in advance – when they are healthy. This money goes into a pooled fund, so they can use it to pay for services when they get sick.

**Public health insurance programs as you describe them are facing problems**

**even in European countries. How can developing countries hope to ever run them successfully?**

VAN LERBERGHE: It’s a journey, and, of course, it will take more than a day. But look, for example at Thailand, which has moved extremely fast. The government made groundbreaking decisions, and political reform was sped up immensely. Within a few years, the situation changed from exclusion of a big part of the population to a system where now most people have access to healthcare. There are a variety of ways to make healthcare more affordable step-by-step, for example starting with local initiatives, thus building a partial social security and then expanding that. You also have to find a balance in making sure everybody gets covered, increasing the number of conditions and interventions covered, and diminishing the level of co-payment that people have to take out of their pockets.

In that way, you get the reform you need even if it takes a bit longer.

**So a lot of money is needed to accomplish these goals.**

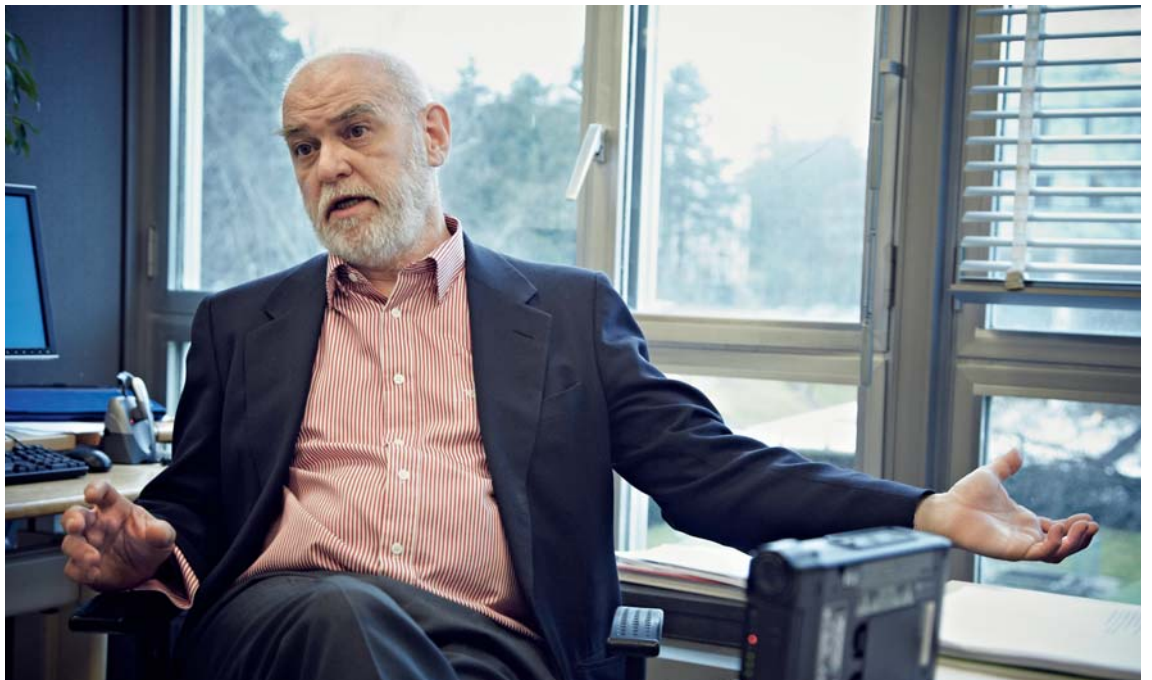
VAN LERBERGHE: Money is needed, of course. But there are many ways to make efficiency gains as well. You can eliminate non-working drugs, focus on cost-effective treatment, and eliminate unnecessary hospitalizations, just to mention a few examples. Some countries, under the same conditions, hospitalize up to ten times more patients than others. And, you have countries that pay up to 60 times more for a drug than others. Any savings made here could be used to make good healthcare more affordable.

**Should accessibility include high-end healthcare services – that is, should people anywhere be excluded from the latest medical developments?**



“Things can be done, but they do not automatically get done.”

Wim Van Lerberghe, Director,  
Department for Health System Governance and Service Delivery,  
WHO, Geneva, Switzerland





VAN LERBERGHE: Ultimately, people should get the care they need, when they need it, and as close to home as feasible. Of course, the range of available treatments expands over time. Let's take Caesarian sections: In many parts of the world, if you need one, you can't get one – either the hospital is too far away, or there is no surgeon. We don't want that. In other parts of the world, one in three babies is born via Caesarian section. That, on the other hand, is overuse, which is not sustainable to a healthcare system, and you don't want that either. So you have to find the balance, and that again means you need to steer the system in the right direction.

**Universal coverage, or “health for all,” was the motto of the Alma Ata convention in 1978. How far are we in reaching that goal?**

VAN LERBERGHE: I think there's still a long way to go, but we also have to admit that some countries have made huge progress. If you compare the access to healthcare systems in 1978 and now, on almost all continents you see progress, and sometimes huge progress. Thailand, Oman, and Portugal, for instance, have done extremely well. But you also have countries that have hardly reduced their mortality rates since then. The numbers show things can be done, but they do not automatically get done.

**So what must be done to make universal coverage a reality?**

VAN LERBERGHE: One thing, surely, is to listen more closely to what the people expect and want from their healthcare system. The importance of that has been grossly underestimated in the past. We have rather focused on externally identified priorities, which, of course, is also important. But, I think the role of consumers and clients is crucial as a counterbalance to professional interests and those of the people in charge of the healthcare system. Patients must be empowered, for instance, through consumer movements or civil society groups that act as a watchdog and have a voice in helping to set the direction of where the system goes. Brazil, for example, has national health

conferences in which civil society participates. Thailand even has an elected health parliament.

**What are the pitfalls when you design a healthcare system?**

VAN LERBERGHE: What you do not want is inverse care – a situation where the rich capture most of the care. That happens

ties. Most of all, the agenda for a better healthcare system must be set by the recipient country itself. Donor inputs only help if they contribute to those priorities.

**What are the biggest challenges for affordable and accessible healthcare in the future?**

“Patients must be empowered, for instance, through consumer movements or civil society groups that act as a watchdog and have a voice in helping to set the direction of where the system goes.”

Wim Van Lerberghe, Director,  
Department for Health System Governance and Service Delivery,  
WHO, Geneva, Switzerland

across countries of all income levels. You don't want impoverishing care: If you need a Caesarian section, you don't want to have to sell all your belongings to get it. Healthcare is one of the very important causes for poverty in many countries, even in the middle classes. You don't want unsafe care. In the USA, the number of deaths in hospitals that could have been avoided is equivalent to that of car accidents.

**How can poor countries be assisted in improving their healthcare systems' sustainably?**

VAN LERBERGHE: It is important to keep in mind that even in the poorest countries, most health expenditures do not come from aid. Aid plays an important role in some countries, but the biggest part is done by governments themselves and by the individual patients. So we should see to it that the domestic expenditure is being allocated and used well and that it is in line with national priori-

VAN LERBERGHE: We have to deal with a number of transitions at the same time. There is the demography, a globally aging population, with the obvious challenges. Then we have to deal with new type of health problems that come up, among them chronic diseases which especially call for a functioning primary healthcare infrastructure. Many countries face a double burden, because they still fight lots of communicable diseases, and the non-communicable diseases add to their problems. Finally, there is a transition in demand. The nature and the level of demand have increased. And, the expectations in terms of quality of care have also increased substantially.

*Marc Engelhardt is a long-time Africa correspondent and author of several books. He moved to Geneva recently after having worked from Nairobi, Kenya, for seven years.*



Dr. June Yang and radiographer Raja Junaisa take care of a patient before a computed tomography scan with the SOMATOM Definition Flash.

## High-Tech Care with Heart

For doctors and technologists at HSC Medical Center in Kuala Lumpur, Malaysia, a major key to providing patient-centered care for heart disease, stroke, and cancer is using the most advanced imaging technology.

By Clark Shimazu





Cardiologist Soo Chee Siong, MD, a physician with a reputation for being extraordinarily persistent, believes his patients should not have to be. "People used to suffer great anxiety waiting two days or even two weeks to learn the results from their medical tests," says cardiologist Dr. Soo, Medical Director of HSC. "It became my priority to reduce the average waiting time so that the patient wouldn't have to spend a whole day for tests and then suffer sleepless nights worrying over the unknown."

In 2003, Dr. Soo's team took on the challenge of compressing the many steps in diagnosis – lab samples, electrocardiograms, exercise stress test, computed

tomography (CT) or magnetic resonance imaging (MRI), and data evaluation – into a single high-speed system. To realize his dream of a computer-based network that could deliver test results in two hours or less, the HSC radiology and imaging staff devoted countless extra hours to describing their work routines, streamlining their methodologies, and comparing medical equipment from different vendors. Since HSC was just an outpatient facility at the start of the project, the task ahead was especially arduous. In the end, in order to optimize an in-house electronic medical records system, cardiologist Dr. Soo and his team designed and built a full-fledged hospital.



According to cardiologist Dr. Soo Chee Siong, HSC Medical Center is based on the patient's viewpoint and the integration of different modalities.

Eight years later, in December 2010, the construction crew completed a purpose-built, 22-story structure in the posh embassy row of the Jalan Ampang district in the Malaysian capital's northeast corner. Following the installation of an entire suite of Siemens equipment in April 2011, the doors of the outpatient/

inpatient hospital were opened – to the astonishment of national health officials, consulting doctors, VIPs, and regular patients. HSC Medical Center was unveiled as a world-leading hospital with a radiology suite, gene analysis lab, operating theaters, catheter intervention area, spine and joint clinic, eye care center, and

intensive care unit. Amenities include spacious patient rooms, a top-notch restaurant, and visitors' quarters in a luxury service apartment replete with rooftop swimming pool, club house, and gym.

From a clinical perspective, HSC helps its patients better understand their disease

## Networking with syngo.plaza



Cardiology technician Yew Choo-Liang supports the placement of a stent in a patient's LAD.

Cardiology technician Yew Choo-Liang is searching through moving images of a beating heart captured by the moveable head of an Artis zee® angiography system. "From the perpendicular angle, the blockage cannot be seen, so we'll take a look from another angle," Yew says. "There, on the LAD [left anterior descending artery], notice the flattening of the artery walls – that's the blockage where a stent had to be inserted." "It's not uncommon to take a hundred coronary images to spot a soft plug or track an unusual rhythm," says Yew. "The low-dosage technology enables us to do this without too much harm to the patient." A patient file containing a history of scans from Artis zee, SOMATOM® Definition Flash computed tomography system, MAGNETOM® Aera magnetic resonance system, and other equipment is easily accessible with the syngo®.plaza picture archiving and communication system. Yew retrieves an image taken during the interventional procedure on the same patient. "Here is the stent being installed by the catheter, and then the balloon is inflated, inside the artery." The thin wires of the stainless steel net of the stent are visible. "Everything looks to be in working order."





Dr. June Yang says top-rate medical equipment attracts patients and physicians alike.

by showing them moving images of their own beating hearts captured by the Siemens SOMATOM® Definition Flash CT scanner and Artis zee® angiography system. They are learning to understand how their bodies function or dysfunction rather than being afraid of some dark secret lurking inside.

### Hospital of the Future

Although Malaysia is an emerging economy with lingering pockets of underdevelopment, compromise was never part of the HSC team's game plan. With its patient-centered focus on heart disease and cancer, user-friendly architectural design, and an electronic medical records system, HSC is now recognized as the prototype hospital of the future.

The revolutionary facility is founded upon two major design concepts: First, the interior is based, in cardiologist Dr. Soo's words, on "the viewpoint of the patient." Instead of having to spend a day negotiating various departments on different floors or in separate buildings, typical at conventional hospitals, the "patient-centered" floor plan saves steps along a circuit, from the waiting room to the medical lab, ECG, stress test, and MRI or CT scans in quick succession. The high-speed Siemens equipment helps cut scanning time down to minutes. Then, the images and data from the battery of tests

are linked in the same local network, with a single interface between the Siemens syngo®.plaza picture archiving and communication system (PACS) and the hospital's own electronic patient records system. Thanks to what cardiologist Dr. Soo calls "integration of modalities," radiologists and physicians can call up hundreds of images within minutes of capture for analysis, and then provide a diagnosis to the patient before he or she returns home or goes back to work. "Now, finally, a patient's diagnostic findings can take as little as two hours," cardiologist Dr. Soo beams. "To achieve that goal, we built this hospital from the ground up."

### Malaysian Pluralism

Senior radiographer Tiew Kee Joon is a cheerful team leader who chats in the Malay language with scanning technicians Ikha, from Pahang at the center of the Peninsula Malaysia, and Dayang, who hails from Sabah on the island of Borneo. The young women are among a generation from once-rural districts who have graduated from the nation's technical colleges.

Malaysia has gained a leading position in Southeast Asia's medical tourism industry with HSC's emergence as a premier healthcare center. Attracted by its high-end technology, new patients are stream-

ing in from Indonesia and China. The in-house Japan clinic, staffed by Japanese doctors, provides service customized for retirees and corporate executives stationed across Southeast Asia.

"Having more Siemens medical equipment than even top-rated hospitals in Singapore, Thailand, or Hong Kong is a huge attractor for new patients, even if most of our 'publicity' is based on word of mouth," says June Yang, MD, a Singaporean and the Chief Operating Officer of HSC. "Medical care is a business as well as a public service, and acquiring the advanced equipment was a sound investment decision, improving the quality of care while reducing the staff time per patient and thereby enabling us to increase the inflow of clients."

As for the impact on staff morale, Dr. Yang adds, "In fact, some of the doctors are a bit obsessive about being able to have so many images at their fingertips." One screen is not enough for radiologist Mohd Azaldin bin Nor, MD, who uses two computers for "parallel analysis." His left palm is controlling the cursor over a CT scan of a kneecap, while his right-hand index finger clicks a mouse to flip through cross-sections of a brain captured by the MAGNETOM® Aera 1.5 Tesla MRI system. Wasting no time during download on one screen, his eyes search images on the other monitor for tiny trouble spots that



The cheerful radiography team is headed by Tiew Kee Joon.



MAGNETOM Aera's Illumination MoodLight™ helps ease patient anxieties.

## Equipped by Siemens



Dr. Shahrin Samat can make clinical images accessible to referring physicians with *syngo* Workflow.

Although he's not a character from the popular American TV series *CSI*, this sleuth is intent on cracking complicated medical histories. Shahrin Samat, MD,

searches across dozens of negative images for the slightest clue – a bright area here or an odd curve there – revealing an as-yet-unsuspected trouble spot. Pointing an index finger at the screen, he shows an anomaly.

"Gallstones. Common enough in Malaysia; they are due to high cholesterol." Whenever a patient is screened for suspected cancer or a malfunctioning heart, the HSC radiology department conducts scans of a major region or the whole body. "Those suffering from a serious heart condition often have multiple disorders in other organs," Dr. Samat explains. "By catching these problems in the early stage, surgery can be avoided and treatment can be done through medication or changes in diet."

The picture archiving and communication system (PACS) *syngo*.plaza makes the acquired images virtually immediately available for fast routine reading. With *syngo* Workflow, he explains, consulting physicians can access images and post their diagnostic notes from other hospitals and clinics. For medical tourists, the teleradiology features of the *syngo* Work-

flow radiology information system are especially important since their personal physicians or cardiologists are overseas. Glowing in soft blue light inside the magnetic resonance imaging room is the MAGNETOM® Aera 1.5 Tesla, an ultra-short donut that can perform whole-body magnetic resonance scans with pinpoint detail. Another reliable partner for radiologists is the SOMATOM® Definition Flash, which takes a series of computed tomography (CT) images that trace an organ as it moves. The very high speed of the CT scans results in not only crisp images but also lower radiation doses for patients. The newest piece in the hospital's suite of medical equipment is the Artis zee® angiography system. Its C-shaped, moveable arm quickly positions the X-ray head to rapidly capture images from any angle without moving the patient. High-speed exposures capture a battery of images that visually resemble video clips. Tucked inside the smaller rooms of the radiology suite are a Siemens general X-ray unit, an ACUSON S2000™ ultrasound system, and the MAMMOMAT® 1000 mammography system.





Radiographers Dayang and Ikha work with various imaging modalities.

are easily missed. A constant smile indicates that this medical detective relishes the hunt for clues.

### Taking on the Naysayers

Persistence and trust in advanced medical technology enabled cardiologist Dr. Soo to resist the skepticism he once met from some of his more conservative cardiologist colleagues. "Back when I studied medicine at the National University of Singapore from 1984 to 1992, physicians relied on chest X-rays on film. Then, the first MRI units were delivered to hospitals about 20 years ago, and in 2003 Siemens introduced the 16-slice CT scanner. That technology was a breakthrough, being sufficiently fast to capture the beating heart."

At the time, cardiologist Dr. Soo was eager to test the system's full potential. "I was among the first to pioneer the use of multislice CT technology during catheter intervention, right in the course of an operation," he recalls with a smirk that conveys professional pride.

"Many cardiologists clung to their belief in the angiogram as the gold standard while dismissing any new technology as rubbish." Since then, cardiologist Dr. Soo says, "Siemens has been at the cutting-edge, always staying ahead of the com-

petition by six months to a year." However, he did not allow his own enthusiasm for Siemens to sway the staff committee of radiologists, radiographers, and end-user physicians. The team members methodically evaluated the equipment from every major vendor in the world, arguing the merits and drawbacks of each system. The conclusion was unanimous. "Our aim was a seamless integration of all modalities," cardiologist Dr. Soo says, "and the single link between our electronic patient records and *syngo.plaza* makes that a reality." Dr. Soo is now completing the finishing touches by using *syngo.via*<sup>1</sup> to present multiple images and data sets on a giant monitor in the new physicians' lounge. "Thanks to *syngo.via*, the doctors will be able to see every detail, even in the middle of an operation."

<sup>1</sup> *syngo.via* can be used as a standalone device or together with a variety of *syngo.via*-based software options, which are medical devices in their own rights.

*Clark Shimazu is a science and technology writer based in Hong Kong. He was also a coordinator for a public-health consultancy and organized seminars for medical professionals and food-industry researchers during the SARS crisis in southern China and the first major avian influenza outbreak in Thailand.*

## Summary

### Challenge:

- Creating a prototype hospital with rapid diagnostics, electronic medical records, and a step-saving floor plan organized from the patient's viewpoint
- Accelerating diagnosis with faster scans and image processing
- Providing detailed images in rapid sequence to examine internal organs in movement
- Conducting full-body scans to detect secondary disorders

### Solution:

- Quick data flow between the Siemens CT and MRI scanners and *syngo.plaza*
- Seamless interface with the electronic medical records for efficient data exchange
- Integration of all modalities, including scans, lab tests, ECG data, and physicians' reports, under an individual patient file
- Display of multiple images and data charts on one computer screen to enhance the accuracy of diagnosis

### Result:

- Inauguration of a "patient-centered hospital of the future" equipped with world-leading diagnostic technology
- Early detection of emerging disorders leading to a shift from curative treatments toward preventive care through diet and lifestyle management
- Improved cost efficiency with reduction of hospital staff time per patient while providing more comprehensive diagnosis and care
- Information transparency for patients to understand their own health issues, alleviating psychological unease





# The Path of Optimized Workflow

*Act on Radiology* is a new consulting approach designed by Siemens specifically to improve processes in radiology. A pilot project with the University Medical Center Göttingen, Germany, shows how well *Act on Radiology* works and where today's radiological workflow challenges lie.

By Tanja Berbalk

Radiology is a discipline that walks the line between standardization and individualization. While diseases, as well as their diagnosis, and therapies are becoming increasingly multifaceted, increased digitization has sped up the work output. At the same time, demand for personalized medicine is also on the rise. Radiology will need to keep pace if it is to be ready for the future.

But, how can increasingly complex imaging processes be sustainably optimized? Is it possible to tailor a workflow analysis precisely to the workflows used in radiology? And, how can defined quality standards be upheld with fewer resources? Siemens spoke with Professor Joachim Lotz, MD, Director of the Institute of Clinical and Interventional Radiology at the University Medical Center Göttingen, Germany. He is considered an expert in the area of cardiac and liver imaging. Lotz has been the head of the institute since spring 2010, and has been driving forward extensive restructuring activities and improvements in radiology processes. Since the medical center's radiology department engaged Siemens in the *Act on Radiology* consulting project, visible changes have been made there.

## **Professor Lotz, overall how do you rate the situation in radiology?**

LOTZ: I think radiology is in a very good situation right now. It is a large, highly

innovative field. On the one hand, we see the trend toward increasing clinical sub-specialization across a broad spectrum of disciplines, from oncology to vascular medicine. At the same time, we have an overview of a large field in clinical imaging diagnostics and interventional therapy, from orthopedics to local ablative tumor treatment. We have to meet the demand for expert representation on a large number of tumor boards, and we are involved in a wide range of different centers, whether they focus on particular topics or specific diseases. And then, too, whole new topics are emerging: optical and molecular imaging strategies. In some cases, even including highly specific therapeutic options. This is our balancing act, which we manage with scant staffing resources.

## **How have the processes in your radiology department developed over time?**

LOTZ: One thing we are definitely experiencing is the sustained advance of electronic media. We are just in the process of introducing a computerized physician order entry system, which will give us much greater transparency in radiology. At the same time, we have much shorter cycle times for radiological work. We are required to deliver results faster – and at much higher quality. Nowadays, you can't just say, 'We have a CT scanner.' Instead, it's, 'We have a CT scanner, an MRI unit,

a PET-CT system, and so on – and what's actually the best thing for the patient now?' To us, that means it's about creating standards for our work, but remaining highly individualized in terms of making decisions. That will be the benchmark for the field of radiology in the future.

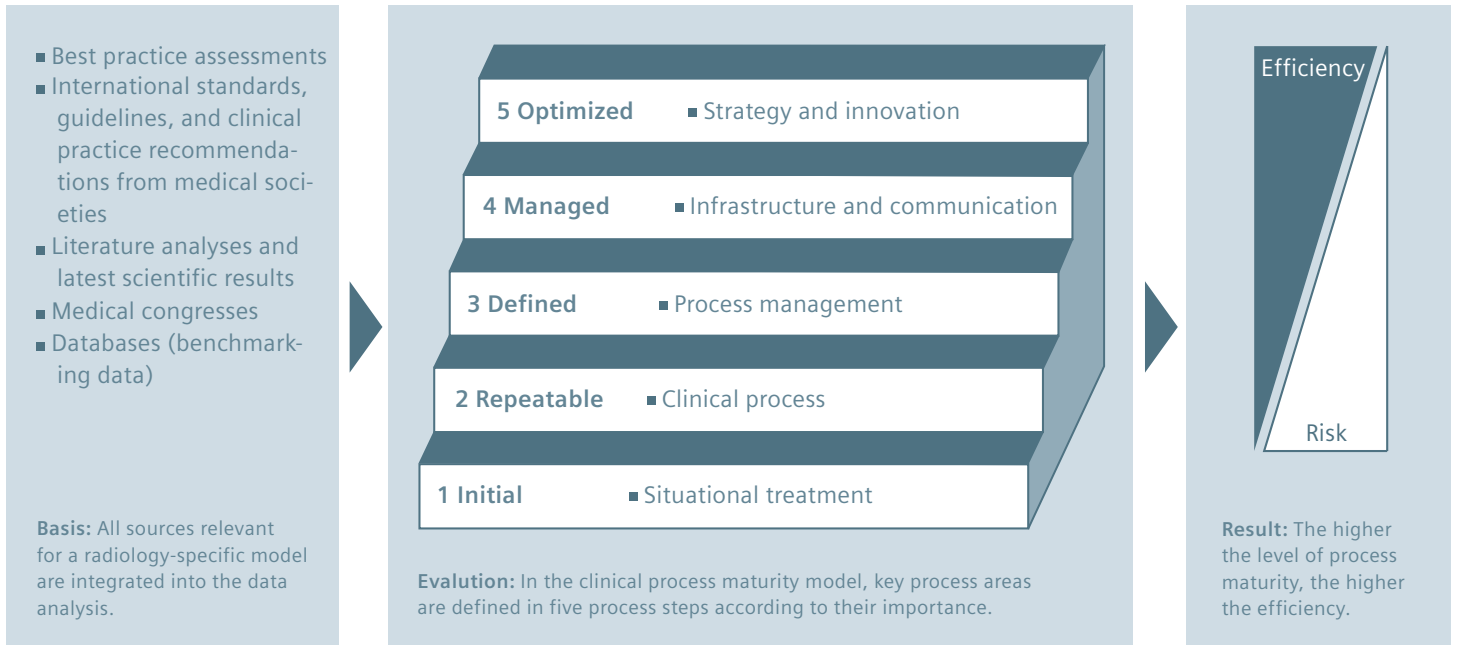
## **What is important in terms of achieving a smooth workflow in radiology?**

LOTZ: Clearly standardized workflows so that the optimum individualized treatment and diagnosis can be pinpointed for each patient. And workflow optimization that ensures that even with scant staffing resources and shorter funding for new equipment and methods, the flow remains smooth. We have to be able to clearly depict a number of things in our flow: How is a scan performed? What overall conditions have to be met? How are data communicated and controlled? These are essential things for a modern radiology department.

## ***Act on Radiology* is a new approach from Siemens that aims to optimize workflows in radiology. What were the major factors in your decision to participate in the project?**

LOTZ: There were several reasons. For one thing, I liked the concept a lot: a short evaluation phase that focuses less on the economic aspect and more on organizational matters and the "soft" factors

# Clinical Process Maturity Model in Radiology



that affect a department. Economic data are so called hard data, which makes them very easy to review. But the other side – organizational and workflow optimization – is very hard to capture in quantitative terms. *Act on Radiology* makes it possible to capture and evaluate quantitative data on precisely this kind

LOTZ: Recommending this approach to colleagues – actually, I’ve already done that several times! You become aware of where there is further room for organizational improvement. After all, there are always various fires to put out. *Act on Radiology* helps tell the minor sparks from the wildfires. And *Act on Radiology*

helped me to define which areas to tackle first. The activities we are involved in range from complication and quality management to training and continuing education and internal further education courses. Complication management and quality management are the areas where we have benefited most from this approach.

**“Act on Radiology helps to make sure our department is ready for the future.”**

Professor Joachim Lotz, MD, Director of the Institute of Clinical and Interventional Radiology at the University Medical Center Göttingen, Germany

of organizational maturity. With *Act on Radiology*, you get a good overview of the organizational structure, which helps with planning to make sure the department is ready for the future.

also provides a structured ranking of the possible improvements.

**What do you consider to be the main benefits of Act on Radiology? What would you tell a colleague he or she could get from this approach?**

**Are there specific things you have put in place because of the Act on Radiology analysis? And what kinds of concrete improvements have you seen?**

LOTZ: A lot! Our institute is being completely restructured, and *Act on Radiology*

**What value do you gain from working with Siemens?**

LOTZ: The units I work with at Siemens have extremely low turnover at the decision-making levels, and I have consistently worked with the same people. I can’t stress enough what a huge plus that is. It makes working together much easier. I also value their innovative power and openness to new ideas. And I appreciate the thorough technical expertise that goes into translating new ideas into functional products.

**To whom would you recommend Act on Radiology more: someone who is just developing a new department, or radiologists who have already**



### established operating practices, clinics, or institutes?

LOTZ: Both. For someone who is starting out, it is helpful to have an outside perspective to find out where it is possible to improve the department. For someone who has been in business for a while and follows the same long-established workflow every day, it's an opportunity to ask yourself: Is the way we are working still in line with current practice? Is it still oriented toward the future? *Act on Radiology* supports these kinds of questions.

### At last year's RSNA trade show, you held a joint presentation with consultants from Siemens on how to apply models of maturity levels for quality and process improvement. How important do you think these kinds of approaches are in the world of research?

LOTZ: The presentation was more about the principle of quantifying the organizational structure of clinical operations. But, it still holds true that sustainable long-term research also requires an effi-

cient organizational structure – which then creates the necessary levels of freedom within the actual research work. In that regard, I could certainly imagine extending *Act on Radiology* to research operations as well. That would be an interesting prospect.

### What do you think lies ahead for radiology? How will you get ready for it, and what do you hope to see from Siemens?

LOTZ: The field of radiology is in the process of solidifying and expanding on its central role in imaging. That starts out with molecular imaging and extends to the newer, image-based treatment systems. The line between diagnosis and treatment will become increasingly blurred. During this process, we are helped by advanced interventional methods, but also by newer optical approaches and highly specific imaging strategies. The radiology segment in Germany is well positioned for this development – because it is actively working on its future fields. We ourselves have a highly active interdisciplinary working group on pre-clinical imaging that I am very happy about. We also urge our junior colleagues to get involved in the newly established cooperative relationships within the university medical center and with the Max Planck Institutes in Göttingen – after all, we have three Max Planck Institutes right here that deal directly with medical imaging. As a result, we can see a wonderful interdisciplinary dynamic emerging, and one that is already beginning to bear fruit. I expect Siemens to continue to actively support new ideas in imaging and image processing research. That also includes being willing to continue considering new forms of operational organization for large-scale equipment in imaging or image-guided treatment with an open mind. One idea, for example, might be to move away from individual units and toward guaranteed availability of imaging technologies.

*Tanja Berbalk has a degree in sociology, marketing, and communications. She is an editor at Medical Solutions.*

## Summary

### Challenge:

- Cost pressure within the healthcare system: Greater numbers of patients need optimal medical treatment with increasingly short resources
- The physician as administrator: Physicians must take on more administrative responsibilities
- Need for reliable processes, clearly defined interfaces, and fast decisions in acute situations

### Solution:

- Apply consulting model that was specifically developed for multidirectional workflows in radiology departments and across the care continuum
- Analyze and evaluate the actual individual situations
- Develop and implement suggestions for improvement
- Weigh the effects on process workflows
- Verify the improvement in the quality of radiology

### Result:

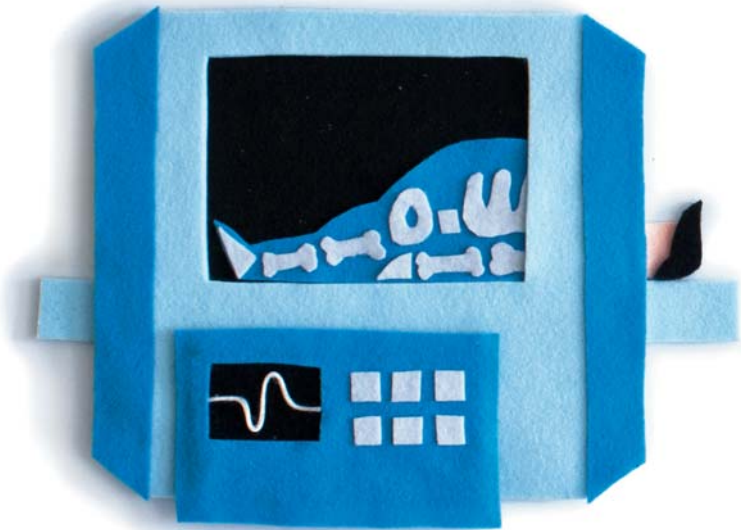
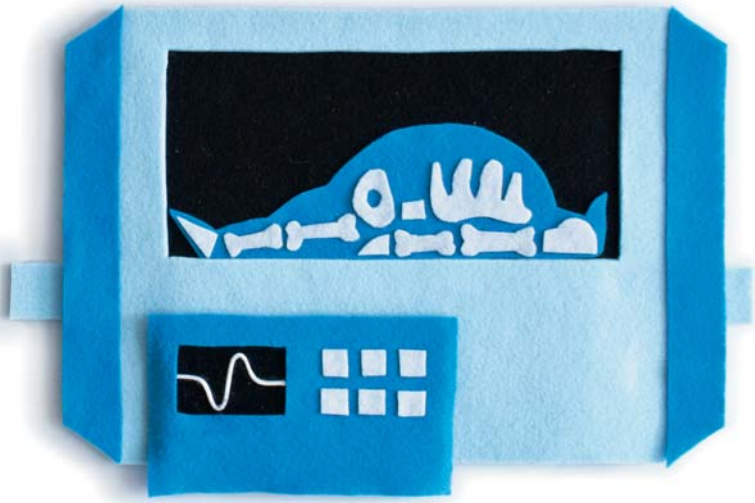
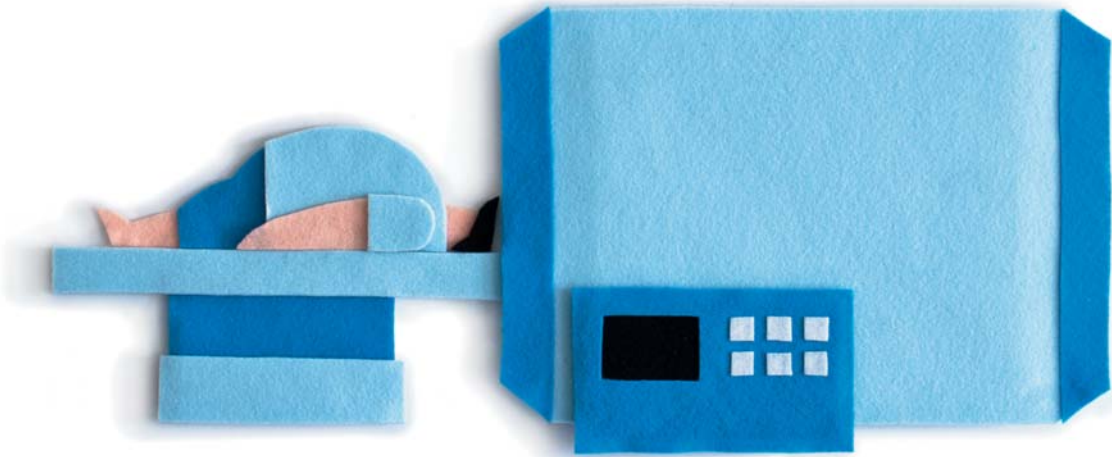
- Improvement in the quality of radiology through guideline-adherent treatment and design of mature clinical processes
- Objective foundation for strategic decisions
- Defined efficiency and quality of processes
- Notable budget allocation for further improvements

## In short

*Act on Radiology* is a consulting approach for the systematic assessment and improvement of hospital operations and clinical processes in radiology. Based on a systematic model, *Act on Radiology* measures the maturity levels of those processes on a scale from one to five and offers individual suggestions for lasting optimization. The Institute of Clinical and Interventional Radiology at the University Medical Center Göttingen, Germany has used *Act on Radiology* to initiate improvements in fields including complication and quality management.

## Further Information

[www.siemens.com/acton](http://www.siemens.com/acton)







# Imaging Challenges

The inability to obtain images of morbidly obese patients because of table load or gantry diameter limitations is a common problem that sometimes undermines patient care.

By Sameh Fahmy, MS

Physicians are increasingly encountering patients who exceed the weight or girth limits of their scanners, leaving them with diminished diagnostic options that have the potential to seriously compromise patient care. Morbidly obese patients often must lose weight before having a suspicious lesion diagnosed, for example, or must undergo risky exploratory surgeries. Complicating matters further, obesity predisposes patients to conditions, such as pulmonary embolisms, for which computed tomography (CT) is of particular diagnostic utility.

Radiologist Naomi Campbell, MB BCH BAO<sup>1</sup>, of the Adelaide and Meath Hospital in Dublin, Ireland, says this status quo of limited access to care for patients who need it the most is simply unacceptable. “We need to put into practice equipment

so that all patients can be treated and not risk being unwell or dying from diseases that could have been treated if they were 20 kilograms lighter,” she says. Imaging these patients also presents challenges associated with optimizing image quality and minimizing radiation dose, Campbell points out, but these also can be overcome with the right combination of awareness and equipment.

## A Global Epidemic

Globally, rates of obesity have more than doubled in the past 30 years alone. According to the World Health Organization, more than one in ten of the world’s adult population is obese, and 65 percent of the world’s population lives in countries where overweight and obesity kills more people than underweight.<sup>2</sup>

In the United States, the problem of obesity and its related health consequences are well known. Nearly 34 percent of American adults are obese, according to the U.S. Centers for Disease Control and Prevention, and another 34 percent of American adults are overweight.<sup>3</sup> Other countries are not too far behind, however. Australia, the United Kingdom, Mexico, and several other countries have obesity rates above 20 percent. Germany, Ireland, and Canada are among the nations with rates of obesity exceeding 15 percent.<sup>4</sup> The World Health Organization notes that obesity is not restricted to industrialized societies. In developing

*To be continued on page 56*

## Lack of High-Weight-Capacity Scanners Hampers Emergency Care

To quantify the availability of cross-sectional imaging equipment that can accommodate morbidly obese patients, Adit Ginde, MD, MPH, Assistant Professor of Emergency Medicine at the University of Colorado School of Medicine and Assistant Professor of Epidemiology at the Colorado School of Public Health, and his colleagues surveyed nearly 400 hospital emergency departments across the United States.<sup>1</sup>

### What was the impetus for your study?

Healthcare providers are seeing morbidly obese patients more frequently, and we are using a lot more computed tomography (CT) and magnetic resonance imaging (MRI) scans as part of our diagnostic workups, particularly in emergency care. The combination of the two – more morbid obesity and the increased use of advanced imaging techniques – makes it more common in daily clinical practice to encounter cases where patients are too heavy to fit onto a CT or MRI scanner, and this can impact your ability to care for these patients.

### What are the consequences of the lack of appropriate imaging equipment for morbidly obese patients?

The advent of CT and MRI has really helped us in terms of being able to accurately diagnose patients before you subject them to an operation or a potentially dangerous treatment. When you can't obtain that information, it really hampers your ability to care for those patients. A complementary aspect of it is that morbidly obese patients are at greater risk because they have less physiologic reserve, so the stakes are higher. It's not uncommon to have a patient who

is too heavy for a scanner and then goes on to have a poor outcome.

**You found that ten percent of the national sample and 28 percent of academic medical centers didn't have CT scanners that could accommodate patients over 450 pounds (204 kilograms). Were you surprised by this finding?**

It was certainly surprising to have it be so low, particularly for academic hospitals. There are almost 5,000 hospitals in the U.S., and you don't necessarily expect that every hospital is going to have the capacity to do everything. But academic hospitals are places where people get referred if they need a higher level of care, and the fact that only a minority of them are able to provide imaging for these patients is definitely concerning.

**You collected your data in 2007 and published the findings in 2008. Do you think progress has been made since then?**

Certainly things can change in the span of four years, and we haven't repeated the survey in any systematic way. I know that this is a high-priority issue, but there are not that many manufacturers of these scanners. It's also expensive for hospitals to purchase them.

**What is a potential solution to the limited availability of cross-sectional imaging equipment for morbidly obese patients?**

Just like we have referral centers for trauma or stroke or heart attacks, it is important that bariatric centers of excellence be further developed so that the ability to provide this type of care with CT or MRI is part of the certification. At the least, we should have centers that are able to take care of all of the needs of these patients spread throughout the country.

<sup>1</sup> Ginde, AA, et. al. The challenge of CT and MRI imaging of obese individuals who present to the emergency department: a national survey. *Obesity*. 2008 Nov;16(11):2549-51.

“We should have centers that are able to take care of all of the needs of these patients spread throughout the country.”

Adit Ginde, MD,  
Assistant Professor of Emergency Medicine,  
University of Colorado School of Medicine;  
Assistant Professor of Epidemiology,  
Colorado School of Public Health, Denver, Colorado, U.S.





## Products Designed for Special Demands

Product	Table Weight Capacity	Opening/Source-to-Image Distance	Applications
SOMATOM® Definition Flash (2 x 100 kW)	307 kg (676 lbs) <sup>1</sup>	78 cm (30.7 in.)	Stellar Detector
SOMATOM Definition AS+	307 kg (676 lbs) <sup>2</sup>	78 cm (30.7 in.)	Extended High-Definition (HD) Field of View (FoV), X-CARE, Adaptive ECG Pulsing, Adaptive Signalboost, SAFIRE, CARE kV, CARE Dose4D
SOMATOM Definition AS	307 kg (676 lbs)	78 cm (30.7 in.)	n.a.
SOMATOM Definition AS Open (100 kW)	307 kg (676 lbs) <sup>3</sup>	80 cm (31.5 in.)	n.a.
Symbia® family	227 kg (500 lb)	Tunnel opening 102 x 78 cm (40.2 x 30.7 in.)	n.a.
Biograph® mCT	227 kg (500 lbs)	78 cm (30.7 in.)	TrueV extends the PET field of view (FOV) by 33%, CARE Dose4D (provides longer spiral ranges and more flexibility for multiphase examinations, especially for obese patients)
MAGNETOM® Espree (1.5T), MAGNETOM Verio (3T)	250 kg (550 lbs)	70 cm (27.6 in.)	Tim® (Total Imaging Matrix) for flexibility, accuracy, and speed
MAGNETOM Aera (1.5T), MAGNETOM Skyra (3T)	250 kg (550 lbs)	70 cm (27.6 in.)	Tim 4G (Total Imaging Matrix) for flexibility, accuracy, and speed in the 4 <sup>th</sup> generation
Luminos Agile	275 kg (606 lbs), height-adjustable table from 65 to 112 cm (25.6 to 44.1 in.)	60 cm (23.6 in.) opening between tabletop and digital imaging tower	Digital Density Optimization (DDO), DiamondView Plus for improved organ-specific detail and contrast in static images, 783 kHU high heat capacity tube
Luminos TF	272 kg (600 lbs)	55 cm (21.75 in.) opening between tabletop and digital imaging tower	Digital Density Optimization (DDO) <sup>4</sup> , 783 kHU high heat capacity tube
Luminos dRF	230 kg, height-adjustable table 48 to 98 cm (19 to 39 in.)	Source-to-image distance of 115 and 150 cm (45 and 59 in.)	Digital Density Optimization (DDO), DiamondView Plus for improved organ-specific detail and contrast in static images, 783 kHU high heat capacity tube
Ysio	300 kg (660 lbs), height-adjustable table from 51.5 to 95.5 cm (20.28 to 37.6 in.)	Wireless detector for flexible detector positioning	DiamondView Plus for improved organ-specific detail and contrast in static images, 783 kHU high heat capacity tube
Multix Fusion <sup>5</sup>	300 kg (660 lbs), height-adjustable table from 51.5 to 95.5 cm (20.28 to 37.6 in.)	Wireless detector for flexible detector positioning	DiamondView Plus for improved organ-specific detail and contrast in static images, 783 kHU high heat capacity tube

<sup>1</sup> Optional. Standard system hardware: 227 kg/500 lbs table load

<sup>2</sup> Optional. Standard system hardware: 227 kg/500 lbs or 212 kg/467 lbs table load, depending on system configuration

<sup>3</sup> Optional. Standard system hardware: 212 kg/467.3 lbs table load

<sup>4</sup> Optional

<sup>5</sup> Under development. Not available for sale in the U.S.

## “The same standard of care should apply to all people.”

Naomi Campbell, MB BCH BAO,  
Adelaide and Meath Hospital, Dublin, Ireland

nations, more than 115 million people suffer from obesity-related problems.<sup>5</sup> Experts such as Campbell say that as global rates of obesity continue to rise, the adoption of imaging equipment to accommodate the needs of large patients is lagging. Her experiences at the Weight Management Service at St. Columcille’s Hospital in Dublin, where the average weight of patients is 128 kilograms (282 pounds), highlighted the consequences of equipment that could not accommodate the heaviest patients. “There were certainly a few patients while I was there who had to lose weight before they could have an imaging exam, because they could not fit the weight or girth restrictions of the equipment that was available in the country at that time,” Campbell says. “These are patients who had a known issue that needed to be imaged for further diagnosis, and it simply was impossible.”

To gauge the extent of the problem, Campbell and her colleagues surveyed 34 Irish hospitals in 2008 and found that the average weight limit of CT scanners was 195 kilograms (430 pounds). Magnetic resonance imaging (MRI) and fluoroscopy equipment had comparable average weight limits of 172 kilograms (379 pounds) and 178 kilograms (392 pounds), respectively. These weight limits accommodate most patients, Campbell noted, but some of the patients at the clinic approach these limits, while nearly five percent of the clinic’s patients were, at the time, unsuitable for any cross-sectional imaging or fluoroscopy.<sup>6</sup>

In the United States, Adit Ginde, MD, MPH, Assistant Professor of Emergency Medicine at the University of Colorado School of Medicine and Assistant Professor

Epidemiology at the Colorado School of Public Health, conducted a similar survey of nearly 400 hospital emergency departments in 2007. He and his colleagues found that only ten percent of hospital emergency departments had CT equipment with a capacity over 450 pounds (204 kilograms).<sup>7</sup> Surprisingly, only 28 percent of academic medical centers and only 21 percent of hospitals designated as bariatric surgery centers of excellence had high-weight-capacity CT equipment. “Morbidly obese patients are sick with multiple comorbidities and have a higher need for healthcare services,” Ginde says. “And the fact that many hospitals are unable to provide the care that they need is a major quality issue for hospitals and healthcare policy makers.” Campbell and Ginde suspect that progress has been made since their studies were conducted. They note that the purchase of a CT or MRI scanner is a major investment, however, and cost issues limit a more rapid turnover of scanners at hospitals. “As the older technology is being replaced, hospitals need to bear in mind that they must purchase machines capable of imaging a patient population that is increasing in both weight and girth,” Campbell says.

### Maximizing Image Quality While Minimizing Dose

Even when a scanner can accommodate a morbidly obese patient, obtaining high-quality images for this population can be challenging. If the girth of the patient exceeds the field of view, artifacts can obscure visualization of organs of interest. Larger gantries with an increased field of view can reduce the occurrence of such artifacts while also making it

easier to position the patient so that the area of interest does not exceed the field of view.

Image quality in obese patients also can be compromised due to poor beam penetration and beam scatter. Increasing the radiation exposure to the patient can improve the contrast-to-noise ratio, but Campbell emphasizes that this decision should be made with the goal of keeping dose as low as possible.

Regardless of which technology is used, Campbell stresses that communication between the radiologist and the rest of the healthcare team is essential to ensuring the appropriate dose is used. Certain diagnoses can be made using lower dose protocols – for example, a CT scan of kidneys, ureters, and bladder (KUB) for the detection of renal stones – but poor image quality can result in a broad range of missed diagnoses, such as pulmonary embolisms or tumors. “As radiologists, it is incumbent upon us to discuss with the clinician how best we can answer their clinical question while exposing the patient to the minimum amount of radiation,” Campbell says. “That’s the ALARA [as low as reasonably achievable] principle.”

Of course, imaging is not the only area of patient care where obese patients face challenges. Waiting room chairs, wheelchairs, or hospital beds that are too small can make patients feel uncomfortable and unwelcome. Some patients are unable to take an exercise stress test because a treadmill that will accommodate their weight is not available. Sometimes, laparoscopic equipment is too short to perform a procedure on a morbidly obese patient. “It’s very difficult on these patients and it’s difficult all around for providers who are ill equipped to take care of them,” Ginde says.

Obesity is a rapidly evolving global epidemic, Campbell notes, and she urges hospitals to adapt accordingly. “There are so many combinations and permutations of limitations to equipment that can hinder these patients and delay their diagnosis and treatment,” Campbell says. “But the same standard of care should apply to all people.”





Globally, rates of obesity have more than doubled in the past 30 years alone. According to the World Health Organization, more than one in ten of the world's adult population is obese, and 65 percent of the world's population lives in countries where overweight and obesity kills more people than underweight.<sup>2</sup>



In the United States, the problem of obesity and its related health consequences are well known. Nearly 34 percent of American adults are obese, according to the U.S. Centers for Disease Control and Prevention, and another 34 percent of American adults are overweight.<sup>3</sup>



Other countries are not too far behind, however. Australia, the United Kingdom, Mexico, and several other countries have obesity rates above 20 percent.



Germany, Ireland, and Canada are among the nations with rates of obesity exceeding 15 percent.<sup>4</sup>

## Summary

### Challenge:

- Minimizing patient exclusion from imaging exams due to table load capacity or gantry diameter
- Optimizing image quality in morbidly obese patients, which can be compromised due to poor beam penetration, beam scatter, and artifacts that occur when the patient exceeds the field of view
- Minimizing radiation dose to patients

### Solution:

- Several advanced Siemens systems that offer a table-weight capacity of up to 300 kilograms (661 pounds) and wide gantries
- Innovative dose-saving features that reduce dose to sensitive areas, block clinically irrelevant over-radiation in spiral CT scans, reduce dose by lowering the initial power needed to acquire the data, and automatically set the appropriate voltage for the examination

### Result:

- Morbidly obese patients receive the same quality of care as the rest of the patient population
- Exceptional image quality and increased diagnostic confidence in morbidly obese patients
- Radiation exposure dramatically reduced, in some cases by up to 60 percent, for improved patient safety

**Sameh Fahmy, MS**, is an award-winning freelance medical and technology journalist based in Athens, Georgia, U.S.

<sup>1</sup> Bachelor of Medicine, Bachelor of Surgery, and Bachelor of the Obstetric Art

<sup>2</sup> World Health Organization. *Obesity and overweight Fact sheet Number 311*. Geneva, Switzerland. <http://www.who.int/mediacentre/factsheets/fs311/en/index.html>. Last accessed Jan. 5, 2012

<sup>3</sup> U.S. Centers for Disease Control and Prevention. *Obesity and Overweight FastStats*. Atlanta, Georgia, USA. <http://www.cdc.gov/nchs/fastats/overwt.htm>. Last accessed Jan. 5, 2012

<sup>4</sup> Organisation for Economic Co-operation and Development. *OECD Health Data 2011*. Paris, France. [http://www.oecd.org/document/16/0,2340,en\\_2649\\_34631\\_2085200\\_1\\_1\\_1\\_1,00.html](http://www.oecd.org/document/16/0,2340,en_2649_34631_2085200_1_1_1_1,00.html). Last accessed Jan 5, 2012

<sup>5</sup> World Health Organization. *Controlling the Global Obesity Epidemic*. Geneva, Switzerland. <http://www.who.int/nutrition/topics/obesity/en/>. Last accessed Jan 5, 2012

<sup>6</sup> Campbell N, et. al. *Obesity in Ireland in 2008: what radiological equipment is available to image the obese patient?* *Ir Med J.* 2009 Apr;102(4):116-7.

<sup>7</sup> Ginde, AA, et. al. *The challenge of CT and MRI imaging of obese individuals who present to the emergency department: a national survey.* *Obesity.* 2008 Nov;16(11):2549-51.



## IT for a Community Hospital

From inspired architecture to serene halls that resemble an art gallery, Platte Valley Medical Center makes every decision with its patients in mind. This is also why the new Siemens Soarian Clinicals information technology became its IT of choice.

By Diana Smith





Located 25 miles north of Denver, Platte Valley Medical Center (PVMC) in Brighton, Colorado, U.S., is a 78-bed facility that serves Brighton, a community of about 35,000 people. PVMC is the only independent community hospital in the Denver metro area, but it does things in a big way; all for the benefit of patients. The original hospital opened in 1960, but moved five years ago to a stunning new campus, spanned across three buildings, which include a patient tower, a diagnostics and treatment facility, and a medical office building. The new hospital is a dramatic display of glass and native

Colorado sandstone with warm, amber wood accents. Spacious, all-private patient rooms and cozy waiting areas feature floor-to-ceiling windows with breathtaking views of the nearby Rocky Mountains. On a clear day, visitors can even see majestic Pike's Peak with an elevation of 14,110 feet and 90 miles to the south.

Works of art painted using oils and watercolors, and a mosaic of more than 200 ceramic tiles created by Brighton fourth-graders grace the hospital's curved, anything-but-sterile walls. "The idea is to get patients up and moving as soon as possible," explains Charmaine Weis, Manager of Communications and Public Relations at PVMC. "Like everything in the building, the art is a way to make them feel energized and happy."

### Going Paperless

In 2009, a "perfect storm" of regulatory issues converged to begin the hospital's journey toward a complete transformation of its medical records, says Harold Dupper, PVMC's Chief Financial Officer. The American Recovery and Reinvestment Act of 2009 mandated a transition to electronic medical records (EMR) by 2014. The Health Information Technology for Economic and Clinical Health (HITECH) Act, a component of the American Recovery and Reinvestment Act, encouraged widespread adoption of EMR by allowing providers that can demonstrate a meaningful use of such systems to qualify for incentive funds.

"Of course, we were aware of these regulatory requirements, but more importantly, we wanted to move forward because it was the right thing to do for the health of our community," reports Dupper. After an arduous review and selection process, PVMC chose the Siemens Soarian® Clinicals information technology system with its powerful workflow engine.

"We had to position our hospital for success in the future as well as meet stringent regulatory guidelines, no small challenge for a small community hospital," says Dupper. "The goal was 'one patient, one record' with clinical decision support as a foundation. Everything had

to be driven by computerized physician order entry [CPOE]."

The hospital chose Soarian® Clinicals as a platform that integrated six applications, including Siemens Pharmacy, Med Administration Check™, Soarian Quality Measures with Embedded Analytics, Soarian Emergency Department tracking board, Soarian Enterprise Document Management, and Soarian Critical Care, plus Siemens' medical imaging platform, *syngo*® Workflow. PVMC worked with Siemens and Quammen Healthcare Consultants, a Tennessee-based healthcare consulting company, to implement the transformative technology. The hospital undertook an aggressive, 15-month design and training process with input from physicians and multiple clinical groups. It then went live with its eCareNet system using a "big-bang" approach – bringing all system components into production at once on July 24, 2011. This fully integrated electronic medical record (EMR) system is powered by the Soarian suite of applications.

### One Patient, One Record – Anywhere, Anytime Access

"Prior to the launch," says Darrell Messersmith, Director of Information Services at PVMC, "we basically created a menu of every single order that could be entered at the hospital. We wanted a powerful IT system to help our physicians and support staff make clinical decisions based on knowledge-based practices. It was also important to us to achieve desired clinical and financial outcomes while supporting key quality and regulatory initiatives. We determined that the electronic medical record would be CPOE-driven and everything else would follow from that. There would be only one place to find information." Since the system was 100 percent CPOE-based, PVMC was able to document the Stage 1 meaningful use CPOE metric within just a few days after the solution went live on July 24. With eCareNet's fully integrated design, physicians and users across all clinical departments can view patient histories, demographics, allergies, test results, and images in a single sign-on workflow. Doctors can access the patient's EMR at



“We wanted a powerful IT solution to support our physicians and clinical staff in making evidence-based decisions.”

Darrell Messersmith, Director of Information Services, Platte Valley Medical Center, Brighton, Colorado, U.S.

The community hospital uses barcoding to help eliminate medication errors and automate clinical information documentation.

the hospital or remotely from their mobile devices. “Their path to get the data is nearly identical whether they are onsite or off,” explains Messersmith. “We have implemented a virtual desktop environment, so they have the same environment from wherever they choose to log in.” Though access is available from remote locations, PVMC has implemented advanced online security technology to ensure patient data is safe and protected. Staff and physicians access the information via a computer log-in and secure ID on a secure network. “To login, each person must be authenticated with a user name and password to get into the network,” explains Messersmith. “There is an additional user name and password required to access Soarian Clinicals inte-

grated clinical applications. We take security of the network very, very seriously.” The Siemens Pharmacy and Med Administration Check applications provide key functions needed to reduce the human element in medical errors. “We now use barcoding and computer technology in the pharmacy and at the patient’s bedside to help eliminate medication errors and automate clinical information documentation,” reports Messersmith. “A physician will place a medication order, and the pharmacist fills it. With Med Administration Check, the system checks the patient’s medical record using the barcodes on the armband to identify each patient. The computer looks for possible conflicts, such as allergies or interactions with other

medicines. If a potential error is detected, the computer immediately notifies the nurse before the medication is given. For example, if a physician has ordered something, and the nurse has entered an allergy after the order has been placed, the system will notify the nurse, through its advanced design, to stop the medication,” comments Messersmith.

### Improved Patient Satisfaction

Since nurses are not required to laboriously document care with pen and paper, they have more time to spend at the bedside. “We can show patients their test results and other information right on the computer screen by their bedside,” says Clinical Coordinator Karen Albrecht, MSN, CCRN. “As a result, they

“Soarian Clinicals has enabled us to get to a day or less for completed coding of a patient chart.”

Harold Dupper, Chief Financial Officer, Platte Valley Medical Center, Brighton, Colorado, U.S.







“We can now invest more time in patient care.”

Karen Albrecht, MSN, CCRN,  
Clinical Coordinator,  
Platte Valley Medical Center,  
Brighton, Colorado, U.S.

feel more involved and invested in their care. The in-room documentation also means nurses are in patient rooms longer, so they can help with other tasks, which means a lot to our patients,” she adds. When a patient is admitted to the hospital, information is collected to customize the patient care experience. “We ask about certain preferences, such as whether they like the curtains open or not, if they prefer the door to stay open or closed, and who can be involved in the discussion of their care,” says Messersmith. Answers are clearly displayed in the patient’s electronic medical record, so nurses and clinicians do not have to ask the same questions multiple times. In less than six months, the new information technology has helped PVMC realize a significant increase in efficiency in its Health Information Management (HIM) department, the area that completes medical coding for quality assurance and billing purposes. CFO Dupper

says, “We experienced a notable reduction in the delinquency rate for chart completion because of the implementation.” Physicians have been able to optimize time because they no longer have to trek to Health Information Management to sign off on charts. Now, they can do it at any time because of its convenient wireless web-based features. Dupper says that the hospital has realized an additional efficiency on the billing side. “One of the things we measure is how long it takes from when a patient leaves the hospital to get a chart fully coded and actually support the bill, so that it can be sent out. Historically, organizations have tried to complete this process in less than three to four days. With Soarian Clinicals in place, we see the opportunity to improve this performance metric from four to two days.” He adds, “Our coders are working almost concurrently as patients are being discharged. Previously, the challenge was collecting all the supporting documentation that makes a chart. Now, we don’t have any paper to track down. So the record is nearly complete when the patient is discharged.”

Two years ago, PVMC began considering new technology to enable transition to EMRs. With the help of Siemens’ Soarian Clinicals next generation healthcare information system, the hospital created its own masterpiece, eCareNet. Now, new infrastructure seamlessly integrates the EMR with clinical, pharmacy, and financial functions. Most importantly, in today’s demanding healthcare environment, patients and staff benefit from exceptional quality and improved workflow. For the community hospital Platte Valley Medical Center, being small does not stand in the way of doing things big.

*Diana Smith is a writer specializing in medical topics. She is based in Liberty Hill, Texas, U.S..*

## Further Information

[www.siemens.com/soarian-clinicals](http://www.siemens.com/soarian-clinicals)

## Summary

### Challenge:

- Become a paperless hospital by implementing a centralized, computerized physician order entry (CPOE)-driven electronic medical record (EMR)
- Provide seamless access to patient information for physicians, clinicians, and coding staff onsite or offsite, 24-hours a day
- Support PVMC patient safety initiatives by helping to reduce the human element in medical errors
- Increase workflow efficiency while meeting increasing regulatory requirements

### Solution:

- Use advanced Soarian Clinicals information technology to complete a full transition to EMR technology
- Implement multiple applications at once with a powerful workflow engine
- Enable physician access to electronic medical records from the hospital or remotely
- Help the hospital prevent medication errors by warning clinicians of allergies and drug-drug interactions with Siemens Pharmacy and the notification system of Med Administration Check

### Result:

- Nearly eliminate paper-based documentation tasks, freeing time for direct patient care
- Seamless interoperability with, and immediate access to, multi-modality data and results, eliminating the need to track down paper-based reports or test results from ancillary departments
- Web-based physician access to electronic medical records onsite or offsite
- Increased patient satisfaction due to increased hands-on knowledge of care by nurses and doctors
- No need for patients to answer same personal history and preference questions multiple times
- Improved timeline for chart completion and billing cycle, significantly reducing delinquent files and accounts receivable days not billed

# From Hours to Minutes

Speed and simplicity are not often words associated with immunosuppressant drug testing for transplant patients. But at Bristol Royal Infirmary in the UK, a teaching hospital with close links to Bristol University, scientists and doctors use the latest specialized monitoring equipment from Siemens to streamline the process, resulting in improved workflows and better patient outcomes.

By Daniel Whitaker





Chief Biomedical Scientist Carolyn Perry can look out from her ninth floor laboratory in all four directions at what may be the best view of the city of Bristol. There are the sandstone buildings of the old city, flaunting the wealth of what was one of the most successful Atlantic ports, post-war office towers similar to that of the Bristol Royal Infirmary (BRI), in which Perry works, and even the Mendip Hills. Within the city that she can see so much of, almost seventy people need an organ transplant – some of the 10,000 in the UK total<sup>1</sup>. Generally, transplantation is their last available treatment option. Most often, it is a new kidney that is needed – more than 80 percent of UK organ transplants last year<sup>2</sup> – though sometimes it will be a heart, liver, lungs, a pancreas or a section of bowel. Recent successes in transplanting hands and faces show how surgeons' skills continue to improve. The number of people needing organ transplants is rising steadily. In part, this is because people are aging. In Britain, the number of people over the age of 85 is set to reach 3.2 million by 2033, compared with 600,000 in 1983<sup>3</sup> – and the elderly are more likely to suffer an organ failure. Also, better medical treatment increases the situations in which a transplant is possible, where some years ago, the prognosis would have been terminal. Each transplant patient faces two severe challenges. The first is to obtain the organ that he or she needs – not easy given limited donations. The second problem is rejection of the new tissue by the recipient's body, either suddenly or gradually over time. Several components of the immune system may attack what they perceive as an invading foreign body. These include lymphocytes – or "natural killer" white blood cells – cytokines – proteins secreted by the nervous system – and macrophages. Their name means "big eater" in Greek, and they aim to devour any cells they view as pathogens.

### ISDs: Walking the Tightrope

Since the 1960s, scientists have developed immunosuppressant drugs (ISDs) to counteract these reactions and allow the transplanted organ to function. Unfortunately, it is easy to overdose a

patient with ISDs, which can lead to infections and cancers, and potentially the loss of the grafted organ. So correct ISD dosage involves carefully walking a tightrope between insufficient and excessive amounts – in Perry's experience, each is equally likely. To fall on either side can mean a repeat of the transplant for the patient or even death. To complicate matters, there can be no set formulas because, as she explains, "Different people metabolize at different rates." Given this unpredictability, the only way to know whether you are still on the tightrope is regular, precise monitoring of the concentration of the ISD in the patient's bloodstream. This is exactly what takes place on the Bristol Royal Infirmary's ninth floor, where ISD concentration is monitored using two systems from Siemens.

The first is a Dimension® Integrated Chemistry System, which will check for the concentration of Cyclosporine A, a common ISD used in adult kidney transplant patients. Next, small enough to perch on a desktop, and a source of obvious pride for Perry and her staff, is a Viva-E® Drug Testing System. This device monitors the concentration of tacrolimus, a newer ISD, more easily tolerated by pediatric kidney patients – important, since BRI specializes in treating children.

The two systems work by analyzing whole blood samples. Perry demonstrates how these are delivered to the lab in clear plastic test tubes. The tube has a special steel insert to allow it to use just a tiny sample of blood from a patient who is only a few months old. The Dimension system provides automated sample

## Organ Donation

Almost three times as many people need organ transplants now in the UK as the 3,740 who received them during 2010/11. For about one thousand of those, the long-awaited call that a suitable donor has emerged will come too late. Need is not equally shared across society: black Britons have three times the risk of kidney failure as the general population, for example.<sup>1</sup> These patterns are echoed internationally – in the U.S., more than 6,500 people die annually while waiting for transplants.<sup>2</sup>

In the UK, donors must explicitly consent to their donation, usually by entering themselves into a national online database. In March 2011, almost 18 million (29 percent) of the UK population had registered.<sup>1</sup> The current donor rate of 33 per million is far above some other European countries; in Greece, for example, it is less than quarter of this rate.<sup>3</sup> But the most effective way to boost the UK donation rate would be to follow the lead of countries such as Spain and Austria and switch to a system where all deceased donate unless they specifically state their wish not to do so.

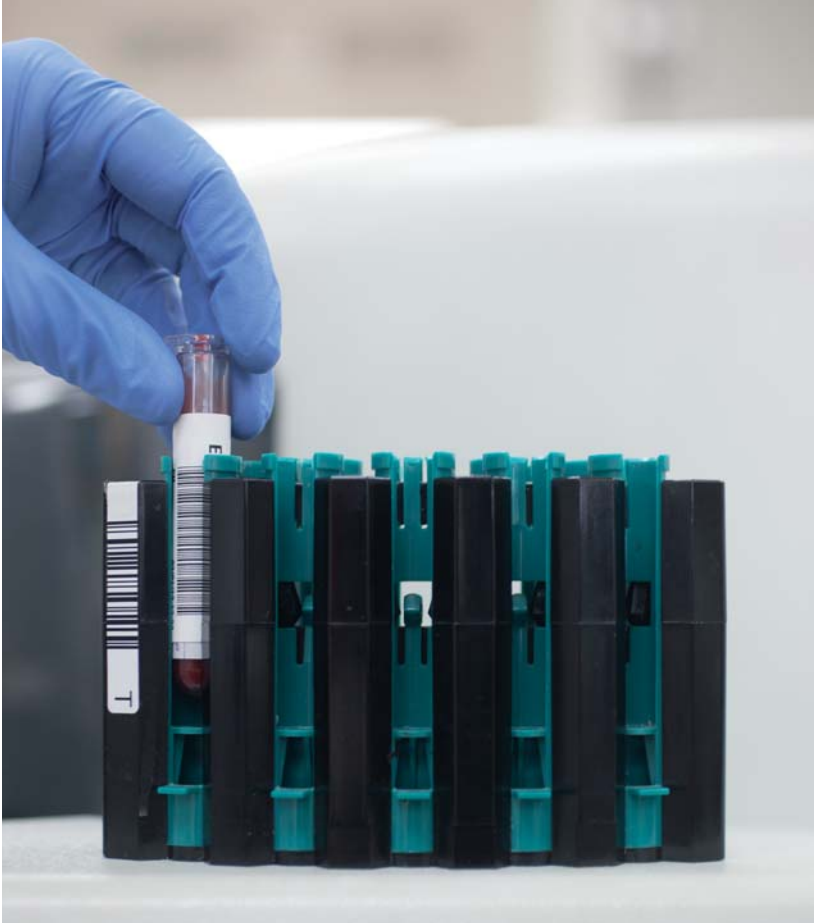
One response to organ shortage is "transplant tourism," generally involving recipients traveling abroad, though sometimes donors are brought to recipient countries. In 2007, the World Health Organization noted the main international donor countries as India, Pakistan, and the Philippines, with Australia, Canada, and Israel as leading recipient nations.<sup>4</sup>

<sup>1</sup> <http://www.organdonation.nhs.uk/ukt/>. Last accessed Feb 10, 2012

<sup>2</sup> <http://organdonor.gov/about/data.html>. Last accessed Feb. 10, 2012

<sup>3</sup> [http://www.grreporter.info/en/resistance\\_compulsory\\_organ\\_donation/4340](http://www.grreporter.info/en/resistance_compulsory_organ_donation/4340). Last accessed Feb 10, 2012

<sup>4</sup> <http://www.who.int/bulletin/volumes/85/12/06-039370/en/>. Last accessed Feb 10, 2012



On both the Viva and Dimension Integrated Chemistry Systems portfolios, Siemens consolidates four fully automated immunosuppressant drug (ISD) assays. The four ISD tests – mycophenolic acid, cyclosporine, tacrolimus, and sirolimus – are the most commonly prescribed immunosuppressants used by physicians to prevent organ rejection.

pretreatment. On the Viva-E system, Perry performs a pretreatment process that lyses, or breaks open, the cells to extract the tacrolimus. The sample is then centrifuged to separate the clear liquid containing the tacrolimus from the blood cells and proteins. The clear liquid portion

“With transplants, a 24-hour delay can be enough for rejection of the newly grafted organ.”

Carolyn Perry, Chief Biomedical Scientist, Bristol Royal Infirmary, Bristol, UK

can then be accurately measured using the EMIT 2000 Tacrolimus Assay on the Viva-E system.

Almost the only sound is the hum of deionized water running through the

Viva-E system to keep it clean. Two pipes remove concentrated and diluted waste. Maintenance requirements are minimal and mainly carried out by Siemens in contracted visits every four months, enough for the systems to easily meet Siemens' commitment of 98 percent uptime. Asked about any problems she has experienced, Perry has to think a long time before answering, “A syringe snapped once – I changed it myself in five minutes.” The most striking aspects of the ISD monitoring process are its speed and its simplicity. The Viva-E system carries out the test in just fifteen minutes, and total lab turnaround time from receipt of blood sample to communication of a patient result to a physician is typically just half an hour. Amy Hayes, the lab's Senior Biomedical Scientist, explains how important this is. “Until we bought this system two years ago, we had to send samples to our sister institution, Southmead Hospital, where the turnaround time was 24 hours. With transplants, a 24-hour delay can be enough for rejection of the newly grafted organ.”

The BRI lab works on the basis that the results of any sample received by 2 p.m. will be communicated by 4 p.m., though abnormal ISD concentrations are telephoned through immediately. This works well for standard review of ISD levels in patients with previously transplanted grafts. But emergency after-hours analysis is also possible with the Viva-E system. The sudden emergence of an organ donor and the resulting rapid transplant can produce just such a need for urgent analysis.

### Expanded Applications for the Viva-E System

Perry and Hayes are so pleased with the Viva-E system that they may soon use it for the cyclosporine analysis. This would double the Viva's workload from the current situation, in which, as Hayes says, “Fifteen samples is a busy day.” If they wanted to work the machine further, the Viva-E system could also check for the presence of drugs in pregnant mothers and young babies, though so much volume is required for this in Bristol that such analysis is currently carried out on a



Carolyn Perry is pleased with the speed and ease of use of the Viva-E Drug Testing System.





Bristol Royal Infirmary specializes in treating pediatric patients.

“I could teach anyone to use the Viva-E system properly within two hours, whatever their background.”

Carolyn Perry, Chief Biomedical Scientist, Bristol Royal Infirmary, Bristol, UK

large platform system on the eighth floor below.

From an economic perspective, versatility in the Viva-E analyzer or any other system is helpful. And economics is already an important driving force in transplant activity. A kidney transplant in the UK will typically cost £20,000 (around €24,000) in the year in which it is carried out, then £500 annually thereafter for the rest of the patient’s life – £46,000 over five years. But the alternative, dialysis, could cost £175,000 over the same period.<sup>4</sup> So transplants make accounting sense, as well as offering the patient a better quality of life.

There are alternatives to the ISD analyzers provided by Siemens – using chromatography or mass spectrometry, and both are widely used for their precise readings. But apart from their large capital outlays, these require large batches of samples, and so are not appropriate for the urgent single sample that comes in following a sudden kidney transplant for a child at BRI.

Moreover, both of these two alternatives require extensive training to use. With the Viva-E system, in Perry’s words, “I could teach anyone to use it properly within two hours, whatever their background.” This is another key issue for BRI, since as across most of Europe, UK hospitals

are currently facing financial restrictions, especially on their largest cost category: staffing.

The same economic pressure is pushing many health facilities to outsource laboratory testing to centralized hubs or “factory labs,” where the large batch sizes might indeed make mass spectrometry or chromatography viable. Not only has BRI traveled in the other direction, by bringing its ISD testing in-house from Southmead Hospital, but other neighboring hospitals are increasingly sending their samples to BRI for testing.

This success is the product of both well-crafted systems and the dedicated humans that use them. Perry certainly fits the latter description, admitting that she came into the lab for six urgent samples on New Year’s Day – a public holiday when few other Britons would consider working. Just before we part, she lets slip the story of how she arrived at her present role. Previously working in finance, she took evening classes in biology out of interest. A temporary placement here at BRI had her captivated with how what she had learned could help so many people. An advanced science degree followed, and the the result is the highly efficient lab high over Bristol’s rooftops.

*Daniel Whitaker is a freelance medical, technology, economics, and business journalist who divides his time between London and Madrid. He has worked with the BBC, the Times, the Observer, the Economist, and the Daily Telegraph in the UK, as well as Cinco Dias in Spain.*

<sup>1</sup> <http://www.organdonation.nhs.uk/ukt/>. Last accessed Feb 10, 2012

<sup>2</sup> [http://www.uktransplant.org.uk/ukt/statistics/downloads/weekly\\_stats.pdf](http://www.uktransplant.org.uk/ukt/statistics/downloads/weekly_stats.pdf). Last accessed Feb 10, 2012

<sup>3</sup> <http://www.dlf.org.uk/content/key-facts>. Last accessed Feb 10, 2012

<sup>4</sup> <http://www.kidneywales.com/index.php?p=1887&doc=Transplant%20Facts>. Last accessed Feb 10, 2012





The random access Siemens Viva-E instrument is easy to operate, reliable, and offers a broad testing menu.

## Summary

### Challenge:

- Accurate monitoring of ISD concentrations in blood samples of organ transplant patients
- Need for quick turnaround of results
- Minimize training costs
- Minimize maintenance requirements and risk of downtime
- Minimize space requirement

### Solution:

- Siemens Dimension Integrated Chemistry System and Viva-E Drug Testing System allow for in-house testing of Cyclosporine A and tacrolimus ISD concentrations in kidney transplant patients
- Ability to do single samples rather than waiting for a full batch
- Minimal training requirement: two hours for a staff member to be able to operate analyzers
- Siemens' reliability plus routine maintenance result in 98 percent uptime

### Result:

- Accurate readings of cyclosporines and tacrolimus ISDs in kidney transplant patients
- The Viva-E system test takes only 15 minutes, entire procedure 30 minutes, compared to 24 hours when outsourced
- Urgent single samples can be checked immediately
- Flexibility regarding which staff members use analyzers
- Virtually no downtime to date
- Viva-E analyzer small enough to sit on desktop
- Substantial cost savings by avoiding outsourcing fees and additional staff costs

## Further Information

[www.siemens.com/ISD](http://www.siemens.com/ISD)



Radiologist Markus Lentschig, MD, and nuclear medicine physician Professor Christiane Franzius, MD, work closely together to bring molecular MR to clinical routine.

# First Molecular MR Goes Private

Biograph mMR, the world's first simultaneous, whole-body system that combines MRI and PET in one integrated device, has for the first time been installed in a private group practice. *Medical Solutions* spoke with practice partner and radiologist Markus Lentschig, MD, about his experience with the new technology.

By Lena Schnabl





In 2010, the integration of magnetic resonance imaging (MRI) and positron emission tomography (PET) into one hybrid system, Biograph® mMR from Siemens, brought about a revolution in diagnostic imaging. The system offers state-of-the-art three Tesla (3T) MRI and cutting-edge molecular imaging, fully integrated in one system. Simultaneous acquisition of PET and MRI datasets allows for insights into morphology, as well as metabolic and functional processes, particularly in oncology, but also in cardiovascular and cerebral imaging. As with any new technology, the first users were high-end university hospitals

and research centers. However, the still evolving PET-MR technology has already made its way to private practice – showing Biograph mMR is now suitable for clinical use. ZEMODI (Zentrum für moderne Diagnostik) translates to “Center for modern diagnostics” and the name says it all. The latest in medical technology is available at its five locations in the city of Bremen in northwestern Germany, bringing high-end applications to the clinical routine. Three of these locations specialize in MRI. Positron emission tomography/computed tomography (PET/CT) and conventional

X-ray imaging are performed as well. With radiologist Markus Lentschig, MD, and nuclear medicine physician and practice partner Professor Christiane Franzius, MD, working closely together, ZEMODI has the consolidated competence for molecular MR. Some practices are connected using *syngo*®.plaza, Siemens’ picture archiving and communication system (PACS) and a radiology information system (RIS). This is one of many factors that enables the locations to cooperate closely to offer the best possible care for their patients. The group practice specializes in oncological and neurological imaging and offers bone





The ZEMODI practice in Bremen, Germany.

scintigraphy and abdominal diagnostics as well as pediatric exams.

**Dr. Lentschig, what do you consider essential for providing the best possible care to your patients?**

LENTSCHIG: I need certain diversity in my daily work and a positive environment. I expect reliable medical equipment that works seamlessly, but at the same time offers the chance for innovation. Since joining ZEMODI in 1998, I have been fortunate enough to use cutting-edge equipment that, at times, even tops equipment of leading research facilities. I want to partake in medical innovation and, by doing so, find new ways to help people be healthy. I also expect my staff to be open to innovations and to be excited about trying out new paths to offer the best possible care.

**Biograph mMR was installed in your practice in October 2011. What were the main reasons behind choosing this device?**

LENTSCHIG: Of course, I want to offer my patients a reliable diagnosis. In order to open up new diagnostic possibilities, innovations are key. I am strongly convinced that MRI is the modality of the

future and that PET can offer invaluable additional information. Currently, the system, which combines the two most advanced imaging methods available, allows us to diagnose tumors earlier and more confidently. For most patients, early detection is the only chance for successful treatment. I hope that we will be able to contribute to a better diagnosis and a safer treatment. We've already had many patients where the therapy changed completely after the molecular MR scan, simply because we suddenly saw something that wasn't visible before.

**Could you give an example where Biograph mMR changed therapeutic options?**

LENTSCHIG: We had a patient with a prostate carcinoma diagnosed through biopsy. He also had a bone scintigraphy and was recommended for radical surgery. He came to our practice to get a second opinion and we found a small bone metastasis. The treatment of choice was changed to hormone therapy and radiation therapy. Without Biograph mMR, he would have lost his prostate and the metastasis would only have been detected later when the patient experienced symptoms and the disease had spread. In another case, a patient had already had radical surgery, but his PSA [Prostate-specific antigen] value continued to rise. He had all kinds of tests and nothing was found. Through the molecular MR scan, we detected a lymph node metastasis and were able to plan further treatment more soundly. The lesion was visible through MRI, but nobody would have rated it as malignant. The extent of lymph node involvement is only seen with PET. These kinds of cases show that there is a clinical justification for using the MR-PET in clinical routine.

**In the long run, would you consider MR-PET as a further step toward more personalized healthcare?**

LENTSCHIG: I would like to achieve the optimal treatment for every patient. Today, we know that different patients react differently to the same treatment. As a radiologist, I cannot determine the optimum treatment for each patient.

However, with the help of the latest imaging technology, I can contribute knowledge about the exact location, size, and shape of a tumor. It does not help much if you perform prostate surgery but do not see a lymph metastasis. The same is true for breast cancer. Especially in young women, you need to know if there are any additional small growths. The sooner you detect them, the better the treatment outcome.

**In your opinion, what advantages for follow-up examinations do you see?**

LENTSCHIG: Definitely the dose reduction, especially for children and younger patients. If you think of all the monitoring and follow-up examinations that tumor patients have to go through, dose reduction is a big issue. Biograph mMR enables us to lower the acquisition dose, which is a major advantage.

**You mentioned earlier that a positive work environment is important to you. How did your staff react to the investment?**

LENTSCHIG: My staff is usually eager to try out new techniques and methods. With Biograph mMR, they were a little skeptical in the beginning though, because medical technologists that focus on MRI usually do not come into contact with radioactivity. Still, they reacted very positively after we explained everything in detail and especially after they experienced the diagnostic imaging success. And, it was not hard for them to get used to the handling either, as the process is very similar to a standard MRI scanner.

**Can you describe how Biograph mMR is used in your daily routine?**

LENTSCHIG: We have two to six patients for combined molecular MR scanning every day and use Biograph mMR for routine MRI scanning the rest of the time. The patients receive the radioactive glucose injection in another clinic of ours beforehand. University hospitals usually have the laboratory right next to them. In doing this, we have more organizational planning to do, but we did not have to build a room that is permanently shielded

## Summary

### Challenge:

- Lead the way to a more personalized treatment
- Understand diseases more comprehensively

### Solution:

- Bring together the two most advanced methods available
- Bring advanced medical technology to clinical routine

### Result:

- Better imaging leading to sounder treatment decisions in oncology
- Potential to understand neurodegenerative diseases and cardiac conditions better



Simultaneous measurement of PET and MRI datasets allows for insights into morphology as well as metabolic and functional processes.

against radiation. After the scan, which can be performed in only 30 minutes, the patient rests in a designated room connected directly to the examination room. Because I want to take full advantage of the benefits of MRI, I often perform additional measurements, such as simultaneous high-definition scans of certain body regions. This prolongs the examination time, but the results are more precise, which is the most important aspect for an accurate diagnosis.

### Besides the organizational aspects, are there any differences between the use of the system in a private practice and in a university hospital?

LENTSCHIG: One difference is that the system is not financed through research funds, so the purchase is a financial risk for the physician. For the patients' comfort, a private practice can be much better because hospitals are often associated with being sick. In a private surrounding, patients tend to be more relaxed. We examine many children and 90 percent of them do not receive anesthesia. This is only possible in a comfortable surrounding paired with individual and thoughtful

preparation that hospitals cannot offer at all times.

### Did you benefit from your previous experience with PET-CT at ZEMODI?

LENTSCHIG: Definitely, because we have worked with PET before. Molecular CT as well as molecular MR are modalities that need the expertise of both radiologists and nuclear medicine specialists. This is why my colleague Christiane Franzius and I work on this modality together. We both diagnose the clinical images, which ensures dual control. We have a very different way of looking at images. I start looking at the MR image and add the information gained from the PET later, while Christiane keeps an eye on the PET images from the start. In this manner, we complete each others' diagnoses.

### Where do you see the future of MR-PET?

LENTSCHIG: One aspect might be PET dose reduction. We started with patients who agreed to have an additional molecular MR scan after they were examined with our molecular CT. These patients received the radioactive glucoses one

hour before the PET-CT scan, in order to achieve the best possible outcome. Then they came in for the Biograph mMR scan, which was performed up to three hours after the injection of the glucoses. Even though this period of time between the injection and the scan is commonly expected to be far from optimal, we still received a very good PET signal on the molecular MR. And, so we felt that the PET dose might be reduced in the future. Moreover, I think molecular MR could become extremely important for a number of fields, such as cardiology and neurology. For example, there is currently no cure for dementia, but maybe we can find a way to diagnose the disease earlier in order to research possible treatments and to add quality of life for many.

*Lena Schnabl, MA, is an editor at Medical Solutions and regularly writes about imaging methods and sustainability in healthcare.*

### Further Information

[www.siemens.com/mMR](http://www.siemens.com/mMR)





# A Gift Pack: Lower Dose, Higher Image Quality

In an interview with *Medical Solutions*, Professor Saruhan Çekirge, MD, Head of the Department of Interventional Neuroradiology at Hacettepe University School of Medicine in Ankara, Turkey, discusses the latest dose-saving and image-quality update, given at no cost to owners of the Artis zee family of interventional C-arm systems.

By Selda Emre Aydingöz, MD

Siemens is currently undertaking the largest field update in its history with the latest software platform on over 2,000 Artis® zee systems installed worldwide. More than 1,400 systems have been updated already, providing both dose-saving features (CARE) and outstanding image quality (CLEAR).

Professor Saruhan Çekirge, MD, has had more than three years of experience working with Artis zee, and his highly equipped clinic was a test center for the new platform for a year prior to its official launch.

## How long have you been working with Artis zee Systems?

ÇEKIRGE: We have been working with Artis zee systems since 2008 and we now have three neurology-dedicated biplane Artis zee angiography rooms.

## How many and what type of procedures are done with this system annually at your institution?

ÇEKIRGE: We have a very busy neuro-interventional service, treating more than 400 cerebral aneurysms as well as 100 cerebral arteriovenous malformations and dural arteriovenous fistulas. We perform around 300 cerebral revascularization procedures, many tumor embolizations, acute stroke treatments, and more each year, in addition to 1,000 diagnostic neuroangiographies. We also share these rooms with our peripheral vascular interventional radiology group. So, more than 4,000 diagnostic and therapeutic interventions are being performed annually through us.

## When was your system updated to the latest software platform?

ÇEKIRGE: We have been working very closely with engineers in the R&D [research and development] team of Siemens Healthcare Angiography on developing new software and improving existing software for complex neurointerventional procedures. Many features of the new platform were already developed and used as prototypes in our service during the last 12 months before the platform was officially released.

## What is your general reaction to the worldwide Siemens initiative to update 2,000 systems?

ÇEKIRGE: Siemens has been the leader in flat-panel angiography technology since 2005. They have the largest global market share. This has put a big burden on their shoulders for keeping their customers' angiography systems updated



with the most recent technology, which changes and improves at an unbelievable pace. I am very happy that Siemens takes this responsibility very seriously, and it will have a great impact on patient treatment and operator safety; not only with improved software for the treatment of complex cerebrovascular disease, but also with applications like CARE for radiation safety.

**How has image quality changed with this update?**

ÇEKIRGE: We already had excellent image quality in two-dimensional [2D] and three-dimensional [3D] angiography and *syngo*® DynaCT with the previous software. However, with the recent update, the quality of 3D imaging and *syngo* DynaCT improved substantially.

**How specifically did the improvements like image quality benefit you during your daily routine and allow you to improve certain procedures?**

ÇEKIRGE: 3D imaging quality is the most important point during the preoperative evaluation of cerebral aneurysms, in order to be able to understand the exact anatomy of the aneurysm neck and of the corresponding vessels close to the neck. Patient and procedural safety increases parallel to this understanding. With the new platform, we have an important improvement in the quality of 3D imaging. It is sharper and shows even very small vessels and perforators much more clearly in relation to the aneurysm and its neck, thereby allowing us to understand the anatomy much better. We also had very high quality with *syngo* DynaCT imaging with pre-existing software.

With this new software, in addition to the very powerful new X-ray tube of the Artis zee systems, 2D angiography and fluoroscopy quality – which is the “bread and butter” of neurointerventional procedures – has improved to a great extent. We have much sharper fluoroscopy and digital subtraction angiography images now. This has become extremely important, since many cerebral endovascular procedures today involve implantable tools like microstents and flow diverters,

## Across the Globe: Less Dose, Better Images

“The Siemens engineers have helped a lot in giving individual training to our personnel with the goal of minimizing the radiation used in a given exam and to devise additional measures of radiological protection.”



Manuel Ronderos, MD, Interventional Cardiologist, Fundación Cardioinfantil, Bogotá, Colombia



Ralph Kickuth, MD, Interventional Radiologist, University of Würzburg, Germany

“Impressive: We actually achieved a dose reduction of approximately 40 percent. Our institution is now set for the future with low dose imaging.”

“The biggest surprise was that Siemens is making this upgrade available for free across the whole world. This initiative tells me that Siemens is a company unafraid to show leadership in a critical area.”



David Lord, MD, Director, Interventional Radiology, Westmead Children's Hospital, Sydney, Australia

“Due to its reduced dose, our Artis zee allows us to do pediatric procedures that we would never have attempted before.”

Kevin Baskin, MD, Pediatric Interventional Radiologist,  
Children’s Hospital of Pittsburgh, Pennsylvania, U.S.

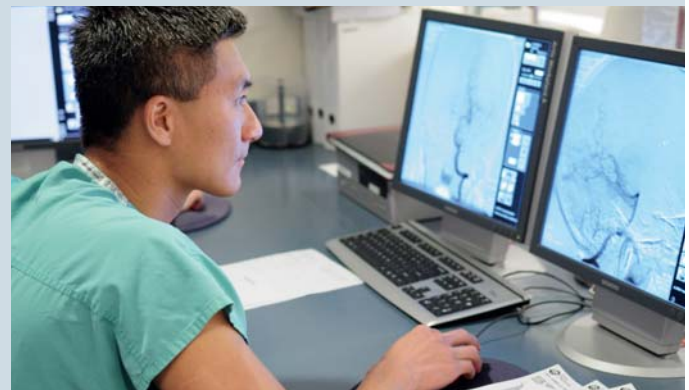


“The image quality and image resolution are very good even when using the low-dose acquisition protocols.”

Elisa Ciceri, MD, Director, Interventional Neuroradiology,  
Neurological Institute Besta, Milano, Italy

“Radiation dose management is absolutely crucial. Siemens’ attention to this is one of the key reasons we use Siemens equipment.”

Henry Woo, MD, Director, Cerebrovascular and Stroke Center,  
Stony Brook University Medical Center, New York, U.S.



“With CAREreport, for the first time, I have all dose information summarized for each series. This allows me to further optimize my work method.”

Eberhard Kuon, MD, Interventional Cardiologist,  
Fränkische Schweiz Hospital, Ebermannstadt, Germany



Hacettepe Interventional Neuro-radiology is one of the world-leading centers where innovative non-surgical endovascular treatment techniques are developed and applied with great success. New techniques developed by the Hacettepe team are shared with physicians from all over the globe via both on-site workshops and live broadcasts of operations via satellite. Hundreds of physicians from important medical centers all over the world have received education in Hacettepe Interventional Neuro-radiology over the last ten years. Furthermore, the Hacettepe team has been invited by over 30 outstanding clinics worldwide and treated more than 300 patients at these facilities.

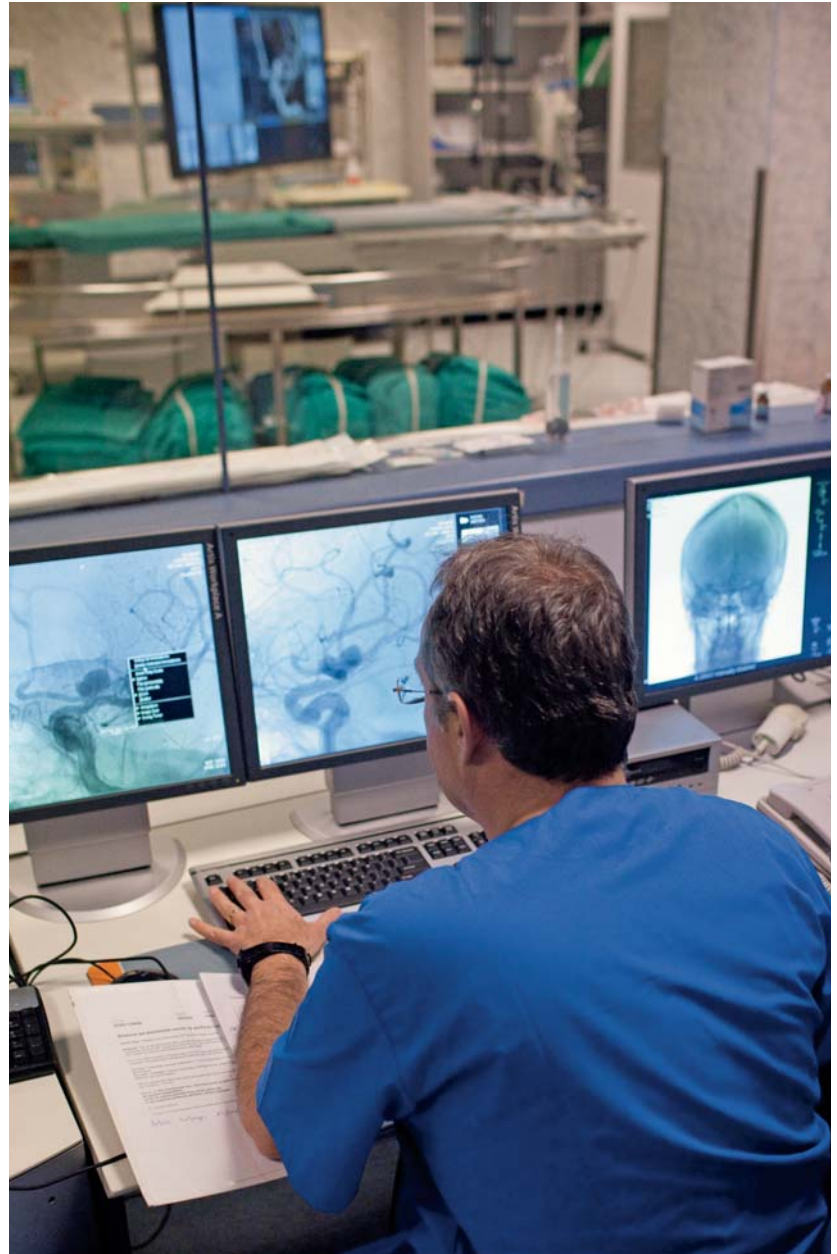


Image quality in 2D, 3D, and fluoroscopy imaging has improved with the software update.

and it is essential to see them clearly during their deployment in the cerebral vessels.

**How do you benefit from the advanced applications of *syngo* DynaCT during your daily routine?**

ÇEKIRGE: The installation of *syngo* DynaCT and CT angiography in our practice has been the most important and revolutionary advancement in neuroradiology

in the last decade. It opened a completely different avenue for us. We are able to have CT-like imaging on the angiography table before, most importantly during, and after the procedure, especially if there is an emergent need after an intraoperative complication. We have started to perform CT angiography with intrarterial or intravenous contrast administration and have excellent CT angiography images to understand and evaluate the anatomy,

preoperative treatment approaches, and results with the ultimate precision. Finally, *syngo* DynaCT in combination with *syngo* Neuro PBV IR allows us to perform functional imaging like CT perfusion to evaluate acute stroke patients on the angiography table. This still-ongoing improvement will eventually make flat-panel angiography equipment a "one-stop shop" in which an acute stroke patient can be taken in





The new features help reduce dose during interventions, which is extremely important for both patients and operators.

## “We can reduce the radiation dose by up to 75 percent.”

Professor Saruhan Çekirge, MD, Head, Department of Interventional Neuroradiology, Hacettepe University School of Medicine, Ankara, Turkey

for functional diagnostic imaging, and then receive interventional treatment directly thereafter if necessary.

### Can you adjust the image quality according to your preferences?

ÇEKIRGE: Yes, certainly. By adjusting the fluoroscopy quality and changing the pulse rate, we can reduce the radiation dose by up to 75 percent. This is the same for *syngo* DynaCT applications.

### How important is dose reduction during neurology interventions, and how do you rate Artis zee’s possibilities to reduce dose?

ÇEKIRGE: This is extremely important not only for the patient, but also for operators. Artis zee applications like CAREvision, CAREprofile, CAREfilter, CAREposition, and low dose *syngo* DynaCT have greatly improved dose reduction and made it

adjustable according to the neurointerventional procedure’s needs. So, although this system is very close to perfect, there should be no limits to reducing the radiation dose without hindering the image quality. Siemens certainly and constantly needs to work on that very important safety issue.

### Which dose reduction application do you find most useful?

ÇEKIRGE: CAREvision and the low dose *syngo* DynaCT application.

### Did you receive and benefit from application training?

ÇEKIRGE: Since we have been working closely with the Siemens R&D team all along, we have been continuously receiving application training, which has been very useful for all members of the team.

## Summary

### Challenge:

- High-quality imaging to improve the ability of physicians to perform diagnostic and neurointerventional imaging procedures with higher efficiency
- Reduce radiation dose during interventional procedures
- Provide application training to every Artis zee customer

### Solution:

- Update more than 2,000 Artis zee systems installed worldwide with the latest software platform, providing both outstanding image quality (CLEAR) and dose-saving features (CARE)
- Give free application training after the update to every customer

### Result:

- Improved software of Artis zee systems for the treatment of complex cerebrovascular diseases
- Substantial improvement in the quality of 3D imaging, which is most important during the preoperative evaluation of cerebral aneurysms
- Great improvement in 2D angiography and fluoroscopy quality, providing sharper fluoroscopy and digital subtraction angiography images
- Reduction in the radiation dose by up to 75 percent by adjusting radiation dose according to the procedure’s needs
- Supplying Artis zee customers with the latest image quality and dose-saving features – even after installation
- Allowing customers to work better with the new software

*Selda Emre Aydın* earned her MD from Hacettepe University Medical School and a PhD in pharmacology from the Hacettepe University School of Pharmacology. She is certified as an editor in life sciences (ELS) and has worked as a clinical research associate, a contract medical writer/editor, and a freelance writer. She is the founder of Edita Medical Writing and Editing Ltd., based in Ankara, Turkey.



# The Portuguese Healthcare System: Successes and Challenges

By Jorge Simões, President of the Portuguese Health Regulation Authority (Entidade Reguladora da Saúde)



The Portuguese healthcare system's roots go back to 1946, when the first social security law was enacted. However, it was only after the revolution of 1974 that the restructuring of health services began – a process that culminated in the establishment of the National Health Service (NHS) in 1979.

Currently, the Portuguese healthcare system is characterized by three coexisting, overlapping systems: the NHS, a universal, tax-financed system; public and private insurance schemes for certain professions (which are called health subsystems); and private voluntary health insurance. Thus, this system has a mix of public and private funding. The NHS, which provides universal coverage, is predominantly funded through

general taxation. The health subsystems, which provide healthcare coverage to between 20 and 25 percent of the population, are funded mainly through employee and employer contributions (including contributions from the state as the employer of public servants).<sup>1</sup> Close to 20 percent of the population is covered by private voluntary health insurance.<sup>2</sup> About 30 percent of total expenditure on healthcare is private, mainly in the form of out-of-pocket payments (both copayments and direct payments by the patient), and to a lesser extent, in the form of premiums to private insurance schemes and mutual institutions.<sup>3</sup> Financial resources dedicated to healthcare have reached a high level relative to the country's wealth. Approximately

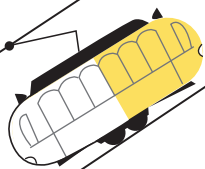
10 percent of the Portuguese GDP is devoted to health expenditure, which puts Portugal among the countries with the highest level of health spending within the European Union (EU) and the Organization for Economic Cooperation and Development (OECD). Since the mid-1990s, the trend in public health expenditure has been of steady and fast growth, with private expenditure remaining constant, relative to GDP.<sup>4</sup>

## Primary Healthcare

A mix of public and private health providers delivers primary healthcare in Portugal. These include primary care clinics integrated in the NHS, which are called "health centers," private sector primary care providers (both not-for-profit and







for-profit), and professionals or groups of professionals in a liberal system with which the NHS contracts or develops cooperation agreements. Despite the public/private mix, primary care is mainly delivered in NHS health centers. Data from the 2005–2006 National Health Survey show that in 2005, only 17.1 percent of primary care consultations were delivered by private providers.

In 2009, Portugal had 186 hospitals (86 of which are of private nature) with a total capacity of 35,593 beds (26,077 in public hospitals). Almost half of the private hospitals belong to for-profit organizations.<sup>5</sup> Trends in hospital numbers have been similar to those in other European countries. There has been a significant decrease in the number of public hospitals over the decades, from 634 in 1970 to 186 in 2009, and also a not-so-pronounced decrease in the number of available beds.<sup>6</sup>

Publicly funded long-term care is mainly delivered by not-for-profit and for-profit private providers, with which the NHS contracts. The recently formed national

Overall, the number of physicians per 1,000 population is currently above the EU average, but there is a relative scarcity of physicians. The relative number of nurses in Portugal is well below that of other countries, which implies that the ratio of nurses to physicians is also much lower than in most countries.

### Administrative Management

Planning and regulation of the health system takes place at the central level by the Ministry of Health and its institutions. The management of the NHS takes place at the regional level. In each of the five regions of Portuguese mainland territory, a Regional Health Administration (RHA) that is accountable to the Ministry of Health is responsible for strategic management of population health, supervision and control of hospitals, management of primary care/NHS primary care centers, and implementation of national health policy objectives. They are also responsible for contracting services with hospitals and private sector providers for NHS patients. Financial responsibilities of RHA's are limited to primary care, since hospital budgets are defined and allocated centrally. All hospitals belonging to the NHS are under the jurisdiction of the Ministry of Health. Private sector hospitals, both not-for-profit and for-profit, have their own management arrangements. The regulation of the healthcare system in Portugal is carried out by several institutions, the most important of these being the Portuguese Health Regulation Authority (Entidade Reguladora da Saúde – ERS), the independent organization responsible for regulating the activity of healthcare providers; Infarmed, IP (the National Authority of Medicines and Health Products), which is responsible for the regulation of pharmaceuticals and medical equipment; and the professional associations (physicians, nurses, dentists, psychologists, and pharmacists), which assure professional self-regulation relating to issues of negligence and deontology.

ERS was established in 2003 and its responsibilities, organization, and functioning were restructured in 2009. Its scope of regulation includes all health-

## “Health human resources in Portugal have been characterized by a high emphasis on specialist hospital care.”

Jorge Simões, President, Portuguese Health Regulation Authority (Entidade Reguladora da Saúde)

network of integrated long-term care combines teams providing long-term care, social support and palliative care with its origins in communitarian services, covering hospitals, primary care centers, local and district social security services, and municipalities.

Health human resources in Portugal have been characterized by a higher emphasis than most other countries on specialist hospital care. In 2009, there were 166 specialist physicians for 100 non-specialist physicians (general practitioners).<sup>7</sup>

Number of Nurses per 10,000 Resident Population (2010):



Male Life Expectancy at Birth (2009):

76.5



Female Life Expectancy at Birth (2009):

82.6

Total Expenditure on Health per Capita (2008): US\$ 2,508

\$\$

Total Expenditure on Health as % of GDP (2008): 10.1

Government Expenditure on Health as % of Total Expenditure on Health (2008): 65.1

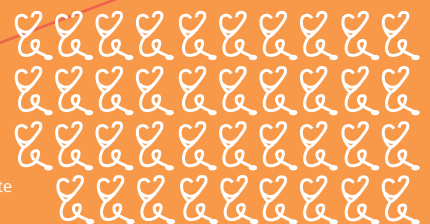
Population in Thousands (2011) 10,562<sup>1</sup>



Number of Hospital Beds per 10,000 Resident Population (2009): 33



Number of Physician per 10,000 Population (2010): 39



Source:  
<sup>1</sup> INE – National Statistics Institute  
All other data:  
OECD Health Statistics database

## The National System of Health Quality Assessment – SINAS

According to its legal framework, ERS is responsible for implementing a system for assessing healthcare providers in terms of global quality of services. Additionally, as a measure to help achieve efficiency and effectiveness improvements in hospital services, the Memorandum of Understanding on the external financial assistance from the European Union (EU) and the International Monetary Fund (IMF) requires Portugal to set up a system for comparing hospital performance (benchmarking) on the basis of a comprehensive set of indicators and produce regular annual reports. To fulfill this obligation, ERS is developing the National System of Health Quality Assessment (Sistema Nacional de Avaliação em Saúde – SINAS).

The SINAS framework for assessing global quality considers several distinct dimensions of quality. This framework is specifically implemented and adapted to the assessment of different types of healthcare providers (the SINAS modules). The results of the assessments produced within SINAS are presented to the public in the form of ratings of the assessed providers. With such assessments, ERS intends not only to inform patients about the quality of healthcare services, but also to encourage continuous improvement in the quality of these services.

The SINAS module applied to hospitals (SINAS@Hospitais) assesses hospitals in five quality dimensions: Clinical Excellence, Patient Safety, Adequacy and Comfort of Facilities, Patient Satisfaction, and Patient Focus. At the present time, SINAS@Hospitais involves 73 hospitals

(43 public, 20 private for-profit, and 10 private not-for-profit). It should be noted that the inclusion of providers in the project is voluntary.

The first ratings of Clinical Excellence – which covers procedures in the areas of orthopaedics, gynecology, obstetrics, pediatrics, acute myocardial infarction, stroke, and ambulatory surgery – were published on the website [www.websinas.com](http://www.websinas.com) in September 2010. The model of assessment of Clinical Excellence was developed and implemented for ERS by a consortium between Siemens and the Joint Commission International (JCI).

For each clinical area, assessment of Clinical Excellence is based on a comprehensive set of JCI performance measures, adjusted to the Portuguese healthcare setting, thereby complying with the highest international standards. Complex and robust statistical models were developed for estimating a rating for each hospital and each clinical area, assessing compliance with clinical guidelines and expected outcomes. Both outcome and process measures were included, focusing simultaneously on a patient's health status and the process of care.

A key value of the SINAS project is the belief that healthcare quality assessment strongly contributes to improving efficiency in the delivery of care, while simultaneously increasing transparency. With SINAS, ERS aims to induce an unprecedented change in the way hospital managers, health professionals, and healthcare users think about the quality of healthcare in Portugal.

care providers located in the mainland territory of Portugal – whether of public, private-for-profit and not-for-profit ownership, and regardless of their individual or collective nature. As an independent regulator, the intervention of ERS is focused mainly on safeguarding the interests of healthcare users. Such independence, both from the government and from healthcare providers, allows for (i) separation between health policy

and healthcare regulation, (ii) separation between healthcare regulation and healthcare provision, (iii) regulation of the entire sector, (iv) independence from interest groups, and (v) public confidence.

### Future Outlook

The recent past has been characterized by the introduction of a number of reform initiatives. There are broadly five different



areas of intervention that have been under the spotlight: health promotion, long-term care, primary and ambulatory care, hospital management and inpatient care, and the pharmaceutical market. The sequence of the several reforms is far from being coherent, due to changes in the Portuguese government, but the most difficult challenge felt by the successive administrations in terms of health policy has been to impose cost-control measures, which (almost) consensually are considered indispensable to assure the sustainability of the NHS in the years to come.

Since the beginning of the global financial turmoil in 2007, the Portuguese financial and economic situation has deteriorated greatly. This culminated in Portugal asking for the external financial assistance of the European Union and the International Monetary Fund (IMF), which occurred in May 2011. The disbursements of the assistance are subject to the compliance with a number of economic policy conditions that were agreed to by the Portuguese government, the European Commission, the European Central Bank, and the IMF, and are detailed

in a Memorandum of Understanding. As part of this Memorandum, Portugal will have to make significant budget cuts and undergo structural reforms in several areas in the years to come. The chapter dedicated to the healthcare system is one of the most ambitious: In general terms, the objectives are to improve efficiency and effectiveness in the healthcare system, inducing a more rational use of services and control of expenditures, and to generate additional savings in the areas of pharmaceuticals and hospital operating costs. And with that, the Portuguese healthcare system faces difficult challenges in the near future.

<sup>1</sup> Barros P., Machado S., Simões J., 2011, Portugal: Health system review, Health Systems in Transition, 13(4):1–156.

<sup>2</sup> APS (Portuguese Insurers Association), 2009, Health Insurance Statistics, Lisbon.

<sup>3</sup> INE (National Statistics Institute), 2010, Health Satellite Account 2000-2008, Lisbon.

<sup>4</sup> OECD, 2011, OECD Health Data: Health expenditure and financing, OECD Health Statistics database.

<sup>5</sup> OECD, 2011, OECD Health Data: Health care resources, OECD Health Statistics database.

<sup>6</sup> Campos A.C., Simões J., 2011, O Percurso da Saúde: Portugal na Europa, Almedina, Lisbon.

<sup>7</sup> INE (National Statistics Institute), 2010, Statistical Yearbook of Portugal 2009, Lisbon.

“The objectives are to improve efficiency and effectiveness in the healthcare system and to generate savings in the areas of pharmaceuticals and hospital operating costs.”

Jorge Simões, President,  
Portuguese Health Regulation Authority  
(Entidade Reguladora da Saúde)

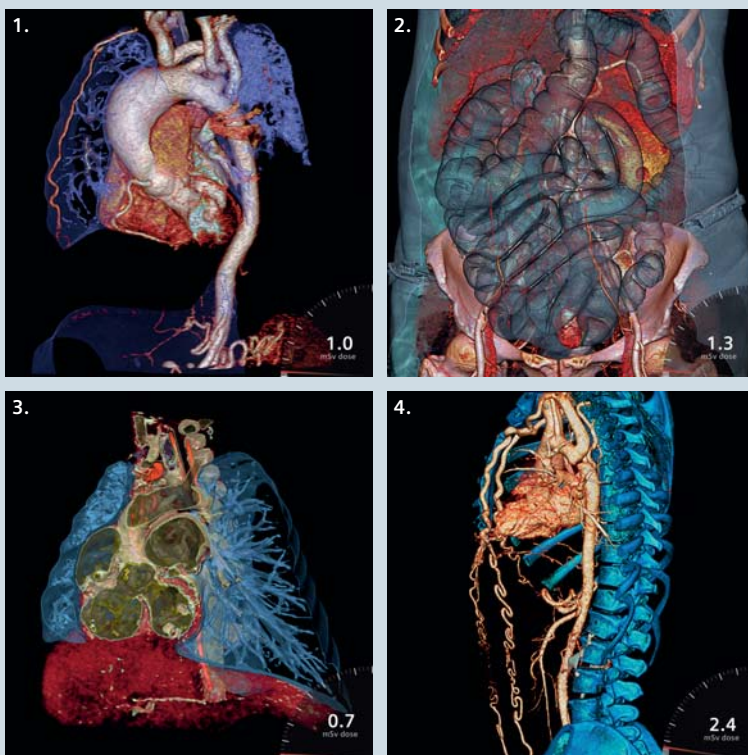


Jorge Simões is the current President of the Portuguese Health Regulation Authority (Entidade Reguladora da Saúde). He holds a PhD in Health Sciences and is currently a professor at several Portuguese Universities, such as the University of Aveiro, the University of Coimbra, the Portuguese Catholic University, the University of Minho, and the Institute of Hygiene and Tropical Medicine at the University “Nova” of Lisbon. In 2009 and 2010, he coordinated the new Portuguese National Health Plan for 2011-2016. In 2008 and 2009, he coordinated the working group that performed the strategic review of the process of creation of public-private partnerships in hospitals, and in 2006 and 2007 he was the Chairman of the Committee for the Financial Sustainability of National Health Service, both projects being commissioned by the Ministry of Health. He has published four books, coordinated the editing of six other books, published eighteen book chapters and dozens of essays in journals. Between 1996 and 2006, he served as direct advisor to President Jorge Sampaio on health matters. In 2006, he was honored by the President of the Republic with the Grand Cross of the Infante D. Henrique Order.

# Further Reading

Siemens offers a variety of customer magazines and information channels. "Further Reading" introduces a selection of articles and topics featured that may be of interest to you. To learn more, follow the link below each article. To subscribe to any of the magazines, see page 89.

## And the Winners Are...



- 1. Winner of the category "Pediatrics":** Jean-François Paul, MD, Centre Chirurgical Marie Lannelongue, France, showing an aortic aneurysm on a 13-month baby, scanned with a SOMATOM Definition Flash at 1.0 millisievert.
- 2. Winner of the category "Routine":** Yang Guo-Qing, MD, Center People's Hospital of Suining, China, showing a small intestinal stromal tumor, scanned with a SOMATOM Sensation at 1.3 millisievert.
- 3. Winner of the category "Cardiac":** Carolyn Young, RT, Great Ormond Street Hospital for Children NHS Trust, UK, showing a tetralogy of fallot, scanned with a SOMATOM Definition at 0.7 millisievert.
- 4. Winner of the category "Vascular":** Liz D'Arcy, RT, Wexford General Hospital, Ireland, showing a coarctation of an aorta, scanned with a SOMATOM Definition AS at 2.4 millisievert.

Siemens Healthcare recently announced the winners of the "International CT Image Contest 2011." More than 160 institutes and hospitals from 43 countries on all continents submitted over 600 images captured on Siemens computed tomography scanners using the lowest possible radiation dose.

The seven winners, selected by an international jury of experts, hail from China, England, France, Ireland, Macau, Singapore, the U.S., and the public vote winner from Taiwan. As well as exhibiting a high-quality standard, the images are impressive examples of how valuable diagnostic information can be obtained even at low dose.

The contest demonstrates Siemens' efforts to raise public awareness about the responsibility that manufacturers and radiologists have in relation to diagnostic radiation.

For the duration of the contest, between March and September 2011, a fan community, comprising more than 4,000 members, discussed the submitted images on Facebook. In addition to a renowned jury of medical experts, all Internet users could vote for their favorite picture in a public vote.

View all winning images of the International CT Image Contest including all clinical details and respective protocols at the link below.

[www.siemens.com/image-contest](http://www.siemens.com/image-contest)



## Building Meaningful Relationships That Last

Laboratorio Médico del Chopo is one of Mexico's largest medical laboratories, covering clinical services such as ultrasound, X-ray, nuclear medicine, and other diagnostic and lab-related services in virtually every major metropolitan region across the country. The healthcare provider relies on Siemens as its ultrasound system vendor of choice. Lately, it has begun replacing legacy ultrasound systems with ACUSON X Family ultrasound systems. Together with Siemens' after-sales support and clinical education, the center attracts top medical talent to provide excellent service to its patients and referring physicians.

The provider's Medical Director, Pedro Zarate, MD, states: "We were extremely satisfied with our first generation of Siemens' SONOLINE™ ultrasound systems, which made the continuation of our partnership with Siemens a very easy decision as we've moved to replace legacy equipment." Recent investments are the ACUSON X150™ and ACUSON X300™ premium edition (PE) ultrasound systems together with five-year service contracts. The Siemens X Family systems cover a wide spectrum of imaging needs from obstetrics and gynecology, to gastrointestinal and cardiac imaging.

Another major asset of Laboratorio Médico del Chopo is its clinical education. Siemens provides on-site trainings on new imaging applications and capabilities and also contributes clinical speakers, demo ultrasound systems, and application specialists to the provider's clinical seminars.

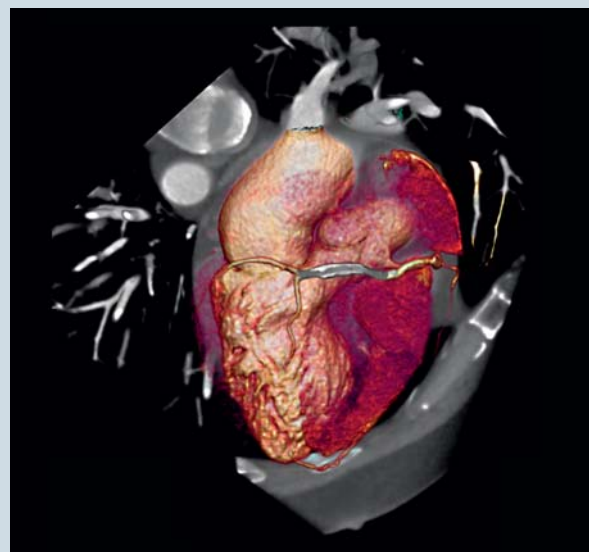
Chief Executive Officer, Roberto Jiménez García, MD, is confident about the new collaboration: "Our partnership with Siemens is about more than ultrasound platforms and imaging technology. It's about quality relationships, great patient care, and continuous innovation and learning."

[www.siemens.com/x150](http://www.siemens.com/x150)

## Creating a New Reference in Image Quality

Introduced for the SOMATOM® Definition Flash Dual Source computed tomography (CT) systems, the Stellar Detector was recently launched by Siemens. It will also be available with the new SOMATOM Definition Edge<sup>1</sup>. With the Stellar Detector, electronic noise and cross-talk are minimized. The new detector generation provides the solutions that radiologists in acute care, cardiology, and other fields have been looking for. Combining improved spatial resolution and reduced noise in low signal examinations, the new detector may allow radiologists and cardiologists to be more secure in their diagnoses.

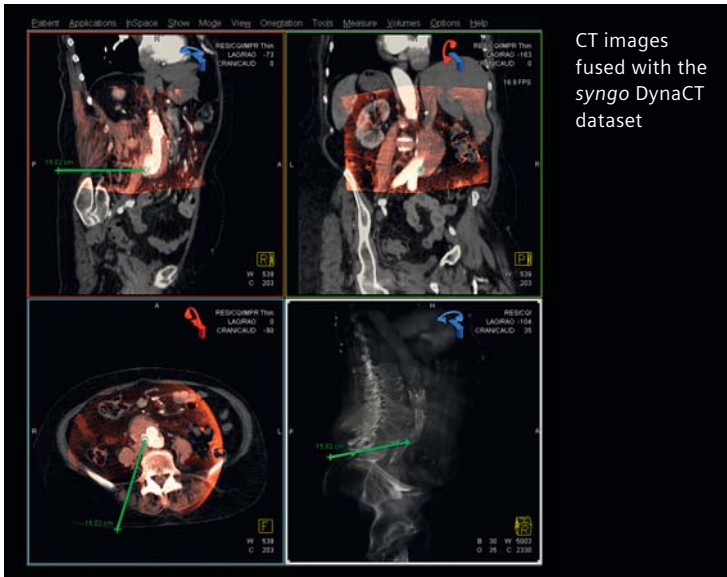
Two renowned imaging experts, the radiologist Savvas Nicolaou, MD, at the Vancouver General Hospital, Vancouver, Canada, and the cardiologist Jörg Hausleiter, MD, at the German Heart Center, Munich, Germany, share their expectations and potential applications for the new detector technology. To read the complete story, please access the website of Siemens' CT magazine SOMATOM Sessions under the link below.



<sup>1</sup> Under FDA review. Not available for sale in the U.S.

[www.siemens.com/somatom-sessions-edge](http://www.siemens.com/somatom-sessions-edge)





CT images fused with the syngo DynaCT dataset

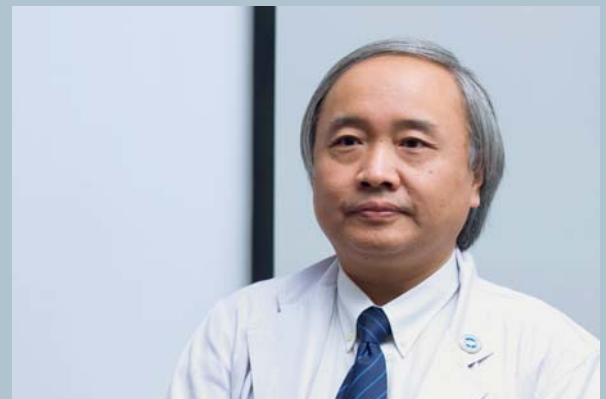
## Versatility at High Speed

The Peking Union Medical College Hospital is among the best medical institutions in China. Also known by its acronym, PUMC Hospital has a long tradition of serving the public benefit both as an outstanding center of scientific research and as a clinic for the general public. Every day, the hospital deals with the whole spectrum of medical work, from routine tasks to cutting-edge research. Therefore, versatility is key, and naturally, this also shows in the radiology department. This is why PUMC Hospital opted to purchase no less than four Siemens SOMATOM® Definition Flash computed tomography (CT) scanners.

“This device is really suitable for an extraordinarily wide range of applications,” says Jin Zhengyu, MD, Director of the Radiology Department at PUMC Hospital and Vice Chairman of the Chinese Society of Radiology.

Due to its versatility, the SOMATOM Definition Flash is an optimal choice both for everyday work and for scientific tasks. Combining Dual-Source technology with low radiation dose makes it one of the best CT scanners in terms of patient comfort and safety. In addition, the SOMATOM Definition Flash provides a whole range of tools and workflows to further increase the speed and accuracy of medical work.

“What this adds up to is that we have more diagnostic tools at our disposal than before,” says Jin Zhengyu. For the complete story about PUMC’s acquisition of four SOMATOM Definition Flash scanners, follow the link below.



Professor Jin Zhengyu, MD, Director of the Radiology Department, PUMC Hospital, Beijing, China

## Endoleaks: Enhanced Visualization Meets Enhanced Navigation

Siemens *syngo*® iGuide integrated needle guidance enables physicians to perform needle procedures such as Type II endoleak repairs more precisely and efficiently using the Artis® zee family of C-arm angiography systems. Since the planning of the procedure is done using cross-sectional images acquired with *syngo* DynaCT, the software solution frees up the hospital’s computed tomography (CT) scanners for routine diagnostic imaging and enhances workflow by eliminating the need to transfer the patient during the procedure. Type II endoleaks, in which abdominal aortic branches that have been excluded by an endograft perfuse the aneurysm sac, are the most common endoleak. This type of endoleak can have multiple feeding and draining vessels that make treatment challenging. “The most important thing for us is that the aneurysm stops growing,” says Alan Lumsden, MD, Medical Director of the Methodist Hospital DeBakey Heart and Vascular Center in Houston, Texas, USA, and Professor of Cardiovascular Surgery at Weill Cornell Medical College of Cornell University, New York, USA. “And in the majority of patients that we have treated with *syngo* iGuide, the aneurysm has stopped growing and the endo-leak has gone away.”

Interventional radiologist David Lacey, MD, at Iowa Methodist Medical Center in Des Moines, Iowa, USA, says the power of the technology is evident by the ease with which it handles challenging cases. He points out that he often encounters aneurysm sacs that measure less than a centimeter. “I’m always impressed that I can hit that target, often in just one pass, using this system,” he says. To read the full article, please follow the link below.

[www.siemens.com/axiom-innovations-endoleaks](http://www.siemens.com/axiom-innovations-endoleaks)

[www.siemens.com/somatom-sessions-flashCT](http://www.siemens.com/somatom-sessions-flashCT)

# Integrating Point-of-Care Testing

The Point-of-Care (POC) Testing Department at London's Royal Free Hampstead National Health Service (NHS) Trust upgraded its existing Siemens RAPIDComm® Data Management System to the newest version 4.0. This Trust is the first healthcare provider in the United Kingdom to take advantage of the full suite of Siemens' POC information technology solutions. Major drivers for the system upgrade were to ensure that the Trust's POC testing services meet Clinical Pathology Accreditation (CPA) guidelines and demonstrate compliance with a range of POC testing services.

The RAPIDComm 3.0 system has been in use at Royal Free Hospital since January 2011. "The installation put us in control of our blood gas testing," says Gillian Hall, the Trust's POC Testing Manager and Clinical Biochemistry Quality Manager, "but version 4.0 goes further. It gives us the ability to control and troubleshoot our urine chemistry and diabetes care analyzers, too." With the upgrade, Hall and her team are able to connect, remotely monitor, and control the Trust's Siemens DCA Vantage® analyzers – as well as Siemens CLINITEK Status® Connect urine chemistry analyzers – through the RAPIDComm system.



In addition, the RAPIDComm system also serves as a conduit for increased support for connected devices from Siemens personnel via Siemens' RealTime Solutions™. This remote monitoring solution provides Internet-based connectivity, enabling dedicated Siemens staff to remotely access the RAPIDComm system and connected POC analyzers.

Visit the website below to learn more about how Royal Free Hospital is using the RAPIDComm Data Management System to better manage POC testing.

[www.siemens.com/rapidcomm](http://www.siemens.com/rapidcomm)

## New Critical Care Test Instrument Released



Siemens Healthcare Diagnostics launched a compact point-of-care (POC) analyzer for critical care testing. The RAPIDPoint® 500 Blood Gas System leverages proven Siemens technology for reliable results and maximum uptime while offering new features designed for ease-of-use in POC settings.

RAPIDPoint 500 blood gas analyzers deliver a complete critical care test menu in approximately 60 seconds from a single, whole blood sample: pH and blood gases, electrolytes, glucose, lactate<sup>1</sup>, plus fully integrated CO-oximetry, including nBili and total hemoglobin.

The system uses Siemens technologies, which have been performance-proven for more than a decade including a time-tested, cartridge-based system design, integrated planar sensors, and patented slide cell technology for CO-ox factions. The hands-free sample port design automates sample aspiration and, along with a self-cleaning probe and clot detection features, helps to preserve sample integ-

egrity and improve operator safety. Automatic quality control (AQC) and calibration systems help ensure accuracy and simplify compliance.

Long-lasting, 28-day measurement and AQC cartridges reduce down-time associated with replacing consumables. An adjustable color touch-screen can be positioned to optimize viewing and reduce glare. Pre-set panels for frequently used tests help to speed and simplify its operation. An on-board bar-code reader supports single-handed scans and helps ensure error-free data capture. Built-in instructional videos can help to simplify training and day-to-day operations. The RAPIDPoint 500 Blood Gas System can be seamlessly integrated with the RAPIDComm® Data Management System to take POC program management to the next level.

[www.siemens.com/rapidpoint500](http://www.siemens.com/rapidpoint500)

<sup>1</sup> Under development. Not available for sale in the U.S.

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Publisher:

**Siemens AG**

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PrePress: Reinhold Weigert, Typographie und mehr ...  
Schornbaumstrasse 7, 91052 Erlangen, Germany

Printer: Mediahaus Biering GmbH,  
Freisinger Landstrasse 21, 80939 Munich, Germany

Photo Credits:

Cover: Christian Grund

News: private, Siemens

Cover Story: Christian Grund, Steffen Roth/Agentur Focus,  
Eirini Vourloumis, Andreas Messner, Andreas Lang, private

Hospital Management: Omar Ariff, Clark Shimazu

Radiology: Siemens, independent Medien-Design

Obesity: Jacopo Rosati

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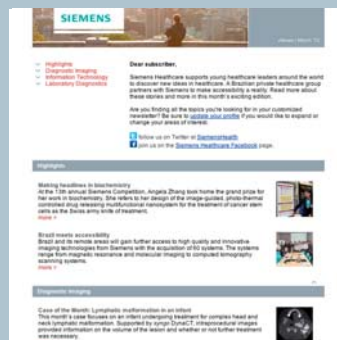
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Order No. A91CC-00045-M1-7600 | Printed in Germany |  
CC 86 051228.0 | ISSN 1614-2535 | © 05.12, Siemens AG

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