



# COVER STORY View to the Future

IT SECURITY • INNOVATION • LOCATION  
CHALLENGES • IMAGING • 3D PRINTING  
PERSONNEL

### SPOTLIGHT

Wendie Berg, Optimal  
Dense Breast Screening

Guy De Backer, Biggest  
Cardiology Successes

EAHM Congress

### IN THE NEWS

Fighting Cybercrime

No More Ransom

### MANAGEMENT MATTERS

Healthcare Innovation

Patient Safety & Risk  
Management

### BEST PRACTICE

Harnessing Potential  
of Radiographer

New ESR Online Journal

Imaging Organisational  
Change

Tomosynthesis

Benefits of Social  
Media for Radiology

### COMPASS

Brexit: Impact on  
Healthcare Personnel

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# AT THE CROSSROADS- THE FUTURE OF HEALTHCARE



Any healthcare leader surveying the healthcare situation in Europe today would have the same observation; the demands on the sustainability of healthcare systems across the continent are weighing heavy on hospital finances, personnel resources and ultimately on the wellbeing of patients. With improving patient outcomes the first and foremost objective, a hospital's financial performance and reputation also hang in the balance as leaders attempt to navigate a healthcare landscape that is swiftly changing as we look toward the future.

It is no mystery why healthcare finds itself at these critical crossroads. Life expectancy is on the rise and, simultaneously, so are chronic and complex conditions that require increasingly personalised treatment for best outcomes. The voice of the patient is also central to the healthcare debate as those receiving care become more knowledgeable about their rights and the types of care available to them and their loved ones.

At the same time, it could be argued that healthcare is experiencing one of its most exciting phases. Rapid technological advances in diagnostics, treatments and workflow procedures are transforming the healthcare terrain before our eyes. Who could have thought only few years ago that the digital world would impact so deeply on the hospital environment, improving practice, bringing together professionals from all specialties and connecting patients with carers creating a transparency that could only be imagined a short time ago.

However, advances bring with them responsibility. It is our duty as healthcare professionals to steer the ship on the right course so that we take advantage of all that new developments can offer and guide our practice toward optimum healthcare that we can sustain. Indeed, this theme of sustainability and the need to collectively advance innovative approaches for improvement and expansion of healthcare services globally, will inform the 26th EAHM Congress in October, details of which are in this issue of HealthManagement.org.

As our International community becomes ever more interconnected, we need to build on those relationships continuing to forge an alliance of healthcare professionals and decision makers across international and state borders. Through such expert collaboration and shared learning we can articulate the required competencies to contribute to a sustainable health care system and convince our politicians and stakeholders, that public financing of healthcare is not purely a question of cost, but an undeniable investment in the future welfare of people.

The changes in healthcare have been radical but where there are challenges there are also opportunities. It is hoped that this issue of HealthManagement.org will inspire leaders to rise to the challenges of the future of healthcare. Together with vision and cooperation, we can create a future of health and safety for all our European citizens.



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**Wendie Berg, USA**

Breast Density and Choosing Optimal Breast Screening p. 194



**Theodore T. Miller & David J. Mayman, USA**

Imaging With EOS® p. 240



**Guy De Backer, Belgium**

Tackling Coronary Heart Disease the Biggest Success in 50 Years: Interview with Professor Guy De Backer p. 196



**Bernd Montag, Germany**

Healthcare Executive Alliance: Insights For Healthcare Leadership p. III



**Stephen R. Baker & Yanira Guerra, USA**

Radiology at the Crossroads p. 242



**Julie Nightingale, UK, Jonathan McNulty, Ireland**

Advanced Practice: Maximising the Potential of the Modern Radiographer Workforce p. 252



**Luis Martí-Bonmati, Ené Regos & Ana Penades, Spain, André van Est, The Netherlands**

Organisational Change in Newly Integrated Medical Imaging Departments: Increase Commitment By Team Involvement p. 258



**Francesco Sardanelli, Italy**

Exploring the Future of Radiology: ESR To Launch New Journal, European Radiology Experimental p. 256



**Rachel Clarke, UK**

Brexit's Brutal Blow to the NHS p. 272



**Veronique Semjonov**

Philips Launches Minicare I-20 Troponin Blood Test For Rapid Diagnosis Of Heart Attack At The Point Of Care p. 213



**Gerry O'Dwyer, Ireland**

At the Crossroads - The Future of Healthcare p. 187



**Valentin Sinitsyn, Russia**

Clinical Use of Coronary CT Angiography p. 244



**Alan G. Fraser, UK**

Medical Devices and Evidence-Based Clinical Practice: Time to Deliver p. 234



**Anna Sort, Spain**

The Role of Gamification and Engagement Design in the Future of Healthcare p. 232



**Mansur Hasib, USA**

Future Leaders: What Healthcare Needs For Cybersecurity Risks p. 238



**Michael E. Springer & Richard L. Izzo USA**

Advantages Of 3D Printing In Healthcare p. 248



**Bertalan Meskó, Hungary**

Will the Hospital of the Future Be Our Home p. 230



**Alex Towbin & Saad Ranginwala, USA**

Social Media Opportunities in Radiology p. 268

# TABLE OF CONTENTS

HealthManagement • Volume 16 • Issue 3 • 2016

## GUEST EDITORIAL

- 187 At The Crossroads - The Future Of Healthcare**  
Gerry O' Dwyer, President, European Association of Hospital Managers, Ireland  
*Healthcare is at a critical crossroads but where there are challenges ahead there are also opportunities.*

## POINT OF VIEW

- 208 Increased Functionality in 5D Ultrasound**  
Lucie Robson, Senior Editor, HealthManagement.org  
*An outlook on new groundbreaking technology advances – 5D Ultrasound.*
- 213 Philips Launches Minicare I-20 Troponin Blood Test For Rapid Diagnosis of Heart Attack at the Point of Care**  
Veronique Semjonow, Philips Handheld Diagnostics, UK  
*A new rapid diagnosis solution to prevent heart attack and improve patient outcomes.*
- 240 Imaging with EOS® : The Radiologist's View The Orthopaedic Surgeon's View**  
Theodore T. Miller and David J. Mayman, Hospital for Special Surgery New York, USA  
*Speaks about the advantages of EOS imaging technology.*

## SPOTLIGHT

- 194 Breast Density and Choosing Optimal Breast Screening**  
Wendie Berg, University of Pittsburg, USA  
*Interview with expert breast radiologist, Wendie Berg.*
- 196 Tackling Coronary Heart Disease the Biggest Success in 50 Years:**  
Interview with Professor Guy De Backer  
Guy De Backer, Ghent University, Belgium  
*As the countdown starts for ESC in Rome, we ask keynote speaker Prof. De Backer for his perspective on the past, present and future of cardiology in Europe.*
- 200 EAHM Congress Preview**  
Lucie Robson, Senior Editor, HealthManagement.org – The Journal  
*Offers a brief insight into this year's congress programme highlights and keynotes.*

## IN THE NEWS

- 202 No More Ransom**  
Christian Marolt, IT Section Editor-in-Chief, HealthManagement.org – The Journal  
*With many healthcare institutions falling victim to ransomware attacks, new European Initiative No More Ransom is in the spotlight as healthcare is challenged to find the best solutions for IT security.*
- 207 HealthManagement.org's Most Clicked Stories**

## MANAGEMENT MATTERS

- 214 Ahead of the Game**  
*A look into cutting-edge healthcare management technology solutions and best practices of the future.*
- 216 Patient Safety & Risk Management**  
Jos Valanduyt, European Association of Hospital Managers, Belgium  
*New ways to improve patient care and reduce hospital readmission – the IMPO model.*

## COVER STORY: View to the Future

- 230 Will the Hospital of the Future Be Our Home**  
Bertalan Meskó, The Medical Futurist, Hungary  
*With healthcare services being outsourced to the home in an attempt to optimise quality of care and engage patients more, what lies ahead for home healthcare?*
- 232 The Role of Gamification and Engagement Design in the Future of Healthcare**  
Anna Sort, University of Barcelona, Spain  
*Offers a fresh perspective on how gamification and design can improve healthcare and patient outcomes in the long term.*
- 234 Medical Devices and Evidence-Based Clinical Practice: Time to Deliver**  
Alan G. Fraser, Cardiff University, UK  
*An insight into how a shift in EU legislation will bring about changes in regulatory practice for health technology assessment and how this will impact clinical practice.*





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EASE OF USE





- 238 Future Leaders:** What Healthcare Needs For Cybersecurity Risks  
Mansur Hasib, University of Maryland, USA  
*Leaders briefed in both IT and business have to motivate and engage the entire organisational workforce towards preventing cyberthreats.*
- 242 Radiology At the Crossroads**  
Stephen Baker, The State University of New Jersey, Yanira Guerra, Williams College, Massachusetts, USA.  
*Speaks about the challenge of genomics and AI that radiologists have to face on a medium-term basis and how the incorporation of genomics into current practice will revolutionise the diagnostic investigation paradigm.*
- 244 Clinical Use of Coronary CT Angiography:** Change of Paradigm  
Valentin Sinitsyn, Federal Center of Treatment and Rehabilitation, Russia  
*A look forward to a future of noninvasive imaging of all vessels with the help of coronary CT angiography.*
- 246 Medical Device Cybersecurity:** When Will Your Pacemaker Be Hacked?  
ECRI, UK  
*Proposes solutions to enhance data security, with a focus on engagement with clinical IT engineers and risk managers in creating cybersecurity policies and procedures.*
- 248 Advantages of 3D Printing in Healthcare:** One Institute's Collaborative Process Impacts Medicine  
Michael E. Springer, The Jacobs Institute, Richard L. Izzo, State University of New York at Buffalo, USA  
*How one institute is revolutionising medical practice by leveraging interdepartmental collaboration.*
- 251 The Road Ahead Infographic**  
*An outlook on the future of healthcare – robotics, AI and groundbreaking technology advances.*



## BEST PRACTICE

- 252 Advanced Practice:** Maximising the Potential of the Modern Radiographer Workforce  
Julie Nightingale, University of Salford, UK, Jonathan McNulty, University College Dublin, Ireland  
*Looking both retrospectively and forward towards best practice and optimal results, Julie Nightingale and Jonathan McNulty highlight the necessity of implementing a better code of practice to establish a clear-cut distinction between radiographer roles and responsibilities and to maximise potential.*
- 256 Exploring the Future of Radiology:** ESR To Launch New Journal, European Radiology Experimental  
Francesco Sardanelli, University of Milan, Italy  
Prof. Sardanelli Editor-in-Chief of new ESR publication 'European Radiology Experimental'
- 258 Organisational Change in Newly Integrated Medical Imaging Departments:** Increase Commitment By Team Involvement  
Luis Martí-Bonmatí, Valencia University, Ené Regos, Philips Healthcare  
Transformation Services Philips Ibérica S.A.U., Spain, André van Est, Care IQ Group BV, The Netherlands, Ana Penades, Hospital Universitario y Politécnico La Fé and Instituto de Investigación Sanitaria La Fé, Spain  
*Describes how one organisation has fostered change for a unified medical imaging department, through active staff involvement and shared ownership.*

- 266 KLAS Tomosynthesis – Hologic:** Can GE Healthcare and Siemens Compete With Hologic?  
Monique Rasband, KLAS Research, USA  
What are the best technology solutions?
- 268 Social Media Opportunities in Radiology**  
Alex Towbin, Saad Ranginwala, University of Cincinnati, USA  
*Why should radiologists use social media and are there any radiology-dedicated social media tools?*



## COMPASS

- 272 Brexit's Brutal Blow to the NHS**  
Rachel Clarke, Oxford University Hospitals, UK  
*An outlook on the Brexit: what do doctors treat, the patient or the patient's nationality? What does the future hold for the NHS?*



## ZOOM ON PROFILES

- 274 Curtis P. Langlotz**, Stanford University, USA  
**Jorge Muniz**, Medcom, USA  
**Eric Poiseau**, IHE Europe, France  
**Rolf Gomes**, The Heart of Australia, Australia

## SPECIAL SUPPLEMENT p. 217-228

- III Healthcare Executive Alliance:** Insights For Healthcare Leadership  
Bernd Montag, Siemens Healthineers, Germany
- IV Improving Patient Outcomes** How To Define, Measure, and Increase Positive and Reimbursable Patient Care Outcomes
- VIII A Closer Look at Financial Performance in Healthcare** Managing Costs, Risk, and Financing to Create an Economically Sustainable Business
- X The Value of a Good Reputation** How Healthcare Providers Can Improve Their Reputation to Attract More Patients and Qualified Staff

HEALTHCARE EXECUTIVE ALLIANCE  
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# Another Big First for Hologic

## 2D/3D Imaging on a Dedicated Prone Breast Biopsy System

Breast tomosynthesis imaging, Hologic calls it 3D mammography™, is proving to be the best modality for breast cancer imaging. The Hologic tomosynthesis system has demonstrated superior clinical performance to conventional 2D mammography in a number of metrics, in particular showing improved detection of invasive cancers and reductions in recall rate. Now Hologic is offering their tomosynthesis technology on a dedicated prone breast biopsy system.

The new CE-marked Affirm™ prone biopsy system provides enhanced 2D/3D biopsy imaging and faster, easier access to the breast. The new product is an important step forward in biopsy technology — allowing doctors to better target lesions found with 3D mammography™ exams, as well as other screening modalities — with exceptional imaging, improved workflow and seamless, 360-degree access to the breast.

### Clinicians prefer prone systems for breast biopsies

Thousands of clinicians worldwide prefer prone patient positioning instead of upright systems for breast biopsies as prone systems support the patient stably throughout the procedure while isolating them from the biopsy needle. This provides a better overall patient experience.

Alejandro Tejerina, M.D., a radiologist with the Centro de Patología de la Mama, Tejerina Foundation, in Madrid, Spain, one of the first adopters of the new Affirm™ prone system, reports that the feedback from the first wave of patients is very positive.

“We have been suffering to handle complex biopsies of subtle lesions like faint calcifications or distortions that we were only able to see on 3D images,” Dr. Tejerina says. “Older breast biopsy systems are restricted to 2D imaging with a narrow window for targeting the lesions. Often they required multiple x-ray exposures to find and position the suspect tumor for the biopsy needle. With tomosynthesis imaging on the new Affirm™ prone system, there is a much wider field of view, the biopsy device can be positioned anywhere in a 360-degree circle, and areas of suspicion seen only with 3D imaging can be easily biopsied.”

On the previous Hologic biopsy table the biopsy device had to be positioned manually, “the new system does this for us automatically, which saves time,” Dr. Tejerina says. “The software really streamlines our workflow, so the procedure goes faster.” The new Affirm™ Prone table uses translucent paddles and a wider detector. “This helps us see lesions in the first scout and significantly reduce the number of images needed to get to the lesion.”

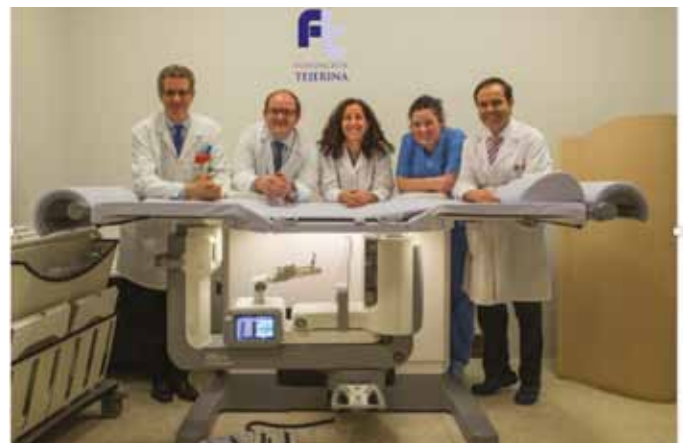


Alejandro Tejerina, M.D., reports that the feedback from the first wave of patients biopsied on the Hologic Affirm™ prone 2D/3D system is very positive.

### Helping the Centre Lead in Breast Health

The Centro de Patología de la Mama, Tejerina Foundation has been leading the way in women’s breast health for over 40 years. In 2000, the Centre pioneered the use of digital mammography in Spain. The Centre was first center in Spain to install a stereotactic guided prone biopsy table in 1997. In 2010 the Centre installed a Hologic Selenia® Dimensions® breast tomosynthesis system, the first site in Spain to use the innovative technology. In 2010 the Centre was also the first site in Spain to combine the Hologic Affirm™ upright biopsy system with the Hologic tomosynthesis system. In 2015 the Centre began offering Hologic’s I-View™ contrast enhanced 2D imaging along with a 3D scan, further increasing the value of a contrast mammography procedure.

The new Hologic Affirm™ prone biopsy system significantly expands the Centre’s breast biopsy portfolio and keeps the Centre in the lead in offering the latest in breast health services to the women of Spain.



The Centro de Patología de la Mama, Tejerina Foundation in Madrid has been leading the way in women’s breast health for over 40 years. Offering tomosynthesis guided breast biopsies on the new Hologic Affirm™ prone 2D/3D biopsy table is another first for the Centre.



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# BREAST DENSITY AND CHOOSING OPTIMAL BREAST SCREENING

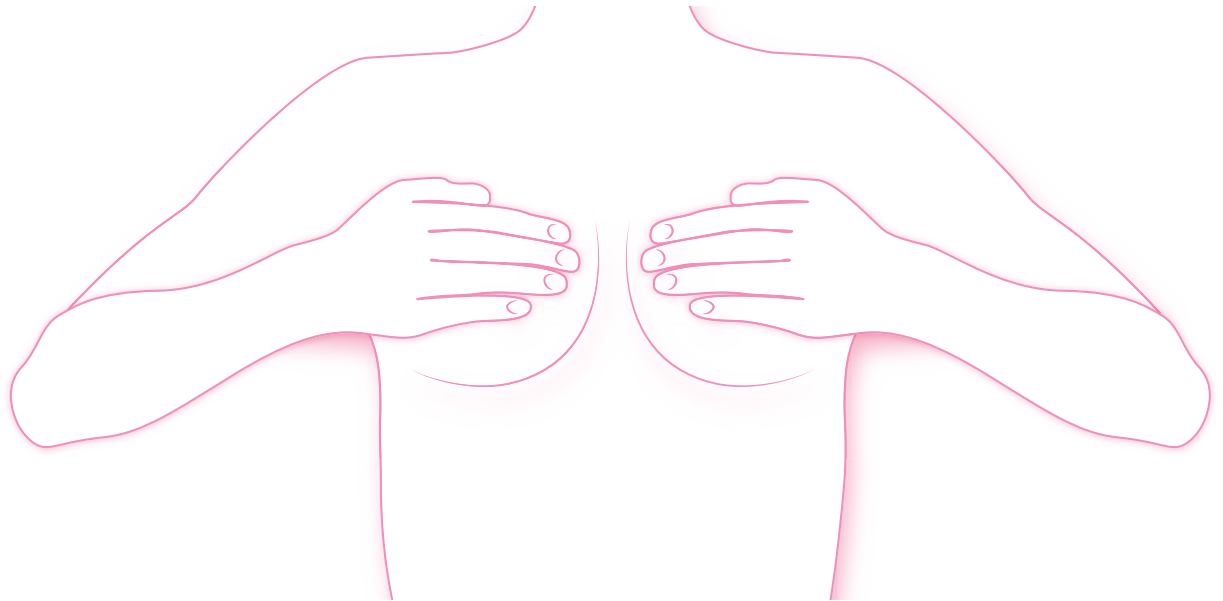


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**DenseBreast-info.org was set up in 2015 to provide education to patients and healthcare providers about dense breasts. How aware are women in the USA about breast density? What still needs to be done?**

As of 1 August 2016, at least 27 states in America require some form of notification about breast density as part of the mammography results letter to patients ([densebreast-info.org/legislation.aspx](http://densebreast-info.org/legislation.aspx)). As such, more than half of American women are receiving some information about breast density. Breast density is described as one of four categories: a) fatty; b) scattered fibroglandular tissue; c) heterogeneously dense which could obscure detection of small masses; or d) extremely dense which lowers the sensitivity of mammography. The latter two categories are considered “dense”. About 40 percent of women of mammography age have dense breasts, and dense breasts are normal.

Despite increasing requirements to inform women about breast density, I think there remains a gap when women are instructed to talk with their physicians about breast density and what to do about it if they have dense breasts. I am very proud to be part of the educational website **DenseBreast-info.org**, which launched in April 2015 as a collaboration between myself, JoAnn Pushkin (patient advocate and founder of DENSE-New York), and Cindy Henke-Sarmento (technologist and entrepreneur). Our website provides much-needed information for both women and their healthcare providers including defining breast density, discussing how

normal dense tissue can mask cancer detection on mammography and that it is also a risk factor for developing breast cancer. Most importantly, we discuss the potential benefits and downsides to supplemental screening with ultrasound or, when appropriate, MRI. We also present areas of ongoing development in breast imaging such as contrast-enhanced mammography and molecular breast imaging. Importantly, breast cancer is often still hidden even on tomosynthesis (3D mammography).

**What needs to be done in order to include all 50 states in the dense breast notification policy? Are you aware of similar policies overseas?**

There is a need for a federal standard, either through a federal law or preferably through regulation with an update to the Mammography Quality Standards Act: ([densebreast-info.org/is-there-a-federal-law.aspx](http://densebreast-info.org/is-there-a-federal-law.aspx)). There are ongoing discussions about informing women of their breast density in several European countries. In Austria, for example, women with dense breasts are routinely offered screening with ultrasound as well as mammography (Graf 2014).

**What role should MRI play in screening for women at high risk of breast cancer?**

In 2007, based mostly on studies done in Europe, the American Cancer Society issued guidelines for screening high-risk women with MRI (Saslow et al. 2007), which have

also been adopted in Europe. The challenge since then has been how to identify such women, and how to make sure those women who are at high risk for developing breast cancer know about the option to have screening with MRI. Our table: “Is My Mammogram Enough?” ([densebreast-info.org/dense-breast-screening.aspx](https://densebreast-info.org/dense-breast-screening.aspx)), is a good place to start, and the flowchart “Who Needs More Screening” ([densebreast-info.org/who-needs-more-breast-screening.aspx](https://densebreast-info.org/who-needs-more-breast-screening.aspx)) is also very helpful. Even in normal-risk women, MRI allows detection of more cancers than we see with the combination of mammography and ultrasound. There are many barriers to widespread use of MRI screening, however. MRI requires an intravenous injection of contrast, and the examination is performed with women lying on their stomach in a tunnel so that women with claustrophobia may have trouble enduring a breast MRI examination. Even when MRI is covered by insurance, there can be a substantial copay or deductible in the United States. I am glad that I knew enough about the risk models and options to choose for myself to have a screening MRI as my 3D mammogram (tomosynthesis) did not show my own cancer. I have dense breasts, and ultrasound also showed my cancer. Fortunately, while my cancer was invasive, it was caught early, and I did not require chemotherapy. That is the goal of screening. When screening works well, chemotherapy can be mostly avoided. That said, like mammography, ultrasound and MRI can result in the need for additional testing such as a needle biopsy for findings that look suspicious but turn out not to be cancer (false positives). I hope that our website will provide women the information they need to have educated discussions with their healthcare providers to help them choose what is best for themselves, given individual variation in tolerance for risks and benefits.

#### Should MRI be used as an alternative for screening? Is ultrasound a reliable tool?

MRI is better at depicting breast cancer than the combination of ultrasound and mammography across all breast densities ([densebreast-info.org/breast-imaging-technologies.aspx](https://densebreast-info.org/breast-imaging-technologies.aspx)). MRI is also more expensive and not very well tolerated by patients. Pioneered by Dr. Christiane Kuhl and colleagues, there is the potential to use a shortened MRI examination for screening to improve patient tolerance and reduce costs (Kuhl et al. 2014). Several sites in the United States are offering this and prospective multicentre evaluation of this approach is planned. Ultrasound is widely available, inexpensive, well-tolerated, and does not require any

injection. Unlike mammography, there is no ionising radiation exposure from either ultrasound or MRI. While some cancers can be found earlier on MRI, it appears that with the combination of ultrasound and mammography, there is a very low rate of “interval” cancers found because of symptoms before the next recommended screening (Berg WA et al JAMA 2012). As such, ultrasound remains an excellent option for most women with dense breasts. For women at high risk because of known or suspected disease-causing genetic mutations (such as some mutations in BRCA1 or BRCA2), annual MRI is recommended in addition to mammography beginning by age 30. Women who had radiation therapy to the chest before age 30 and at least 8 years earlier (such as for Hodgkin’s disease) are also recommended to have annual MRI. It is less clear at what age to stop screening with MRI, but certainly it is not cost effective beyond age 74. Our patient checklist ([densebreast-info.org/img/risk\\_checklist.pdf](https://densebreast-info.org/img/risk_checklist.pdf)) can help prepare a patient to discuss their risk factors and determine their personalised optimal screening strategy with their physician.

“THERE REMAINS A GAP WHEN WOMEN ARE INSTRUCTED TO TALK WITH THEIR PHYSICIANS ABOUT BREAST DENSITY”

You have raised the question of “Is having dense tissue the cause of the risk, or just the amount of tissue density?” Please elaborate.

Not only can dense tissue mask cancer on mammography, but dense tissue is also a risk factor for the development of breast cancer. This is likely due to several factors, including the presence of more glandular tissue where cancers develop and also due to growth factors produced by the supporting tissue. We also know that tamoxifen, a drug which blocks oestrogen receptors, cuts in half the risk of developing breast cancer. Several studies have shown that tamoxifen only produces that benefit in women who experience a measurable decrease in breast density while taking the drug. Most importantly, women with dense breasts should be aware of any changes in their breasts even if their mammogram is normal. Women need to advocate for optimal screening so that breast cancer, if present, can be caught early and easily treated. ■



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# TACKLING CORONARY HEART DISEASE HAS BEEN THE BIGGEST SUCCESS IN 50 YEARS

INTERVIEW WITH PROFESSOR GUY DE BACKER



**Guy De Backer**

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**P**rofessor Guy De Backer, Emeritus Professor at Ghent University, Belgium, will be a keynote speaker at the ESC Conference in Rome on August 27-31, delivering the ESC Geoffrey Rose Lecture on Population Sciences on “Epidemiology and Prevention of Cardiovascular Diseases: Quo Vadis?” Prior to the conference, he gave an interview to *HealthManagement.org* about the past, present and future of cardiology, where he reflected on perceptions and personal experiences working as a cardiologist in a western society. His research domain has been cardiovascular epidemiology and prevention, while, as a clinician, Prof. De Backer has been working in noninvasive cardiology and in particular in cardiac rehabilitation.

**How different is cardiology today from 50 years ago? What would you say are the biggest achievements in this discipline —the human learning or the technology side?**

The cardiological discipline has changed tremendously over the past 50 years. I started my cardiology training in 1968. At that time, we used our clinical experience, electrocardiography, phonocardiography, x-rays and a few biochemical measurements. Patients suffering from an acute myocardial infarction (AMI) were treated with bed rest, pain relief, oxygen and monitoring; most of them were kept in hospital for 4-6 weeks. The rate of return to work was less than 50 percent. Nowadays, an acute myocardial infarction (AMI) can still be very serious, but most uncomplicated cases are discharged after a few days, and return to work is over 85 percent. This is just one example of changes that took place on the basis of better knowledge, better treatments and societal changes.

Personally, I think that the greatest achievement in cardiology has been the reversal of the epidemic of coronary heart disease (CHD) that started after World War II. In most western European countries, we have been able to reduce CHD mortality by more than 50 percent over the last 30-40 years. A large proportion of the gain in life expectancy that we have observed in the past 30 years is due to fewer cardiovascular deaths.

More than half of that gain—and in some countries such as Finland up to 70 percent of the reduction of CHD mortality—is related to prevention and the rest to better treatments.

Prevention means in the first place smoking cessation and, a balanced healthy diet and physical exercise. Unfortunately,

in more recent years, we have seen a growing epidemic of obesity and type 2 diabetes, important risk factors for CHD; the gain in CHD mortality that we observed mainly in the 1980s and 1990s seems to have slowed down in recent years.

CVD prevention is possible and has worked and this is not on the basis of new technologies, but due to better insights into pathogenesis, epidemiology and CVD risk factors. One of the main challenges nowadays is the implementation of that scientific knowledge into practice, a challenge for society including cardiologists and their societies.

But cardiology has also gained a lot from discoveries in the field of pharmacology and medical devices. The latter has led us to a discipline with a different kind of ‘super-specialist’, dealing exclusively with electrophysiology, percutaneous coronary intervention (PCI), percutaneous aortic valve replacement (PAVR), support devices etc.

**“IN EUROPE, WE HAVE FAILED IN DECREASING THE SOCIAL INEQUALITIES IN HEALTH AND THIS IS ALSO TRUE WITHIN THE FIELD OF CARDIOLOGY”**

These developments are fascinating and very welcome, but in terms of “what is best?” they should not be balanced against prevention or noninvasive approaches. The trend towards a more personalised medicine is welcome in this respect; each patient should be considered on his own and the best approach for their personal problem should be offered on the basis of expert opinion from a team of cardiologists in dialogue with the patient. All these different approaches should also receive sufficient support for further research and development.

For noninvasive cardiologists, one of the challenges is that within an actual generation we have prevented premature CVD mortality and disability-adjusted life years (DALYs), but the result is more a postponement than a complete prevention; this has resulted in an epidemic of more advanced clinical entities of atherothrombotic cardiovascular disease (CVD)



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in the elderly and in the very old, such as heart failure and vascular dementia. This requires more care than cure and will increase healthcare costs.

### Where would you like to see new achievements in the next few years?

For the immediate future, I think that we need more research on preventive strategies, a shift from aetiological research into preventive research. We need to know how to overcome the barriers for the implementation of prevention guidelines into daily clinical practice. At the level of the individual patient we hope that epidemiological research will help us in understanding the complex interactions between the genome and the environment. This could help us in identifying novel targets for a more personalised preventive strategy.

### How important is multidisciplinary teamwork in cardiac rehabilitation?

Cardiology has always required teamwork and in the field of CVD rehabilitation this is even crucial.

In my experience in the cardiac rehab unit in Ghent University Hospital, the social nurse was the key player in identifying in a given patient the problems that affected his or her quality of life. Based on that information, the whole team was responsible for relieving these problems in order to achieve the most optimal results for that patient. The same is true for the management of patients with chronic heart failure, where the 'heart failure nurse' is in a key position to coordinate the efforts made by the cardiologist, the family doctor, the dietician and the physiotherapist. It is probably true that what the cardiologist has said to the patient may be differently perceived by the patient than what comes from the other team members; therefore it is crucial that all team members know what message to give and what goals to reach.

### How important has the European Society of Cardiology contribution been to improving quality of healthcare, technological development and also education of young cardiologists?

The European Society of Cardiology (ESC) has played a major role in bringing cardiologists together in Europe. In the 1960s and 1970s, European cardiologists went mostly to the scientific meetings of the American Heart Association and the American College of Cardiology; these meetings are still of great interest, but the meetings of the ESC and affiliates (associations, councils, working groups, etc.) have improved tremendously and attract more and more attention in Europe and globally. Initially, we met mainly to discuss study results and to exchange experiences; this has expanded to other aspects related to education, continuing medical education, research, guidelines, surveillance, networking and international collaboration.

### What do you see as the biggest healthcare problem in Europe today?

It is hard to identify 'the biggest health problem in Europe

today'. It depends on how you define health in the first place. Personally, I feel that we have failed in decreasing social inequalities in health, and this is also true within the field of cardiology. We have been successful in decreasing CVD mortality in all classes of society, but the social differences that existed already years ago have not diminished.

### How important is it to have both public and private healthcare? Which one is more efficient?

Healthcare is responsible for a large proportion of the gross national product in most societies in Europe and public money should be spent as efficiently as possible. Different healthcare systems have been tested in Europe; they all have advantages and limitations. We should learn from each other. Good management of large departments in university hospitals that are responsible for teaching, medical care and research is very important and this requires the input of a team of experts from different disciplines.

### If you had not become a cardiologist, what would you be today?

In my experience the choice of a professional career is not influenced by inspiration but mainly by circumstances. I never thought of doing something else. I have had the great privilege of working in almost ideal circumstances, in a community free of war and catastrophes, doing a job that I loved with a family that gave me a maximum of opportunities. I do not believe in reincarnation. So that will be it. ■



## Key Points

- ✓ The greatest achievement in cardiology has been the reversal of the of coronary heart disease (CHD) epidemic that started after World War II.
- ✓ Prevention of CHD means in the first place no smoking of tobacco, a balanced healthy diet and physical exercise. Unfortunately in recent years the prevalences of obesity and of type II diabetes have increased and counteract what has been gained in the 80s and 90s.
- ✓ CVD prevention has worked, not on the basis of new technologies, but on better insights into pathogenesis, epidemiology and good management of CVD risk factors.

# INNOVATIVE SOLUTIONS ADDRESSING CHALLENGES OF COMPLEX CARDIOVASCULAR DISEASE

## An integrated approach to interventional cardiovascular medicine

According to the American Heart Association, cardiovascular diseases (CVDs) are the leading cause of death worldwide.<sup>[1]</sup> As CVDs are on the rise, it's important to understand the risk factors associated with complex heart disease, as well as the impact of innovative solutions that can offer the best clinical benefit for both prevention and treatment.

In recent years, we've seen major progress in the shift from invasive and costly procedures to enhanced workflow and more integrated approaches to the diagnosis and treatment of heart disease. A combination of new innovations in image guided procedures and high-precision imaging technology has provided clinicians with increased confidence to deliver exceptional patient outcomes, enabling faster recoveries, improved patient care, and ultimately reduced healthcare costs.

Leading professional societies in the field of cardiology have recommended percutaneous coronary intervention (PCI), a minimally invasive procedure using real time image guidance, for treatment of coronary artery disease. According to the National Institute for Cardiovascular Outcomes Research (NICOR), in recent years, the number of PCI procedures has increased significantly, with worldwide research showing it to be more efficacious and cost effective than drug treatment.<sup>[2]</sup> However, the procedure itself does have limitations, with multiple factors used to determine whether a patient is suitable. For example, X-ray image guidance, though a mainstay for imaging is often limited to two-dimensional images. This is challenging because a full view of the artery is needed to confirm the extent of the blockage.

### Integrated approach for innovative solutions

"Primum non nocere" or "first do no harm" has long been a principal tenet of medical training. Knowing when not to treat is just as important as knowing when treatment is required.

When it comes to definitive diagnosis and ultimately treatment, the best approach is an integrated approach. This takes into consideration the level of risk for PCI over invasive surgery and uses precision diagnostic tools that provide clinicians with a holistic view of the entire patient's condition. We aim to provide interventional cardiologists with integrated solutions that not only allow real-time image guidance, but also a precise and detailed "roadmap" of the vessels of the heart, which can be closely monitored throughout the entire PCI procedure. Watch a recent session on complex PCI approaches to learn more.

Fractional flow reserve (FFR)\* has been a revolution in helping physicians decide when to treat coronary lesions. Some can appear significant on angiogram when they are truly non-flow limiting and we have seen a positive trend over the last decade to transition from only angiographic-guided treatment to one with support of physiologic-guided treatment. FFR is a tool that gives the ability of true physiological assessment of the coronary vessel. The landmark DEFER study has now shown with 15 years of robust patient follow up, that by using FFR to help decide when not to perform PCI in single vessel disease, we can actually lower a patient's risk of myocardial infarction. In other words, "primum non nocere."



**Bert van Meurs**  
CEO Image Guided Therapy, Philips

Despite strong outcome data, FFR is still underutilized, partially because of workflow challenges related to physicians having to inject vasodilators like adenosine to induce hyperemia. Instant wave-free ratio (iFR)\*\* is a novel technology that now improves the FFR workflow by eliminating this additional step, and also the cost of the FFR vasodilator. These technologies are a win-win as they help physicians not only treat patients, but also help our society realize cost benefits, by reducing unnecessary treatments and hospital readmissions.

Philips has integrated this approach with its intravascular ultrasound (IVUS)\*\*\* guidance. By meaningfully co-registering the IVUS and angio images together, this can help reduce the risk of not completely treating a lesion with a single stent – so called "geographic miss", which study data suggests may occur in 66.5% of PCIs. Of course having to place a second stent adds not just complexity to the case, but also cost.<sup>[3]</sup> If FFR/iFR indicates stenting is warranted, Intravascular imaging technology confirms if the stent has been placed appropriately or needs a "touch-up".

Through integrated approaches, we are increasing possibilities for patients to undergo minimally invasive PCI treatment, offering the possibility for quicker patient recovery time and fewer complications in comparison to invasive surgery. These technologies give confidence to make clinical decisions that help save costs often associated with complex procedures and invasive bypass surgeries.

Coronary artery disease and PCI is just one facet of CVD. Philips offers innovative and integrated solutions for structural heart disease and cardiac electrophysiology, keeping true to our vision of improving clinical excellence by helping physicians decide, guide and confirm the right therapy for each patient at the point of care.

\*With FFR clinicians can accurately assess blood flow reserve in the coronary artery. Through a high-tech, miniaturized pressure sensor mounted on a guidewire that is inserted into the coronary artery, it is possible to identify where blood flow is reduced and ultimately determine the artery location to guide treatment strategy for the PCI procedure.

\*\*iFR technology acts in a similar manner to FFR – but instead measures blood flow without needing a second measurement in hyperemia induced by an accompanying drug.

\*\*\*IVUS is a catheter based system that provides a precise anatomical perspective from inside the coronary artery, with a 360° view and detailed look at the nature of plaques that build up on the artery wall that can lead to vessel blockage.

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# PHILIPS





# EAHM 26TH EUROPEAN ASSOCIATION OF HOSPITAL MANAGERS CONGRESS



Everybody in healthcare across the C-Suite, clinician, policy-maker, nursing and IT spectrum is aware of how critical the situation is by now; healthcare in Europe is just not sustainable. The demands facing European healthcare systems are becoming greater with increased life expectancy, new pathologies and the rise of chronic disease. Added to this is a highly-monitored environment and increase in awareness of patient rights and, quite rightly, higher expectations from this body. At the same time, technology is swiftly developing alongside advances in diagnostics. This all should point to better patient outcomes but the bottom line is that few hospital budgets can sustain the related costs in a time of public cuts.

The 26th European Association of Hospital Managers (EAHM) Congress organised jointly with the National Association of Hospital Medical Directors (ANMDO), will put all of these issues in the spotlight under the title of *Sustainable Healthcare, Needs, Responsibility and Competence* with an array of eminent experts invited from around the continent to provide insights into how to effectively manage the changes taking place in healthcare.

“It is this gap between the health systems ‘inputs’ and ‘outcomes’ that hospital management have to bridge – that is our responsibility,” say EAHM and ANMDO about the theme for this year’s event. “We can confidently predict that the demands on and for healthcare will only continue to increase, the gap will widen and the challenges will grow if left unchecked. This requires appropriate solutions both now and in the future

to prevent a crash of our health systems and to guarantee sustainability. This challenging responsibility for hospital management demands competence and leadership to expertly steer internal processes efficiently and effectively.”

Speakers will share their experience on how to meet the challenges of sustainability in healthcare in the immediate and longer-term future.

“Through such expert collaboration and shared learning we can articulate the required competencies to contribute to a sustainable health care system and convince our politicians and stakeholders, that public financing of healthcare is not purely a question of cost but also an undeniable investment in the future welfare of people.”

Additionally, participants will get the opportunity to exchange ideas during podium discussions and interactive breakout sessions in an exploration of specific themes and a search for solutions.

The congress takes place in mid-October. Satellite professional and social programmes will enhance the two-day congress and offer further opportunities for networking amongst participants.

The gathering will start with a pre-congress event on the theme of *Future Hospitals* organised with Siais on Wednesday, October 12. It will cover themes that include future trends in hospital functions, the future of single-speciality hospitals, the building flexibility, structure and management efficiency (routes, transportation and supplies) and elements characterising the quality and comfort for patients and medical

practitioners. At the end of the seminar there will be a technical visit to the cardiothoracic vascular Medical Centre at Saint Orsola Malpighi University Hospital in Bologna.

On the same day there will also be a meeting amongst board members and Excom members.

The congress proper will open on Thursday, 13 October with a performance by the Choir Collegium Musicum (Alma Mater Studiorum) University of Bologna. EAHM President, Gerry O’Dwyer and ANMDO National President Gianfranco Finzi will introduce the event. A keynote speech by Paolo Biscottini, “Il corpo dell’uomo”, will introduce the first session of the congress, *Sustainability and the Future of Healthcare Systems*.

Presentations on the future-oriented welfare systems, new paradigms in medicine and in ethics, the example of oncology; how to measure appropriate expenses and a panel discussion will follow.

On the morning of Friday, October 14, the congress will open with a session on *Values and Liability of Professionals*. A rich range of topics bound to be of interest to healthcare professionals include values and liability of professionals, quality in healthcare 2030: a challenge for hospitals, ethics in management and patient outcomes. This will be followed by a panel discussion of healthcare leaders and experts.

The third session of the congress is on Friday afternoon. *Focusing on Leadership and Competence of Managers*, themes covered include the role of CEO’s in improving the quality of hospital outcomes, leadership needs for sustainability of healthcare, facing up to the challenges of System Leadership, a diffused leadership for high-value healthcare.

Two satellite sessions will focus on the central topics of IT health Information Exchange in a range of European countries and Mental Health.

Bologna is a historic spot so congress organisers have prepared an opportunity for family or friends who are accompanying congress participants to enjoy the town itself and surrounding cities with optional tours to Florence, Parma and Ferrara at an additional cost.

“IT IS THIS GAP BETWEEN THE HEALTH SYSTEMS ‘INPUTS’ AND ‘OUTCOMES’ THAT HOSPITAL MANAGEMENT HAVE TO BRIDGE – THAT IS OUR RESPONSIBILITY”

On both days partners from the healthcare industry will provide an overview of their products and services in an attractive exhibition, presenting innovations and imparting specialist knowledge in their own workshops.

Before and after the day programme participants will have the chance to engage in further intensive exchanges of ideas, discussions, and networking with a Gala Diner on Thursday kicking off these opportunities.

The 26th European Association of Hospital Managers Congress takes place from October 13 – 14, 2016 in Bologna Italy at the Palazzo dei Congressi. For more information and registration go to: [www.eahm-bologna2016.com](http://www.eahm-bologna2016.com) ■



Gerry O’Dwyer  
EAHM  
President



Gianfranco Finzi  
ANMDO  
National President



# NO MORE RANSOM

LAW ENFORCEMENT AND IT SECURITY JOIN FORCES TO FIGHT CYBERCRIME

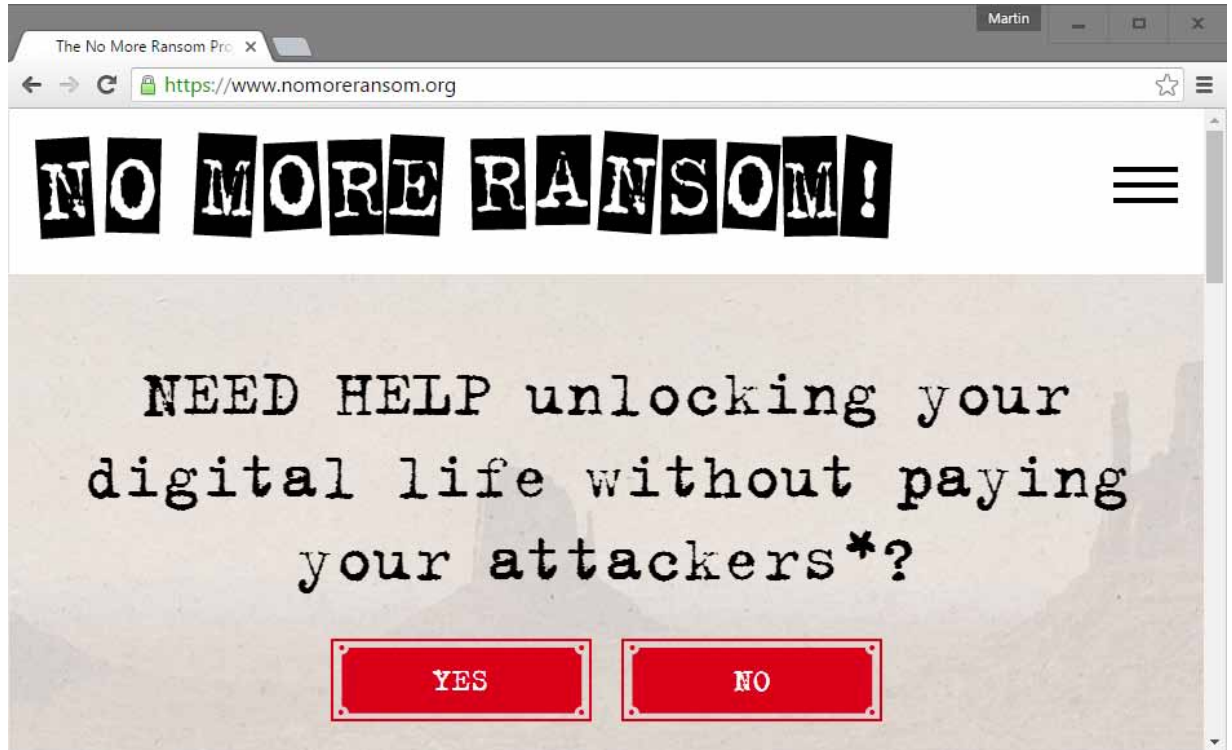


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There are two simple yet effective preventive measures that a public or private enterprise must put into place to stop cybercriminals in their tracks says Europol; practice pristine digital hygiene and keep anti-virus protection up-to-date.

While these steps should be taken as the bare minimum to protect an organisation, if the dramatic increase in cyber-crimes is anything to go by, they are being widely overlooked.

According to Kaspersky Lab, the number of users attacked by crypto-ransomware rose by 5.5 times, from 131 000 in 2014-2015 to 718 000 in 2015-2016. Ransomware is a top threat for EU law enforcement: almost two-thirds of EU Member States are conducting investigations into this form of malware attack.

Ransomware attacks on healthcare facilities are increasing with reports of incidents hitting the headlines on a regular basis.

“The increase has been evident over the past three to five years,” a Europol spokesperson told HealthManagement.org. “There are two things you can do immediately to protect your organisation from cyberhacking. Firstly, exercise digital hygiene amongst staff. This means staff need to be educated to not open emails from unknown sources for

example. The second is to keep your anti-virus up to date. It’s amazing how organisations fail to implement these two basic measures and how much disruption this can cause.”

With staff so central to the prevention of potentially devastating cyberattacks, it may come as a relief to healthcare facilities that Europol said, contrary to some media reports, the law enforcement body is not aware of widespread cases of personnel actually cooperating with cybercriminals.

HealthManagement.org was speaking to Europol after its July launch of *No More Ransom*, a website initiative by Europol’s European Cybercrime Centre, the National High Tech Crime Unit of the Netherlands’ police and two cyber security companies – Kaspersky Lab and Intel Security. The goal is to help victims of ransomware retrieve their encrypted data without having to pay the criminals. The initiative is open to other public and private parties.

The site provides a guide to what ransomware is, how it works and, most importantly, how to ensure protection of data. The project provides users with tools that may help them recover their data once it has been locked by criminals. In its initial stage, the portal has four decryption tools for different types of malware, the latest developed in June 2016.



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## Europol Cybercrime Key Findings

- Cybercrime is becoming more aggressive and confrontational. Various forms of extortion requiring little technical skills suggest changes in the profile of cybercrime offenders, and increase the psychological impact on victims.
- Ransomware attacks, particularly those incorporating encryption, were identified as a key threat both in terms of quantity and impact.
- Due to the support for many of the 'old school' banking Trojans such as Zeus, Citadel or Spyeeye being withdrawn, either voluntarily or as a result of law enforcement action, the use of many of these products is in decline, paving the way for a new generation of malware such as such as Dyre or Dridex.
- The number and frequency of publicly disclosed data breaches is dramatically increasing, highlighting both a change in attitude by industry and that data is still a key target and commodity for cybercriminals.
- Rather than devising novel attack methods, most cyber-attacks rely on existing, tried and tested exploits, malware code and methodologies such as social engineering, which are re-used and recycled to create new threats.
- The lack of digital hygiene and security awareness contributes to the long lifecycle and continued sales of exploit kits and other basic products through CaaS models, bringing opportunities and gain to the criminal masses.
- The use of anonymisation and encryption technologies is widening. Although these address a legitimate need for privacy, they are exploited by criminals. Attackers and abusers use these to protect their identities, communications, data and payment methods.
- Bitcoin is establishing itself as a single common currency for cybercriminals within the EU.

Source: Europol <https://iii.hm/4v6>

"Cybercrime has changed a lot in the last few years. Hackers are becoming more professional and aggressive."

If a hospital or other healthcare facility is successfully hacked Europol said that management of the body should not hesitate to report the incident to police.

"It is critical that when an organisation is hacked, that they report it to police right away," the spokesperson said. "We have fortunately noticed a trend toward this while before, the instinct of many companies was to keep it under wraps because they didn't want a negative impact on their reputation. But the role any hacked enterprise plays in fighting cybercrime is very important and the first step is reporting as soon as they detect a data breach. Europol can support a hacked organisation and help them retrieve their data."

Under no circumstances should an organisation pay the cybercriminals, *No More Ransom* says.

"Paying the ransom is never recommended, mainly because it does not guarantee a solution to the problem. There are also a number of issues that can go wrong accidentally. For example, there could be bugs in the malware that makes the encrypted data unrecoverable even with the right key."

In addition, if the ransom is paid, it proves to the cybercriminals that ransomware is effective. As a result, cyber-

**“IT IS CRITICAL THAT WHEN AN ORGANISATION IS HACKED, THAT THEY REPORT IT TO POLICE RIGHT AWAY”**

criminals will continue their activity and look for new ways to exploit systems that result in more infections and more money on their accounts, the initiative says.

While *No More Ransomware* describes itself as 'outreach' for the public, most details of Europol's cybercriminal-fighting activity is kept firmly under wraps for security reasons.

"I'd like to think that we will get ahead of cybercriminals – our team is made up of the best in Europe," said the spokesperson. "We're bringing hackers to justice every day but this information is not publicly releasable as arrests and investigations across pan-European cybercriminals networks continue. Eventually we will bring down cybercriminals."

For details on *No More Ransom* go to: [nomoreransom.org](http://nomoreransom.org)

Europol produces an annual Internet Organised Crime Threat Assessment (IOCTA) document with information on the state of cybercrime in Europe, key findings, operational priorities and general observations. The next document will be available online at the end of September at: [europol.europa.eu/iocta](http://europol.europa.eu/iocta) ■

## No More Ransom: Types of Ransomware

### Encryption Ransomware

- Encrypts personal files and folders.
- Affected files are deleted once they have been encrypted, and users generally encounter a text file with instructions for payment in the same folder as the now-inaccessible files.

### Lock Screen Ransomware — WinLocker

- Locks the computer's screen and demands payment.
- Presents a full screen image that blocks all other windows.
- No personal files are encrypted.

### Master Boot Record (MBR) Ransomware

- Part of the computer's hard drive that allows the operating system to boot up.
- Changes the computer's MBR so that the normal

boot process is interrupted.

- Instead, a ransom demand is displayed on the screen.

### Ransomware encrypting web servers

- Targets webservers and encrypts a number of the files on it.
- Known vulnerabilities in the Content Management Systems are often used to deploy ransomware on web services.

### Mobile device ransomware (Android)

- Mobile devices (mostly Android) can be infected via "drive-by downloads".
- Can also get infected through fake apps that masquerade as popular services such as Adobe Flash or an anti-virus product.

Source: No More Ransom <https://iii.hm/4v5>

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# HEALTHMANAGEMENT.ORG'S MOST CLICKED STORIES

Every week *HealthManagement.org* publishes top healthcare management, leadership and best practice news of the week in dedicated newsletters. We know you're busy, so we do all the work and pick the best three stories to send you. Read on for a variety of topics that piqued record interest recently.

## MRI-Guided Ultrasound to Treat Tremor Gets OK From FDA

The U.S. Food and Drug Administration has given the green light to a focused ultrasound device that uses magnetic resonance (MR) images taken during the procedure to treat essential tremor in patients who have not responded to medication. See more at <https://iii.hm/4br>

## More Errors with EHR over Paper Records

A Journal of the American Medical Informatics Association (JAMIA) study found that doctors made more errors in Electronic Health Record (EHR) note-taking than in paper records. The study, which focused on medical reporting at a Michigan hospital, showed progress notes in the first-stage implementation of EHRs contained more mistakes to paper charts. See more at: <https://iii.hm/4aw>

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# INCREASED FUNCTIONALITY IN 5D ULTRASOUND



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With the aim of reducing the time factor and increasing convenience in ultrasound procedures, Samsung keeps expanding its offering in women's healthcare with a novel 5D flagship system WS80A with Elite.

2D offered axial imaging to ultrasound, 3D contributed the capacity for volume and 4D ultrasound combined time and volume. The fifth dimension of ultrasound is all about workflow, which WS80A with Elite virtually automates.

This high-resolution premium system offers enhanced diagnostic capabilities and expanded 5D features – including a new CNS (Central Nervous System) and fetal heart application – building on Samsung's WS80A platform.

The 5D CNS+ provides nine planes (axial, coronal, sagittal planes) of the fetal brain with anatomical landmarks and six biometric measurements (BPD, HC, OFD, Cerebellum, Posterior Fossa, Atria lateral ventricle) from the perspective of three transverse views. All of this can be generated from one volume of the fetal brain to enhance measurement reproducibility and streamline workflow.

“5D CNS+ has the potential to provide to the sonographers accurate and reproducible measurements of the fetal CNS and to automatically retrieve the diagnostic planes of the fetal brain”

Prof. Giuseppe Rizzo, Professor of obstetrics and gynecology, University of Rome Tor Vergata, Rome, Italy; President, Italian Society of Ultrasound Obstetrics and Gynecology

The 5D Heart Color application generates nine standard fetal cardiac views simultaneously in a single template. Samsung anticipates that the technology will lift the burden of the screening and diagnosis challenge for congenital heart disease, a leading organ-specific birth defect.

"Samsung plans to keep up with delivering solutions that highly benefit professionals in the Obstetrics & Gynecology field. Our WS80A with Elite performance package incorporates the latest innovations including an expanded set of 5D workflow applications", said Insuk Song, Vice President and Head of Marketing for Health and Medical Equipment Business at Samsung Electronics.



Identifying which ultrasounds were the most time-consuming and aiming to improve the process were the factors that led Samsung to enter the 5D ultrasound market.

A technology that is a form of automation, 5D allows physicians to do a scan and have the results auto-populated. This improves workflow dramatically, said Insuk.

Improved consistency through standardized measuring and data searching is a further advantage of the platform.

Samsung is currently the sole player in the 5D ultrasound field. The Samsung WS80A with Elite performance package has received 510(k) clearance.

“ Our experience with Crystal Vue over the past few months, specifically imaging of the bone and soft tissue interface, leads us to believe that it may offer new opportunities for prenatal imaging, particularly for the skeletal system, but also in facial and brain imaging... We were able to obtain highly detailed images that give particular information on the contour of the ribs and allow inference on mineralization ”

Dr. A. Dall'Asta, Dr. G Paramasivam & Dr. Christoph Lees, Centre for Fetal Care, Imperial College Healthcare NHS Trust, London, UK\*

Through this flagship ultrasound equipment from Samsung, users can also gain access to eye-opening imaging solution such as the Crystal Vue. Visualising the interior and exterior structures of the fetus with new volume rendering technology, Crystal Vue provides boundaries of soft tissue and anatomical structure that can help diagnose abnormalities. This recent upgrade from the leader in the women's healthcare was introduced in the Ultrasound in Obstetrics and Gynecology (UOG) March issue as the image of the month.



Figure 1. 5D CNS+

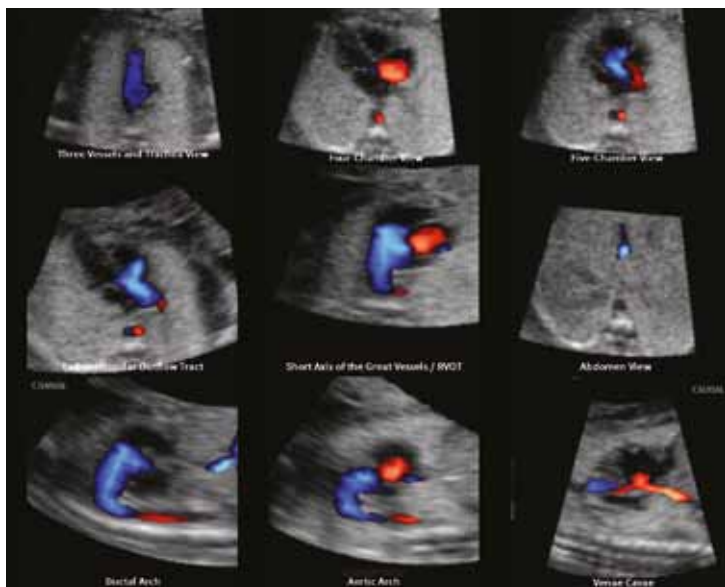


Figure 2. 5D Heart Color

### Further Information

For detailed information on Crystal Vue and WS80A, please visit [http://www.samsungmedison.com/micro/WS80A\\_with\\_Elite/main.jsp](http://www.samsungmedison.com/micro/WS80A_with_Elite/main.jsp)

### Key Features

#### Hybrid imaging engine evo

Optimal 2D and color image quality together with a fast frame rate enable powerful processing and reduced noise.

#### S-Harmonic

This new harmonic technology improves image clarity, near to far. Reducing signal noise, S-Harmonic provides more uniform ultrasound images.

#### ClearVision™

Provides speckle reduction, edge and contrast enhancement.

#### Crystal Vue

Crystal Vue is an advanced volume rendering technology that preserves context and surface information of 3D ultrasound. Crystal Vue easily differentiates between the boundaries of soft tissue and anatomical structures and provides additional information for detailed anatomic evaluation to ascertain fetal risk and diagnose abnormalities.

#### S-Vue Transducers

Four S-Vue transducers provide broader bandwidth and higher sensitivity, and enable best resolution and great penetration. They are lightweight and ergonomically designed for user comfort.

#### DISCLOSURE:

"Point of View" articles are part of the HealthManagement.org Corporate Engagement Programme



#### REFERENCE

Dall'Asta A, Paramasivam G, Lees CC (2016) Crystal Vue technique for imaging fetal spine and ribs. *Ultrasound Obstet Gynecol.* 2016 Mar;47(3):383-4. doi: 10.1002/uog.15800.



### Mergers Rise in 2016: Response to Value-based Care Drive

Mergers and Acquisitions have increased year-on-year, said Kaufman Hall with the first half of 2016 showing more activity in the same timeframe as 2015. A report said the drive toward adapting to rapid change in the industry and new payment models was one of the key triggers to the rise. See more at: <https://iii.hm/4kx>

### Investment Hints at Future Healthcare Priorities

In the first part of 2016, patient experience, Big Data analytics and personalised medicine have attracted a record-setting quantity of investment funding, indicating where hospital leaders should be focusing their attention. According to a report published by StartUp Health, early stage investments have reached close to \$4 billion this year. The funds were invested into 155 deals at seed and Series A in the investment process. The five leading investment groupings were as follows: Patient experience (\$958 million); Wellness with (\$854 million); Personalised medicine with (\$524 million); Big Data analytics (\$406 million); Workflow (\$328 million). See more at: <https://iii.hm/4b6>

### Few Young Doctors Are Training To Care For U.S. Elderly

A report in Kaiser Health News has highlighted the serious lack of physicians available to tend to the growing population of elderly in the U.S. saying the problem is going to get worse in the future. The dearth of appropriate physicians is likely to worsen by 2030 when one in five Americans will be entitled to Medicare, the state health insurance. The United States has 130 geriatric fellowship programs, with 383 positions. In 2016, only 192 of them were filled. The stumbling block appears to be the level of debt the average medical student graduates with: \$183,000. See more at: <https://iii.hm/4g2>

### New AMA Telemedicine and Telehealth Guidelines

New ethical guidance adopted at the American Medical Association's (AMA) Annual Meeting will help physicians understand how their fundamental responsibilities may play out differently when patient interactions occur through telemedicine, compared to traditional patient interactions at a medical office or hospital. The new ethical guidance on telehealth and telemedicine was developed over the past three years by the AMA's Council on Ethics and Judicial Affairs, and adopted by a vote of physicians from every corner of the country. See more at: <https://iii.hm/3x8>

### Using Sugar To Detect Cancer: A Game Changer For Screening

Early detection of cancer, usually through advanced medical imaging, is crucial as it increases the chances of survival and the potential for full recovery and the EU-funded GLINT project will develop a ground-breaking new technology which allows for less invasive, more accurate and earlier diagnosis. See more at <https://iii.hm/3h1>

### Cybersecurity: Who Can You Trust?

An Institute for Critical Infrastructure Technology (ICIT) report highlighted a new threat to cybersecurity in healthcare; technology companies that cannot deliver the security that they promise. The report showed that CISOs now have to deal with an avalanche of information from IT security vendors touring for business and not all of it is helpful or even accurate. See also: <https://iii.hm/4at>

### 9 Best Practices for IT Project Management

Companies and organisations struggle to keep an IT project within schedule and budget. According to a PricewaterhouseCoopers study of 10,000 projects from 200 companies in 30 countries, only 2.5 percent of companies succeeded in completing their IT projects and the Journal of the Medical Informatics Association says that healthcare's track record is even worse than that of other sectors. Nine recommendations for proper IT project management are: Solid IT governance; Connect IT and Admin; Connect IT with Business Strategy; Develop a Standard Open Planning Process; Supplement Planning Process; Maintain Effective Communications; Have the Right IT Skills; Expect the Unexpected; Document Project Closures. See more at: <https://iii.hm/424>

### Doctors Demand Apology: BMJ Medical Error Deaths 'Shoddy' Study

Two Pennsylvania doctors reacted against a BMJ paper that claimed one third of deaths in the U.S. are caused by medical errors. They called for the journal to retract the paper and apologise to the medical community. BMJ editors have responded by saying they are standing by the study and have no intention of retracting it. See more at: <https://iii.hm/4f4>

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**JMIRS: Many Still Not Fully Aware of Dose Risk from CT Scans**

A survey of about 300 healthcare professionals in Canada found that radiologists and technologists generally had better knowledge than referring physicians when it comes to radiation dose levels and potential risk. See more at <https://iii.hm/439>

**New Guidelines For Using Nonstatin Cholesterol-Lowering Drugs**

The American College of Cardiology (ACC) has released an "Expert Consensus Decision Pathway" document on the role of nonstatin therapies for low-density lipoprotein (LDL) cholesterol lowering in the management of cardiovascular disease risk. The document was published in the Journal of the American College of Cardiology. Donald M. Lloyd-Jones, MD, the Chair of the writing committee explains that the ACC updates cholesterol guidelines back in 2012 but since then new data from clinical trials has been gathered for at least three new cholesterol-lowering medications. This new document was issued to advise on the use of these new nonstatin medications. See more at: <https://iii.hm/4bx>

**RSI With MRI Distinguishes Prostate Cancer Tumour Grade**

A magnetic resonance image (MRI) of a prostate enhanced with restriction spectrum imaging (RSI). Higher grade tumour is indicated by orange and yellow. Physicians have long used MRI to detect cancer, but results of a study in California describe the potential use of RSI as an imaging biomarker that enhances the ability to differentiate aggressive prostate cancer from low-grade or benign tumours and guide treatment and biopsy. See more at: <https://iii.hm/3qm>

**Half of Transcatheter Heart Valves Degenerate Within 10 Years**

A study presented at EuroPCR 2016 shows that half of transcatheter heart valves may undergo degeneration within 10 years. A significant number of valves showed degeneration between five and seven years after TAVI. This is the first study to evaluate the long-term durability of these valves. See more at: <https://iii.hm/3f4>

**Pokémon Go May Decrease Type 2 Diabetes Burden**

Leading diabetes researchers believe that Pokémon Go could be an innovative solution to rising obesity levels and chronic disease and could be an easy and accessible way to get active and maintain a healthy body. See more at: <https://iii.hm/4ma>

**EHR Leading to Burnout**

The expansion of the electronic environment in healthcare is coming at a cost. According to a national study of physicians led by Mayo Clinic, the use of electronic health records (EHRs) and digital physician order entry is leading to increased professional burnout and lower job satisfaction. Unintended negative consequences include reduced efficiency, increased clerical burden and increased risk of burnout for physicians. See more at: <https://iii.hm/48n>

**Are fMRI Analyses Not To Be Trusted?**

Researchers in Sweden and the U.K. have shown that common statistical methods to analyse brain activity through images taken with MRI scanners had a twelve times higher rate of false results than normal. The team published their findings based on data collected from nearly 500 cases in the esteemed American scientific journal Proceedings of the National Academy of Sciences (PNAS). Their work suggested that common statistical methods using functional magnetic resonance imaging (fMRI) to measure brain activity by detecting changes associated with blood flow cannot be trusted. See more at: <https://iii.hm/43a>

**Solution ER Overcrowding: Tele-triage**

With unpredictable rises in Emergency Department use, one Florida health system brainstormed to develop a strategy to deal with the unexpected volume with tele-triage. How it works is the programme enables patients to connect with doctors via video conferencing moving them through the Emergency Department (ED) more swiftly. See more at: <https://iii.hm/4oj>

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# PHILIPS LAUNCHES MINICARE I-20 TROPONIN BLOOD TEST FOR RAPID DIAGNOSIS OF HEART ATTACK AT THE POINT OF CARE

Chest pain patients presenting at the emergency department are set to benefit from a major development by Royal Philips. The company has CE marked its cardiac troponin I (cTnI) blood test on the Philips Minicare I-20 handheld device. Current guidelines for the diagnosis of myocardial infarction (MI) require blood test results of cardiac troponin for the 90% of patients who present at the ED with chest pain, but are not diagnosed by an electrocardiogram (ECG).

For high-risk cardiac patients (such as those with Acute Coronary Syndrome), fast triage and rapid initiation of treatment are critical in order to improve patient outcomes and to save lives.

Minicare cTnI delivers lab comparable test results in less than 10 minutes, from only a single droplet of blood. The result is delivered near the patient, while they are being assessed and a medical history taken, reducing the time the physician needs to decide on treatment. This simplifies the patient-doctor interaction, helping physicians provide the best possible care for their patients.

Only 10% of chest pain patients can be diagnosed by ECG. The rest need to rely on additional cardiac marker testing for the diagnosis of MI. Physicians often have to wait up to six hours before deciding if they can safely discharge the patient or if they need to admit for further tests. The use of Minicare cTnI supports a reduction of the diagnostic protocol by up to three hours.

## Lab2Go Study confirmation

The Minicare I-20 was tested in real life acute care settings within the European project Lab2Go, a consortium of European hospitals. The study showed the potential of the Philips Minicare cTnI to accurately measure cTnI values, near the patient in the emergency department, with a turn-around-time of less than 10 minutes.

Minicare I-20 is simple and easy to use by non-laboratory staff. The user is guided through the process steps by the intuitive interface and incorporated fail-safes. A droplet of blood from a finger prick or venous whole blood tube can be applied directly on the cartridge. Connectivity allows for direct transfer of the data to the laboratory or hospital information systems to update the patient files. The robustness and accuracy that is needed for confident decision making is provided by integrated calibration and fail-safe guarantees.



“Blood samples are usually analysed in the hospital laboratory, which can easily take more than an hour to get the result back to the ED physician. Point of care testing can significantly help to reduce the turnaround time,” said Dr. Paul Collinson, consultant chemical pathologist at St George’s University Hospitals NHS Foundation Trust.

“Minicare I-20 is designed to help care providers to reduce time to treatment and reduce time to discharge of patients, thereby helping to decrease crowding in the emergency department and leading to better use of hospital resources,” said Marcel van Kasteel, CEO of Handheld Diagnostics at Philips.

## Performance

The clinical and analytical performance of Philips Minicare cTnI was validated during multicentre clinical studies. Minicare cTnI point of care assay showed excellent clinical performance for the diagnosis of myocardial infarction comparable to central laboratory assays. Minicare cTnI can be used as an aid in the diagnosis of an acute myocardial infarction (AMI) in a diagnostic protocol, including a cTn test, when the patient presents at the emergency department; and 2-4 hours later (0/3h diagnostic protocol) in appropriate patients. This follows the 2015 European Society of Cardiology (ESC) guidelines for the management of NSTEMI-ACS patients.

The Philips Minicare I-20 analyser and Minicare cTnI test cartridges are sold in selected countries in Europe, including Austria, Belgium, Denmark, Germany, Netherlands, Norway, Sweden, UK and Switzerland. Please contact your Philips representative for availability in your country.

## DISCLOSURE:

“Point of View” articles are part of the HealthManagement.org Corporate Engagement Programme



**Dr Veronique Semjonow**

Medical Director, Philips Handheld Diagnostics

[www.philips.com/minicare](http://www.philips.com/minicare)



# AHEAD OF THE GAME



There are always trailblazers implementing the latest technology, experimenting with management styles and putting the latest best practice in place. There are too many leading lights to name here, but *HealthManagement.org* has created a round up of facilities and individuals in healthcare - leaders who have caught our attention because of their efforts in taking steps toward the ultimate goal - better patient outcomes without compromising the bottom line. Could these examples point toward where healthcare management and best practice are heading?

## Digital Hospital

Opening its doors in autumn last year, Humber Valley Hospital (HRH) in Toronto, a 26-acre site, provides a broad range of healthcare services. The HRH 656 bed facility boasts a pneumatic tube delivery network, automated supply delivery systems incorporating robots and a pneumatic transport system for soiled laundry and linen that connects to external haulage units.

The aim of these features was to save 164 kilometres per day of walking time and a potential 2 million dollars in annual operating costs.

HRH also gets points for focusing on energy consumption - one of a hospital's biggest expenses. The hospital

was designed with focus on the implementation of energy recovery measures and efficiency in operating protocols while not compromising on delivery of 100 percent fresh air to all hospital areas (HOK 2015).

“AN ENCOURAGING EXAMPLE OF CROSS-COLLABORATIVE TEAMWORK, THE DESIGNS OF THE ROOMS WERE A RESULT OF ONGOING EMPLOYEE FEEDBACK”

## Cutting Edge Operating Rooms at U-M

In June, the University of Michigan (U-M) Health System opened four new state-of-the-art operating rooms (ORs) at University Hospital. The new surgical premises implement technology that includes surgical positioning systems, new microscopes, 3D image-guided navigation systems and robotics.

The new ORs are primarily being utilised by the neurosurgery and Orthopaedic surgery departments.

Particularly exciting, two of the new ORs will allow neurosurgery to expand their services in complex cranial and spinal surgery. The other two will provide a more efficient layout for robotic-assisted joint replacement surgery and 3-D image-guided spinal surgery.

An encouraging example of cross-collaborative teamwork, the designs of the rooms were a result of ongoing employee feedback (U-M 2016).

### Population Health Management

Population health is one of the current buzzwords in healthcare but most providers are playing a waiting game on implementation. But with the risk for population of patients moving over to a provider, health systems need to have good knowledge about the patients they are caring for.

How do you manage when you are treating a patient outside your health system? Anne Arundel Medical Centre in Annapolis, Maryland, combines use of a state-designated health information exchange and an EHR system vendor's data-exchange platform to move patient information across health systems. It then imports it into its own EHRs.

They've partnered with a local hospital in another health system and set standards on the transmission of critical clinical data allowing them to display real time care alerts between hospitals.

The facility was one of this year's *Hospital and Health Networks Healthcare's Most Wired* winners for its innovation (H&HN 2016).

### Robotic "Flight Simulator" Surgery

Roswell Park Cancer Institute (RPCI) in Buffalo is changing robotic techniques surgical training by moving from procedure practice in a live to simulated environment. A collaboration with Buffalo's School of Engineering and Applied Sciences and RPCI's Centre for Robotic Surgery they are introducing RoSS (Robotic Surgery Simulator) into training.

RoSS is often compared to flight simulation for pilots. Debuting in 2010, this gives training and professional surgeons the chance, through real-world views of actual robotic technique surgeries to make mistakes in a simulated rather than a real environment. Honing skills in a simulated procedure increases the chances of succeeding when in the real world and when a life is at stake on the operating table. ■

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# PATIENT SAFETY & RISK MANAGEMENT



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In recent years patient safety and risk management have become important topics of debate at different levels of healthcare throughout Europe so that where there is one, the other is also found.

In this article we will bring these topics together, putting them in the context of the Input-Management-Processes-Outcomes (IMPO) model, and also introducing them to the IMPO-Conference taking place on November 17 in Düsseldorf. The main question is: are patient safety and risk management bound to each other as two sides of a coin or are they counterweights in the balance health care management seeks?

For years, patient safety has been an important topic on the agenda of the European Union. It is estimated that 8 to 12 percent of patients admitted to hospital in the EU suffer from adverse events. A high proportion of these are avoidable and have their roots in systematic issues. In 2009 the Council of the European Union adopted a series of recommendations regarding measures designed to improve patient safety, complemented with recent initiatives such as the directive 2011/24/EU on the application of patients' rights in cross-border healthcare. Because patient safety is (mostly) an area of national competence, action at European level has focused on a collaborative approach and exchange of best practice, for example through EU-funded projects and expert groups.

The World Health Organization (WHO) is very active in this field as patient safety is the foremost attribute of quality of care. Patient safety can be considered as a goal (or an outcome) in terms of zero-level patient harm as well as a practice, meaning processes and structures that aim to make healthcare safer. To make this more concrete, WHO developed a Conceptual Framework for the international classification for patient safety (ICPS) and is now working intensively together with the EU on a minimal information model for patient safety incidents. The WHO Surgical Safety Checklist is a well-known example to put patient safety into practice.

Another definition used by WHO describes patient safety as "the reduction of risk of unnecessary harm associated with healthcare to an acceptable minimum". While this definition once more links patient safety with unnecessary harm, it refers also to an acceptable minimum, which indicates that it should be measurable and hopefully manageable.

Hospitals have gone through a long evolution with quality leading to safety management. Now with the financial crisis, risk management is at the forefront.

Looking to the practice, risk managers conduct an in-depth investigation in case of an adverse event to assess the liability exposure of the organisation and to help mitigate any future loss that may arise. They are also responsible for

identifying and assessing high-risk areas that could cause harm to patients, visitors, and employees and for implementing programmes to avert risks.

As a result, processes will be improved and expertise or assets will be acquired where needed; regulations and legislation will be more closely followed. To ensure this, a range of risk management processes are required as an interface between processes and management.

On the other hand, patient safety is mostly part of quality management in hospitals. Quality management professionals focus on best possible outcomes in patient care and often ensure that the organisation meets accreditation and other regulatory requirements. Their focus is not necessarily about but primarily to improve the quality of patient care. With patient safety we also put the patient back in the centre.

Considering that the risks are with the processes and the patients are the input while the outcome is to be considered in terms of safety, both topics can be projected on the IMPO-model.

Many solutions ensuring patient safety are putting incident management in the centre to reduce the risks. In order to keep the risk to an acceptable minimum it is important to be able to analyse and assess the risk so that appropriate actions can be taken.

Patient safety within a healthcare organisation like a hospital is a challenge as hospitals are high reliability organisations, complex adaptive systems where cultures have an impact. Healthcare managers have an important role in ensuring a high level of patient safety practice in order to reduce unnecessary harm.

During the biggest health fair of Europe, *Medica*, the *Krankenhaustag* presents the most up-to-date themes dominating discussions not only in Germany but also in Europe. On November 17 2016 the conference, co-organised by the *European Association of Hospital Managers*, will present different views on patient safety and risk management. Also on the agenda will be healthcare managers' role, necessary competencies and experience in the context of individual healthcare systems as well as in the broader context of Europe.

For further information, go to the EAHM website:

[www.eahm.eu.org](http://www.eahm.eu.org)



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## IMPROVING PATIENT OUTCOMES

HOW TO DEFINE, MEASURE, AND INCREASE POSITIVE AND REIMBURSABLE PATIENT CARE OUTCOMES

p. IV



## A CLOSER LOOK AT FINANCIAL PERFORMANCE IN HEALTHCARE

MANAGING COSTS, RISK, AND FINANCING TO CREATE AN ECONOMICALLY SUSTAINABLE BUSINESS

p. VIII



## THE VALUE OF A GOOD REPUTATION

HOW HEALTHCARE PROVIDERS CAN IMPROVE THEIR REPUTATION TO ATTRACT MORE PATIENTS AND QUALIFIED STAFF

p. X

# HEALTHCARE EXECUTIVE ALLIANCE

INSIGHTS FOR HEALTHCARE LEADERSHIP

**H**ealthcare organizations do a phenomenal job. Today, an increasing number of diseases are treated successfully and people enjoy a better quality of life even into old age. Yet, while much is being done to discover new ways to improve patients' lives, we now see radical changes to structures, incentives, and processes within healthcare to sustain provision for our inhabitant-rich planet.

Gone are the days of the simple equation that a higher price guarantees quality and vice versa. Faced with cost pressures, we see provider strategies of consolidation, industrialization, and population health management to meet the growing care demands. Times have changed: Today, healthcare and its delivery are increasingly validated and regulated by performance metrics. This development has led to nothing short of a paradigm shift in the structures and infrastructures of care.

In times of transformation, success comes from leading the changes. Riding the wave, rather than being washed away. We believe that effective healthcare transformation must include clinical, operational, and financial improvements. Delivering healthcare to more people with fewer resources is possible. But the levers need to be ideally set to improve your particular clinical outcomes, streamline your operations, and optimize your financial performance.

Through the Healthcare Executive Alliance initiative, we would like to support you and your teams to find insights, ideas and solutions for succeeding in these times. Our goal is to be your inspiring partner helping you to achieve better outcomes and reduce costs. As a starting point, we developed this set of white papers to help identifying key challenges in your healthcare organization with some first outlines on improvement methods.

*Now's our time to inspire the future of healthcare together.*




**Dr Bernd Montag**

Chief Executive Officer  
Siemens Healthineers

# IMPROVING PATIENT OUTCOMES

## HOW TO DEFINE, MEASURE, AND INCREASE POSITIVE AND REIMBURSABLE PATIENT CARE OUTCOMES

Due to increasing cost pressure, established remuneration models for healthcare services are changing all around the world. As part of the move toward value-based care, patient outcomes are entering the spotlight. Thus, hospital managers face the challenge of improving overall patient outcomes in a cost-effective manner.

### Diagnosis: Making Well-Informed Decisions

Every successful treatment and pathway to positive patient care outcomes begins with a correct and timely diagnosis. When a patient goes to see a doctor, the first few minutes usually determine the subsequent treatment steps – which directly influence the success of the treatment and the associated costs. However, diagnosis itself can be a particularly complex challenge. Research suggests that, in the U.S. for example, diagnostic errors affect one in 20 patients annually, an estimated 12 million Americans each year.<sup>1</sup> Moreover, diagnostic error is the leading cause of medical malpractice claims in the U.S. (almost 30 percent), and is estimated to cause 40,000 to 80,000 deaths annually.<sup>1</sup>

As demanding as it can be to identify and avoid diagnostic errors, it is well worth the effort, as doing so significantly improves patient outcomes. Misdiagnosis can lead to unnecessary treatment for non-existing conditions, or to proper treatments being initiated too late or not at all. This not only impacts the patient but providers as well. Providers are increasingly facing the operational and economic consequences of incorrect medical care – for instance, when hospital stays are unnecessarily long, medications are used incorrectly, or avoidable exams and operations are performed. The results are often a worsening of the patient’s condition, readmissions, reduced efficiency, and, worst of all, expensive legal battles.

### Efficient and Effective Treatment

Usually, the diagnostic procedure is followed by a treatment decision. In the interests of beneficial patient outcomes, diagnosis and treatment should be seen as two separate decision-making processes that need to be optimized, because the initial diagnosis could be incorrect or incomplete. In addition, even if the diagnosis is correct, there are often several possible therapeutic approaches. For good treatment decisions, it is important to know all the options. These arise



**“VERY FEW CONVENTIONAL METRICS CURRENTLY TRACKED BY PROVIDERS REFLECT ACTUAL HEALTH OUTCOMES.”**

from one’s knowledge of the individual medical condition, the patients themselves, and scientific findings. Electronic health records (EHR) and a seamless flow of information between physicians and specialists, and science and technology, can play a crucial role here.

## Proven Medical Errors in German Hospitals

A third of errors were caused by incorrect diagnosis

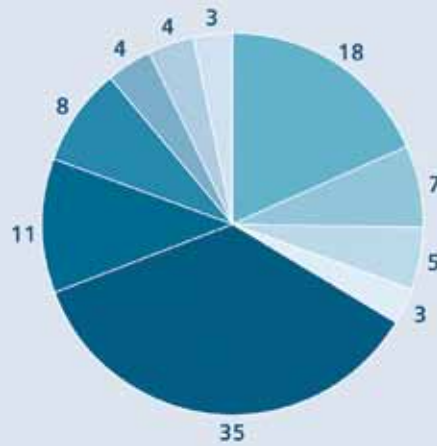
### Most frequent errors in hospitals

#### Diagnosis:

- Imaging procedures (18%)
- Medical history/examination (7%)
- Laboratory/additional examinations (5%)
- General (3%)

#### Treatment:

- Surgical: implementation (35%)
- Postoperative therapy measures (11%)
- Indication (8%)
- Postoperative: Infection (4%)
- Drugs (4%)
- Surgical: choice of procedure (3%)



Source: Bundesärztekammer, Behandlungsfehlerstatistik 2014

**“ FACING LOWER PAYMENT RATES AND POTENTIAL LOSS OF MARKET SHARE, PROVIDER ORGANIZATIONS HAVE NO CHOICE BUT TO IMPROVE VALUE AND BE ABLE TO PROVE IT. ”**

Michael Porter, Harvard Business School

The variety of treatment options and the uncertainty involved in planning them are the areas in which patient outcomes and sensible resource allocation are at risk. Treatment should be efficient as well as effective, and should lead to the desired outcomes. Clinical monitoring will become more important for optimizing patient outcomes and maximizing cost efficiencies. Up-to-date diagnostic imaging and laboratory equipment can support the ongoing, near-time monitoring of treatment success. However, many hospitals delay modernization of expensive devices due to increasing cost pressure. This can create significant differences in the kind of hospital equipment available in richer countries compared to poorer countries. For example, data on European equipment stocks show that patients in Eastern Europe in particular have very limited access to MRIs and CTs.<sup>2</sup>

### Improving Outcomes through Quantification

The quality of diagnosis, treatment decisions, and monitoring/management of the treatment significantly affect patient outcomes. According to U.S. economist Michael Porter, provider organizations - facing lower payment rates and potential loss of market share - have no choice but to improve value and be able to prove it. Although hospital managers have now recognized the need for doing this, in practice they often still lack suitable measurement methods. Most quality metrics do not gauge quality; rather, they are process measures that record compliance with practice guidelines. According to Porter, the only true measures of quality are the outcomes that matter to patients.<sup>3</sup>

To obtain meaningful benchmarks, care providers should actively engage patients in the collection of outcomes data. Patient-Reported Outcome Measures (PROMS) are already being successfully used by various hospitals in the U.K. to improve patient outcomes. For example, PROMS are used to calculate health gains in the aftermath of several kinds of surgical treatment, using preoperative and postoperative

patient surveys. Some British studies show how hospitals have successfully used PROMS data as a benchmark for their own quality measures. These best-case studies show that standardization can greatly help improve patient outcomes. At the same time, the case studies suggest that improved patient outcomes do not necessarily have to be accompanied by higher costs, and can actually improve profitability.<sup>4</sup>

### Creating a Continuum of Care

Especially in western industrialized nations, the present-day healthcare system is a highly sophisticated but fragmented collection of service providers. Previously, the process of tracking the journey of individual patients often ended at the point of transfer to another provider/specialist, or at discharge. Follow-up on the success of treatment rarely took place. In light of rising costs, however, providers in many countries are increasingly seeking to make optimum use of available healthcare resources. To ensure more cost-effective healthcare, providers are examining the entire care continuum to identify areas for improvement. By looking at the overall patient journey, providers can potentially improve patient outcomes while reducing costs. Also, provider cooperations and alliances that encompass hospitals, physician groups, outpatient clinics, and other provider facilities are on the rise.



The Affordable Care Act, which was passed in the U.S. in 2010 under President Barack Obama, provides clear examples of how service providers are encouraged through financial incentives to continue making a positive contribution to patient outcomes beyond the day of discharge. For instance, Medicare reduces provider compensation if patients are readmitted within 30 days of discharge. This affects every fifth Medicare patient - a staggering number of those treated. According to the Center for Medicare and Medicaid Services (CMS), approximately 2,700 of the 3,400 Medicare contract hospitals will have cuts totaling \$420 million in fiscal year 2016 due to such readmissions.<sup>5</sup>

Because of increasing cost pressure, hospital managers face the challenge of improving patient outcomes in a cost-effective manner.

### Engaged Patients Improve Outcomes

For healthcare providers, it is worthwhile to examine how care is provided along the treatment chain and to optimize it as needed. In particular, the general practitioners who care for patients following their discharge, and also the patients themselves, have a considerable influence on patient outcomes. Survey and research results from the U.S. show that handoff communication and the discharge process are sorely in need of improvement at many companies. In the latest annual U.S. national patient survey, 14 percent of respondents said they had neither received any written information about what symptoms or health warning signs they should look for in the future, nor had had conversations about the need for a follow-up appointment and, with whom, after their discharge.<sup>6</sup>

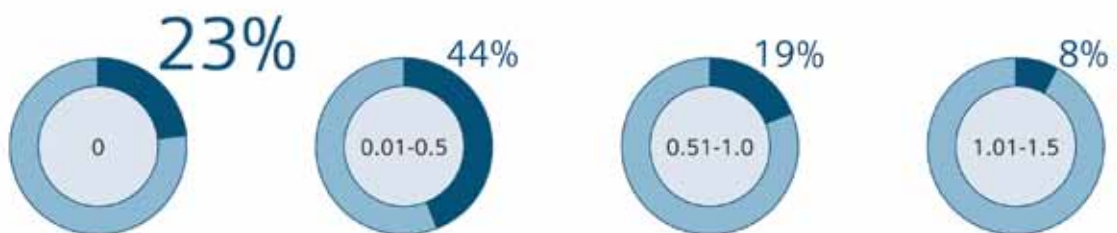
However, the patient's proven influence on his or her own outcomes may be challenging in cases where service providers find it difficult to increase patient engagement. Socioeconomic factors such as low income, unemployment, and poor education can lead people to neglect their health and fail to follow their doctors' recommendations or keep appointments. Several studies from the U.S. actually show a link between high readmission rates and a hospital's catchment area. It indicates that hospitals in poor regions are disproportionately affected by readmission penalties.<sup>7</sup> This once again shows how important it is to develop reliable and reasonable outcomes measurements.

### Smarter Data for Better Care

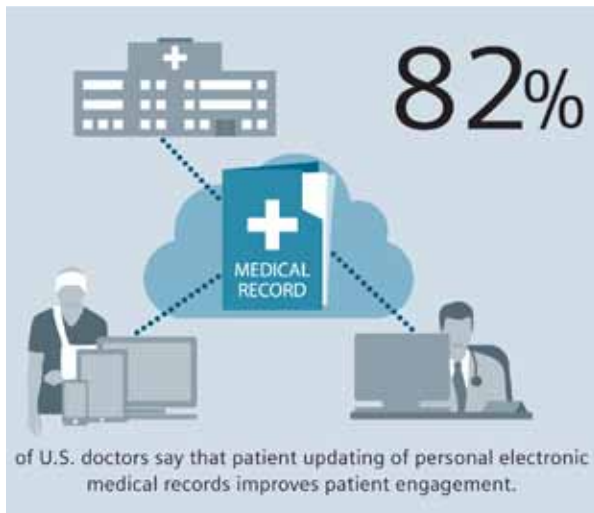
Well-managed IT infrastructure and mobile technology can help optimize the patient pathway and investments in mobile technology encourage patient engagement, for example by helping patients and doctors stay connected via mobile resources like tablets and smartphone apps. Thus, visit-based care is giving way to connected care. In developed economies, some of the greatest benefits of connected care would be improvements in the treatment of chronic diseases.

### Readmission Penalties Impact Revenue

Penalty for 30-day readmissions (in percent of relevant DRG payment): Only 23 percent of U.S. hospitals will escape cuts in 2016



Source: CMS



## In a Nutshell Improving Patient Outcomes

1. An accurate and quick diagnosis is an essential aspect of positive patient outcomes and is the foundation for proper treatment decisions.
2. Treatment can be efficient without being effective, and vice versa. Ensuring that treatment is both efficient and effective is the hallmark of medically and economically successful healthcare providers.
3. To determine one's own economic position in the market and measure progress, patient outcomes must be clearly defined and reliably and transparently evaluated. True measures of quality reflect what matters to the patient.
4. Seamless information flow along the treatment pathway is crucial for overall treatment success. Hospital operators must provide comprehensive, prioritized, and systematic information to subsequent treatment providers.
5. Active patient involvement in the treatment process help improve patient outcomes. Clear, intelligible communication is the key to success.
6. Modern IT infrastructure as well as the use of mobile devices can contribute to significant advances in diagnostics and treatment. This is especially true for medically underserved regions.

Furthermore, the greatest benefits of Internet-of-Things applications could lie in expanding delivery of healthcare services to the underserved, according to a recent McKinsey study.<sup>8</sup>

The Electronic Health Records that have been introduced in many countries also provide a platform for shared decision-making between patients and doctors. According to a recent survey by the consulting firm Accenture, more than half of all patients want to be able to access their data online.<sup>9</sup> This would definitely be to the benefit of many doctors. A vast majority of U.S. doctors report that patient updating of personal electronic medical records improves patient engagement and satisfaction.<sup>10</sup> Healthcare providers who manage to create stronger ties to their patients and let them independently contribute to their patient journey can achieve better long-term patient outcomes. ■



Read the QR-code to watch a short video introduction about the topic of patient outcomes on YouTube.



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# A CLOSER LOOK AT FINANCIAL PERFORMANCE IN HEALTHCARE

## MANAGING COSTS, RISK, AND FINANCING TO CREATE AN ECONOMICALLY SUSTAINABLE BUSINESS

Healthcare providers around the world face resource shortages, economic and regulatory uncertainty, and increasing market volatility. Trends such as alternative compensation models and public-private partnerships are leading people to rethink established business models and adapt their investment strategies.

### Investing during Difficult Times

The bulk of medical costs is incurred during treatment. Fast and accurate diagnoses as well as effective therapy management and control can significantly reduce costs. The use of modern diagnostic technologies in imaging and the laboratory can help achieve this goal.

At first glance, the required investment may appear to be a financial hurdle. But investing in medical technology and in systematic and continuous training for staff can contribute to the proper management of diagnosis and treatment. This could help hospital operators minimize costly mistakes and opportunity costs, and thus substantially improve their cost structure in the long term.

### A Growth Market under Cost Pressure

Global healthcare expenditures amounted to approximately US\$7.2 trillion in 2013, which equates to 10.6 percent of global gross domestic product (GDP). Global expenditures continue to rise, but there are differences between regions.

The growing and aging world population, rise in chronic diseases, growing middle class in emerging markets, and advances in diagnosis and therapy are all key drivers of rising global healthcare expenditures.

However, for hospital operators, rising healthcare expenditures do not automatically translate to an increase in revenues and profits. Rather, faced with more patients, they come under pressure to reduce the cost of treatment as health systems increasingly respond to higher overall expenses with cost-capping measures. In the U.S., for example, financial challenges are still the biggest headache for hospital managers.<sup>1</sup>

Today, hospital operators take on risks formerly managed by insurance companies. This reversal of the value-added mechanism, away from a “fee-for-service” model and toward a “fee-for-outcome” model, changes the significance of investments in medical technology.



In Europe and in the U.S., cost pressure and commercial risks abound. Nearly half of all European hospitals face financial difficulties, especially in countries such as Greece and Portugal. The high risk of bankruptcy within the industry makes it harder for hospital operators to access the capital market. According to a study by consultancy firm Accenture, the average EBITDA margin of selected European hospitals amounted to approximately 5 percent in 2014.<sup>2</sup>

Given increasing patient numbers and costs in both Europe and the U.S., greater efficiency is rising an existential concern for hospital operators. Meanwhile, financially sound healthcare companies can consolidate their market position through strategic investments.

### Cost Efficiency in Asia

In the search for innovative business approaches, it is worth taking a look at the Far East. In countries like China and India, low per-capita income, a rapidly growing population, uncertain economic prospects, and a shortage of beds and doctors in rural regions make efficient and affordable healthcare provision a special challenge. In India, the out-of-pocket spending rate is the highest in the world (approximately 70%). At the same time, India is one of the poorest nations in the world.

Narayana Health (NH), one of the world's least expensive and very rapidly expanding hospital companies, was established in this environment. Since its founding in 2001, NH has grown from a small cardiology clinic into an internationally renowned, medical company with approximately 6,500 beds in 30 hospitals. Its success is mainly based on a low-cost strategy. This involves efficient use of modern technology and optimized surgery capacity. In 2014, the Boston Consulting Group named NH as one of the 50 most successful companies in the emerging markets.<sup>3</sup>

**“ FINANCIALLY SOUND  
HEALTHCARE COMPANIES  
CAN CONSOLIDATE THEIR MARKET  
POSITION THROUGH STRATEGIC  
INVESTMENTS. ”**

### The Medical Tourism Trend

Many of NH's patients come from abroad, which means NH is participating in the worldwide medical tourism trend. Many successful hospital operators secure lucrative patient flows from abroad thanks to excellent low-cost services, a good international reputation, and a focus on foreign target groups, especially wealthy private patients.

The huge market for medical tourism is fueled by a variety of motives: many who travel for care do so because treatment is much cheaper in other countries. For instance, the cost of heart surgery at NH averages less than €1,700; in the U.K., it is 7 to 10 times higher.<sup>4</sup> By the same token, wealthy patients from places like the Middle East and Eastern Europe often seek better medical care abroad. ■

## In a Nutshell Financial Performance in Healthcare

1. Efficient service delivery is key to competitiveness for hospital operators worldwide. This calls for solutions that deliver better patient care outcomes at a lower cost.
2. Innovative, high-performance technology is particularly useful. Viewed in isolation, expensive, large equipment is no longer an automatic revenue generator. However, accurate assessment of the patient's condition significantly enhances the cost-efficiency of treatment.
3. New business models are increasingly turning hospital operators into risk and population health managers. To assess risks and efficiently manage the costs of service provision, they need reliable diagnostic data more than ever.
4. Access to available capital can be a major challenge for many hospital operators. One possible solution: Using financing instruments like leasing, lease-purchase or mezzanine financing allows utilizing new technologies without purchasing them – and remain financially healthy as well.
5. When it comes to competing for wealthy private patients and medical tourists from other countries, financially sound companies will be able to defend and expand their competitive position in the future — even across borders.



Read the QR-code to watch a short video introduction about the topic of financial performance on YouTube.



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# THE VALUE OF A GOOD REPUTATION

## HOW HEALTHCARE PROVIDERS CAN IMPROVE THEIR REPUTATION TO ATTRACT MORE PATIENTS AND QUALIFIED STAFF

A good reputation is an important asset for healthcare providers. Along with credible market positioning, it is vital for attracting self-reliant, quality-conscious, and cost-aware patient groups. Qualified and committed employees are key to a positive patient experience and hence to a provider's reputation.

### From Patients to Customers

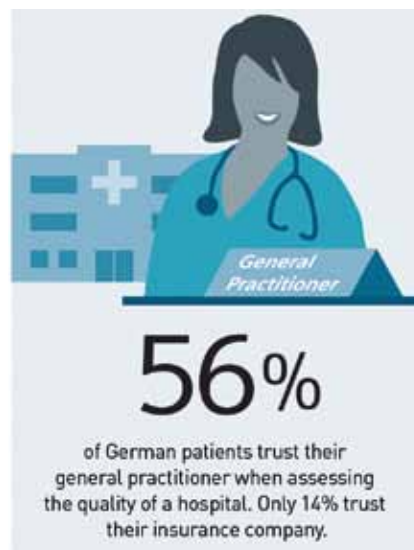
"Where will I get the best treatment?" is an important question that patients ask with increasing frequency prior to hospital stays. The evolution into a consumer-driven healthcare industry with well-informed customers is desirable from a political point of view, especially in countries with expensive healthcare systems such as Germany and the U.S.

Insurance representatives call for increased transparency regarding quality of care and more focus on results in order to improve patient outcomes. They also advocate for quality-driven remuneration models with quality-related premiums or discounts.<sup>1</sup> To facilitate patients' choice of healthcare providers, some health insurance companies publish annual hospital quality reports online, making them broadly available to the public. Indicators of the quality of processes and outcomes are to be included in patient-friendly quality reports.

### Medical Quality Counts

Despite increased efforts by hospital operators to score points with convenience features, medical quality is still the most important criterion when it comes to choosing between hospitals.<sup>2</sup> However, many patients find it difficult to rate this, so general practitioners and specialists play a prominent role in the choice of a hospital. Fast and accurate diagnostic results, timely appointments, and smooth, IT-based data exchange are some of the assets with which hospital operators can significantly improve their reputation among this important, influential group.

A hospital's economic basis also affects its reputation. According to a survey by consulting firm PwC, when hospitals face a poor financial situation, many patients suspect a negative impact on medical care or the condition of medical equipment. Modern equipment, for instance, allows for readily available and accurate diagnostic results, which can significantly help reduce waiting times, improve patient outcomes, or avoid ineffective treatments. All of this significantly increases patient satisfaction. For example, in Germany, large, well-equipped teaching hospitals tend to have the best reputation, followed by privately run hospitals. Both exceed municipal or church facilities by a wide margin.<sup>3</sup>



### The Internet Crucially Shapes Reputation

Online review sites and social media platforms are rapidly becoming very important for a hospital's reputation and its selection by partners – especially among younger, well-educated patients and potential employees. This is equally true for Europe, the U.S., and many emerging economies. More than a third of the Indian population, for example, use the Internet to search for health information, with similar percentages of younger, more educated people seeking health information online in Brazil, Mexico, and China.<sup>4</sup>

In Denmark, for example, customers grade hospitals online on a special website by giving them scores that range from one to five stars as if they were hotels, with service level indicators as well as actual results, including case fatality rates on certain diagnoses. In the U.S. too, patients and referring physicians can compare hospitals online – via the CAHPS Hospital Survey.<sup>5</sup> The CAHPS results give hospital managers interesting ways to invest in patient satisfaction. According to the survey, a whopping 30% of all newly discharged patients would not unequivocally recommend their hospital.

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## Good Staff, Good Reputation – and Vice Versa

The CAHPS results show that open-minded, responsive staff significantly affect patient satisfaction and hospital reputation. Close and personal patient engagement can only be achieved through dedicated, satisfied employees.<sup>6</sup> Investments in employee satisfaction seem to pay off financially. Research from Gallup indicates that committed or 'engaged' physicians are more productive and ensure considerably more recommendations. Gallup estimates the average annual increase in revenues at just under half a million dollars per doctor.<sup>7</sup>

The use of state-of-the-art technology for diagnosis, treatment, and information management can significantly increase employee satisfaction, which in turn improves patient experience and hospital reputation. Key starting points include improvements to the working environment through efficient IT-based processes that save staff time and allow more time for patient care, and training that empowers employees to make optimum use of technical equipment. Access to an extensive, cutting-edge database and accurate diagnostic results also support researchers with their studies and publications. This not only helps increase the reputation of a hospital as a healthcare provider, but also increases their standing as a desirable employer with attractive development prospects.

## Attractive for Patients Around the World

Excellent and reasonably priced services, a good international reputation, and a focus on the needs of foreign patients are some of the ways successful hospital operators secure lucrative patient flows from abroad. Experts peg the global market volume for medical tourism at around \$38.5 to \$55 billion, based on approximately 11 million cross-border patients worldwide spending an average of \$3,500-5,000 per visit.<sup>8</sup> According to the OECD, dental care, cosmetic surgery, elective surgery, and fertility treatment are particularly popular.<sup>9</sup>

Globally, only about one in eight patients is going abroad mainly for cheaper treatment.<sup>9</sup> Instead, the majority of medical tourists want better medical care. According to a study by McKinsey, advanced technology, better quality of care, and quicker access to medically necessary therapies are the main motivations for medical tourism.<sup>8</sup> ■

## In a Nutshell The Value of a Good Reputation

1. Attracting new patients requires going beyond accurate diagnostics and efficient treatments. It requires a compelling relationship management that includes patient education, fast appointment scheduling, effective communication, and short waiting times to help increase patient satisfaction.
2. Competition for patients has gone international. Medical tourism is a growing trend and already a lucrative market. For most international patients and elective patients in general, access to cutting-edge technology and high-quality diagnostic and therapeutic services are decisive factors. This should be taken into account when addressing this customer group.
3. Fostering a good relationship with referring physicians is essential, as they have a major influence on the selection of care providers. General practitioners and specialists expect accurate and timely diagnosis results from hospital operators, they want them to act as partners in the treatment of their patients.
4. Attracting skilled professionals in the industry's tense labor market is a serious challenge – the employer's reputation is a major criterion for prospective employees.
5. A good reputation and motivated staff mutually reinforce each other: motivated employees largely determine the quality of medical and economic outcomes. They are crucial for positive patient experiences and a hospital's reputation. Modern technology helps improve working conditions and employee satisfaction significantly and help position the hospital as a desirable employer.



Read the QR-code to watch a short video introduction about the topic of reputation on YouTube.



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## Improving Patient Outcomes

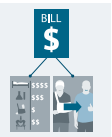
How to define, measure, and increase a positive and reimbursable outcome for patient care

**Introduction**

Due to increasing cost pressure in the healthcare sector, established remuneration models for healthcare services are in transition around the world. Fee-for-performance and value-based systems are increasingly replacing fee-for-service. Major players – including Medicare and Medicaid in the U.S., the National Health Service in the U.K., the National Health Care Institute in the Netherlands, and several leading European university hospitals – have all made great strides in this area. In Germany, the proposed Hospital Restructuring Act aims for a stronger correlation between remuneration and quality of treatment. In newly industrialized countries, where patients pay a large share of the treatment costs out of their own pockets, the quality of treatment plays a decisive role in choosing a hospital (in addition to price and access to care).

Hospital managers around the world face the challenge of improving patients' overall outcomes – and doing so cost-effectively. Further, outcomes can be impacted by many factors, including overall patient health, safety, comfort, and satisfaction.

For both healthcare providers and payers, it can be difficult to establish and measure reliable, meaningful value-based metrics. However, this is the only way to quantify and compare results and make improvements where necessary. Binding, appropriate performance indicators are essential for the implementation of value-based care.



Only 3% of organizations say they have completed the transition to value-based care, whereas 85% indicate that the transition is still underway.

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## A Closer Look at Financial Performance in Healthcare

Managing costs, risk, and financing to shape an economically sustainable business

**Introduction**

Today's discussion on the future of healthcare revolves less around arguments regarding medical technology, and more surrounding economic challenges. Scarce resources, government budget constraints and limited to no access to the capital market offset various cost drivers.

In addition, a global trend towards population health management exists, an integrated optimization of healthcare that greatly impacts processes and business models and requires the comprehensive aggregation and analysis of patient data. This is relevant to the increasing standardization and industrialization of patient care.

All over the world, top managers of health-care facilities face scarce resources, economic and regulatory uncertainty and increasing market volatility. Trends such as alternative compensation models, public-private partnerships and new, lucrative patient flows from abroad (medical tourism) cause people to rethink established business models and adapt their investment strategies. Most players will need to develop new business models to rely on the consulting firm Bain & Company predicts. Deloitte consulting adds, "Many of these new models will require costly infrastructure investments."



10.6% of the global gross domestic product (GDP) amounted on total healthcare expenditures in 2011.

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## The Value of a Good Reputation

How healthcare providers can improve their reputation to attract more patients and qualified staff

**Introduction**

Whether in consumer goods, financial services, or medical technology, a company's reputation is key to its commercial success. Brand awareness and a good reputation produce trust, and sustained trust is priceless. Although it is difficult to quantify the exact value of a good reputation, companies around the world spend a lot of energy, time, and money to acquire and retain one in order to win over customers (patients), qualified personnel, and referring doctors. They invest in the creation and maintenance of a distinctive image, measure their customers' wishes, carry out regular quality checks, and participate in independent tests and comparisons to document the quality of their products and services.

In healthcare, however, reputation management is frequently still limited to crisis communications, e.g. when there are hygiene or staffing problems. In many countries, this results from legal restrictions on promoting one's image through active hospital marketing.

The performance and achievement of many not-for-profit companies in particular often seem quite diffuse and inextricable from the perspective of patients and applicants. For-profit institutions are different, not just in countries like the U.S. but also in countries where patient tourism and out-of-pocket payments are important.



56% of German patients consider most their general practitioners when assessing the quality of a hospital. Only 14% would trust their insurance company.

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# Sustainable Healthcare Needs Responsibility and Competence



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CONGRESS





# WILL THE HOSPITAL OF THE FUTURE BE OUR HOME?



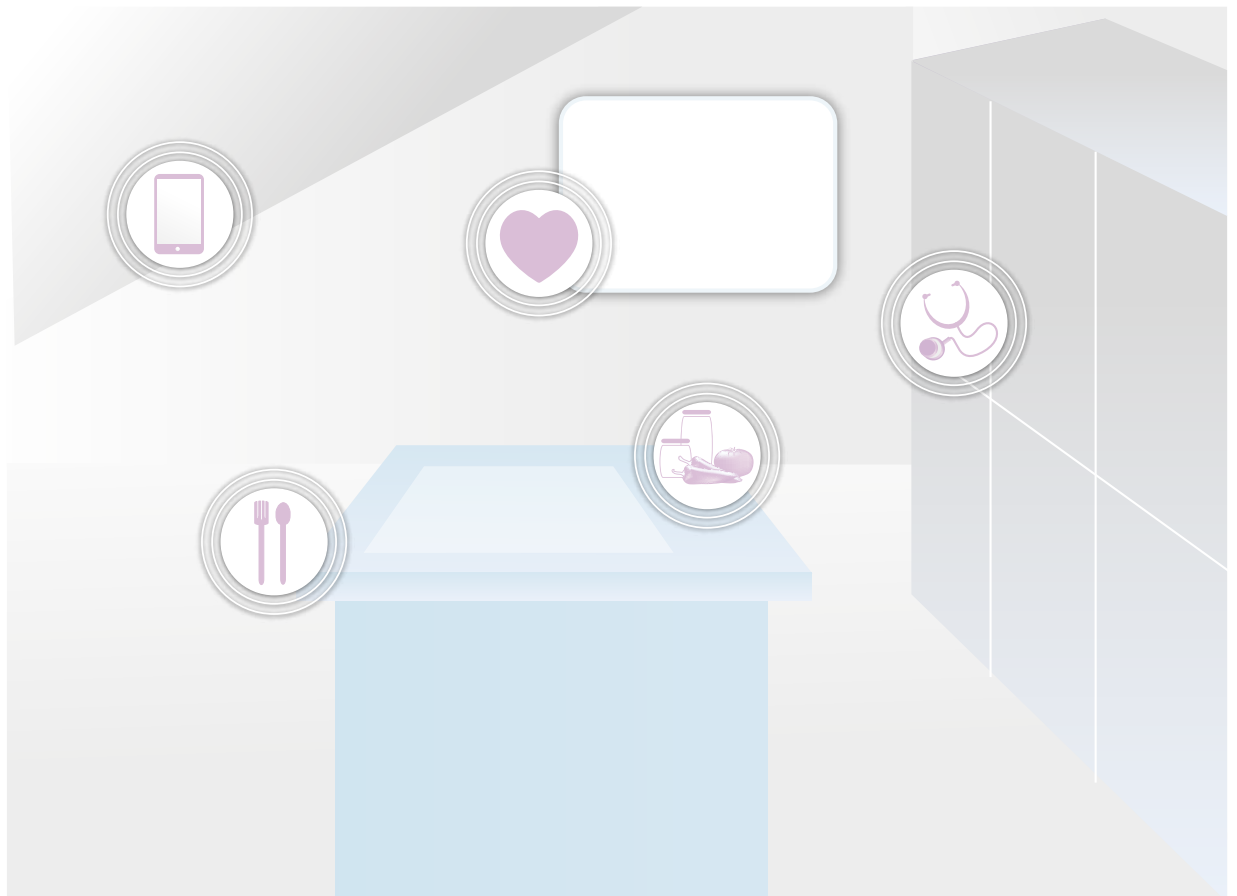
**Bertalan Meskó**

The Medical Futurist

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**A**lready, healthcare is being outsourced to the home in a bid to encourage more patient involvement in wellbeing and to develop centres of health expertise in place of multi-bed hospitals. The Medical Futurist, Bertalan Meskó reflects on how the future of home healthcare could evolve.

## The Home and Future Healthcare

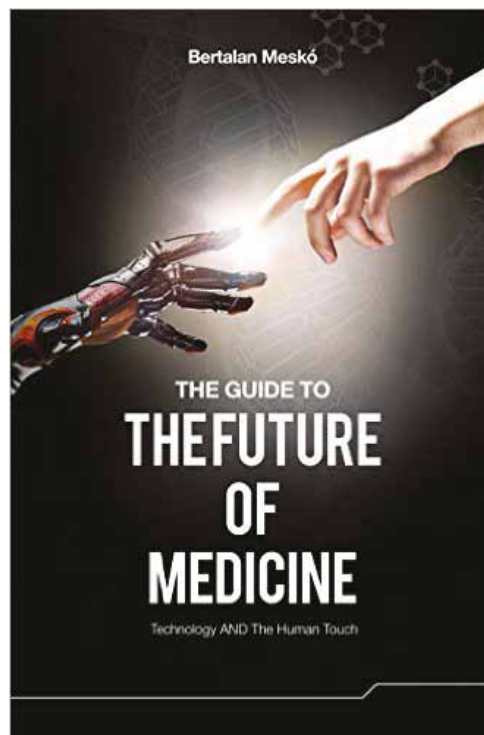
The biggest part of healthcare is self-care which takes place outside the medical system. I need to manage my health and disease not only in the hospital and during the doctor visits, but also at home. Still when people talk about the future of hospitals, they usually depict amazing technologies and really huge devices.

What if the majority of care could be provided in our homes? What if wearable and other devices could measure what needs to be measured in the bathroom or bedroom? What if smart clothes and brain activity trackers could change the way we work from home?

Let's see what technologies might transform our home to be the new clinic, the hospital of the future.

## The Bathroom

This room could include a smart scale that measures weight, body fat percentage, recognises you and sends data immediately to your Smartphone. The mirror could be a digital one analysing your stress levels, pulse and mood just by reflecting you. It could present news related to these parameters. You



could use a smart toothbrush that could analyse whether you are hydrated or not and give rewards for spending enough time with that activity. Then in the toilet, there could be a little microchip for urine analysis. When you go into the shower, the smart home could bring the temperature down by using the smart device like Nest acquired by Google. Water quality and quantity, cardiac fitness and a range of other simple devices could measure health in the bathroom.

**“THE QUEST IS TO FIND THOSE TECHNOLOGIES THAT CAN REALLY CHANGE THE WAY WE LIVE OUR LIVES BY BRINGING CLINICAL AND HOSPITAL EQUIPMENT TO OUR HOMES”**

### The Bedroom

The bedroom could include smart sleep monitors which first give you data about what quality of sleep you had and then wake you up at the best time to make sure you are energised in the morning. When you go to bed, the smart sleep monitor could let the Nest know it should bring the temperature down because you are about to sleep. Such monitors could include specific music and lights to make sure you are gently woken up. Pulse variability, breathing and oxygen saturation could be measured to reduce sleep apnoea and snoring.

### The Kitchen

There could be smart forks and spoons that either teach us how to eat slowly or help people with Parkinson's disease eat properly again. Scanners could measure the ingredients, allergens and toxins in our food and let Smartphone applications help control our diet. There could be 3D food printers using fresh ingredients to create pizza, cookies, or almost any kind of final products just like what Foodini does these days.

### The Work Desk

You could wear smart clothes measuring vital signs, posture, stress levels and brain activity telling you when exactly to work for better performance. Services such as Exist.io could constantly look for performance tips by finding correlations between our digital habits and health parameters.

We can use almost all these devices now and looking ahead into the future the best is just yet to come. The quest is to find those technologies that can really change the way we live our lives by bringing the clinical and hospital equipment our actual homes providing better care without making the distance between patient and caregiver wider.

### Biography

Dr. Bertalan Meskó, PhD is the Medical Futurist, keynote speaker and consultant. A geek physician with a PhD in genomics and Amazon Top 100 author, he envisions the impact of digital health technologies on the future of healthcare, and helps patients, doctors, government regulators and companies make it a reality. He is the author of *The Guide to the Future of Medicine, My Health: Upgraded and Social Media in Clinical Practice*. ■





# THE ROLE OF GAMIFICATION AND ENGAGEMENT DESIGN IN THE FUTURE OF HEALTHCARE



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**G**amification is on the rise right now as a powerful tool to change behaviour - not only in healthcare but in many fields, such as education and business. However it can be seen and experienced in all its glory in healthcare, and I believe it will be crucial for the very near future.

First of all, what is gamification? A crystallised definition about it was made, amongst others (Dixon et al. 2011), by Professor Kevin Werbach, from University of Pennsylvania (Hunter et al.). In 2012 he created the first Coursera course on the subject and it was a huge success. That first definition was a bit complex for the general public but a takeaway message became popular: “the use of game design elements in non-game contexts.”

Two years later Werbach offered a redefinition of that concept saying that gamification “should be understood as a process. Specifically, it is the process of making activities more game-like” (Werbach 2014).

The importance of this redefinition is that it connects gamification with what he calls persuasive design, and what I call engagement design. In my experience this new concept

is a natural evolution and does not exclude gamification at all. On the contrary, it amplifies it. Being so, engagement design focuses on building extraordinary and unique experiences with the purpose of engaging customers (they could be patients or employees, for example) and ensuring their involvement in following and completing a journey previously designed and co-created with them.

When we bring engagement design and gamification to healthcare we find a happy couple that can flourish. On one hand, we are all aware of chronic diseases being a major cause of healthcare costs - half of the adult population is suffering from one or more chronic conditions in the United States. On the other hand, according to Pew Internet Project’s research related to health, 72 percent of internet users say they looked online for health information within the past year (Pew Research Centre 2013). The most commonly-researched topics are specific diseases or conditions, treatments or procedures and additionally patients look for other ways of interaction with the healthcare systems.

## Gamification in Healthcare

Mixing technology with need creates a product. Understanding the final user's motivations, fears, doubts and happy moments helps us develop a system which not only works and makes life easier, it makes "things that you have to do everyday" in your life, more fun to do (in the case of taking the stairs), and easier to bear in (the case of diabetes).

This is why I believe engagement design and gamification will be key to:

- Increasing adherence to treatment;
- Build patient's awareness about his/her own role in treatment;
- Contributing to patient's recovery and especially his/her emotional state;
- Helping in tracking various kinds of aspects;
- Helping rehabilitation;
- Helping in all matters related to the prevention of diseases and build-up of long-term healthy habits.

I see this already happening in healthcare. That's why there's a boom on mHealth. A pilot study in Toronto showed that adolescents with diabetes (who always have to track their glucose) that were using an app that awarded them points and had a ranking, already increased their satisfaction by 88 percent (Carfazzo et al. 2012). They have to do this everyday! Let's make it a bit more interesting and a bit more entertaining as it's very necessary.

The strength of engagement design and gamification derives from a radical change in the logics of the whole process, which consists in giving more power to patients. As well as what has happened in general consumerism, where final customers got the power to be much more in control of brands and products as never seen before, engagement design and gamification enable patients to push for changes. This will be a bottom-to-up change and can only be conveyed through the large scale adoption of new technologies as we are already experiencing today.

## Creating and Adapting: Healthcare Professionals and Tech

Another big change lies in the role of health professionals developing these technologies. There are many mHealth apps using healthcare professionals to assist engineers and technicians to develop apps. However, I'm seeing a change starting in universities, where they encourage young nurses and doctors to become entrepreneurs, and join start-ups. As a professor who has been teaching nurses how to find creative solutions and in engagement design, I am really proud to say that the last group of nurses that graduated



who had had classes with me, presented more tech-related solutions than any other year.

My experience as a nurse has been vital in all the projects I have been involved and this is a seed I try to plant among my students in academia. You, who work in the field, are the most skilled and prepared to detect real needs, make life easier for patients, and to change behaviour for good.

**“WHEN WE BRING ENGAGEMENT DESIGN AND GAMIFICATION TO HEALTHCARE WE FIND A HAPPY COUPLE THAT CAN FLOURISH”**

I foresee that this combination between health professionals and technology will bring excellence to healthcare at a much larger scale than ever seen until now.

## Biography

Anna Sort is a qualified nurse and has a master's degree in cognitive systems and interactive media. She specialises in Health IT and user engagement design, and lectures at institutions such as the University of Barcelona and Stanford University. She is the co-founder of PlayBenefit ([www.playbenefit.com](http://www.playbenefit.com)), a start-up based in Barcelona that helps public and private organisations to bring gamification and engagement design to their core. ■



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# MEDICAL DEVICES AND EVIDENCE-BASED CLINICAL PRACTICE

## TIME TO DELIVER



**Alan G. Fraser**

Professor of Cardiology,  
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Chairman, Committee on  
Regulatory Affairs, European  
Society of Cardiology

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### The European Commission's 'New Approach'

The current system for evaluating and approving new medical devices within the European Union derives from the "New Approach" first proposed by the European Commission in 1985. That legislation was designed to harmonise all industry sectors in Europe, by delegating to independent "Notified Bodies" the responsibility to confirm that new products met accepted technical standards. Although the New Approach was never planned to be appropriate for evaluating medical devices, a similar approach has been applied since the 1990s to medical technology. The Treaty of Lisbon in 2007 extended the competence of the European Union to include policies that are required to address common safety concerns in public health and achieve a high level of human health protection.

Eight years ago the European Commission responded to widespread concerns that the relevant EU Directives no longer provided an adequate basis for evaluating and approving medical devices. Serious clinical problems had occurred with some high-risk implantable medical devices that could be attributed to deficiencies in the regulatory processes. The Commission initiated a public consultation and then in September 2012 proposed two new draft EU Regulations – for the evaluation and approval of Medical Devices and In Vitro Diagnostic Devices. Around the same time, the "PIP" scandal concerning the replacement of medical grade by industrial grade silicone in breast implants by a French manufacturer, and complications observed with metal-on-metal hip replacements, both led to an emergency "Action Plan" that has ensured that the current system is more tightly controlled.

The draft legislation made slow progress through the political channels in Brussels. Although the European Parliament approved the regulations in October 2013, after well-attended public hearings, then the experts and regulators nominated by all EU member states through the Council of the European Union considered the legislation line by line for nearly two years. Only thereafter could the "trilogue" start, through which the two EU co-legislators – the Council and the Parliament – could agree on final versions with amendments, in conjunction with the Medical Devices Unit of the European Commission acting as advisor. This process was

also lengthy but it was concluded in May 2016 under the Dutch presidency of the EU. Since then, the pace of change has accelerated.

### New regulations fast gaining approval

The Regulations concerning Medical Devices and In Vitro Diagnostic Devices were published on 14th June\*. They have already been endorsed by the committee of permanent representatives to the European Union (COREPER); by the Environment, Public Health and Food Safety (ENVI) Committee of the European Parliament; and by the EPSCO configuration of the Council of the European Union (Employment, Social Policy, Health and Consumer Affairs). Final approvals should follow later this year, and once published in the Official Journal of the European Union the Regulations will become law. There will be a three-year period for transition, during which it will be essential for all stakeholders to implement the new systems.

**“ THE CHANGES WILL AFFECT EVERYONE, IN ALL BRANCHES OF CLINICAL AND LABORATORY MEDICINE, WHERE MODERN MEDICAL PRACTICE WOULD BE IMPOSSIBLE WITHOUT MEDICAL DEVICES ”**

The changes will affect everyone, in all branches of clinical and laboratory medicine, where modern medical practice would be impossible without medical devices. The definition of a medical device has been extended to include medical software as well as any other device ("instrument, apparatus, appliance, software, implant, reagent, material, ..") used for the purpose of diagnosis, prevention, monitoring, prediction, prognosis, treatment or alleviation of disease. The most important changes relate to high-risk implantable medical devices (Class III).

A major goal has been to strengthen requirements for clinical evidence concerning devices before they are approved.

# Der 39. Deutsche Krankenhaustag auf einen Blick



## Zukunft gestalten

14.-17. November 2016  
CCD-Ost, Messengelände Düsseldorf



Datum	Raum L	Raum M	Raum R
Montag 14.11.2016		10.00 - 12.00 Uhr <b>Auftaktveranstaltung</b> Zukunft gestalten	13.00 - 16.30 Uhr <b>Das G-DRG-System 2017</b>
Dienstag 15.11.2016	10.30 - 14.30 Uhr <b>KH Träger-Forum</b> Zentrale Hausforderungen für das Krankenhaus  10.30 - 12.00 Uhr Teil 1 <b>Investitionen für Zukunftssicherung</b>  13.00 - 14.30 Uhr Teil 2 <b>Demographiefeste und kultursensible Krankenhäuser</b>	10.00 - 12.00 Uhr <b>Budgetverhandlungen 2017</b>  14.00 - 17.00 Uhr <b>IT-Entscheiderfabrik</b> Unternehmenserfolg durch optimalen IT-Einsatz	10.00 - 13.00 Uhr <b>BDI-Symposium</b> Qualitätsindikatoren und Indikationsqualität  14.30 - 17.00 Uhr <b>KHSG-Umsetzungs-Monitoring</b> (Qualitätsoffensive und Finanzierungsvorgaben)
Mittwoch 16.11.2016	10.00 - 13.00 Uhr <b>BMVZ-Veranstaltung</b> Rentabilität von Krankenhaus-MVZ: Praxisseminar zu Benchmarks & Controlling für die ambulante Versorgung  14.00 - 16.15 Uhr <b>VKD-Forum mit Work-Café</b> Haftungsfalle Management  16.30 - 18.30 Uhr <b>VKD-Mitgliederversammlung</b>	10.00 - 12.00 Uhr <b>Fachtagung Patientenfürsprecher</b> Dialog und Patientenzufriedenheit im Krankenhausalltag  14.00 - 18.00 Uhr <b>Vortragsveranstaltung AKG</b> Der Architekt als Dialogpartner – als Zukunftsmodell geeignet?	10.00 - 14.15 Uhr <b>Forum „Pflege im KH“</b> Fit für die Zukunft  15.00 - 17.30 Uhr <b>DVKC-Veranstaltung</b> Update Controlling  18.00 - 20.00 Uhr <b>VLK-Forum</b> Korruption im Gesundheitswesen: Sind alle Ärzte potentielle Täter?
Donnerstag 17.11.2016	10.30 - 17.15 Uhr <b>IMPO-Forum</b> Patientensicherheit und Riskmanagement	10.00 - 12.30 Uhr <b>P.E.G.-Veranstaltung</b> Boundaryless Hospital: Vision oder Zukunft?	10.00 - 12.30 Uhr <b>IT-Entscheiderfabrik</b> Start Up & Young Professional Preis

**126 Referenten**  
beim 39. Deutschen  
Krankenhaustag!  
Unter anderem mit:



Hermann Gröhe,  
MdB, Bundesminister für  
Gesundheit



Landrat Thomas Reumann,  
Präsident der Deutschen  
Krankenhaus Gesellschaft



Irene Maier,  
Kongresspräsidentin

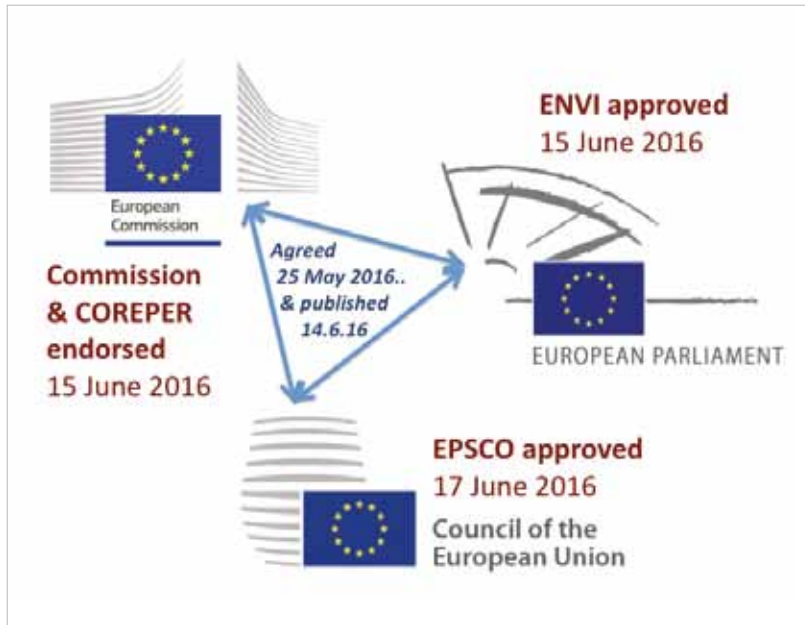


Prof. Hans-Fred Weiser,  
Präsident des Verband der  
leitenden Krankenhausärzte  
Deutschlands



Dr. Josef Düllings,  
Präsident Verband der Kranken-  
hausdirektoren Deutschlands

Bitte detailliertes Programm anfordern bei: Gesellschaft Deutscher Krankenhaustag mbH (GDK)  
Tel.: 0211/4 54 19 45 · info@deutscher-krankenhaustag.de



Several EU bodies have been involved in devising the Regulations concerning Medical Devices and In Vitro Diagnostic Devices.

The new regulation states that, for class III medical devices, manufacturers should as a general rule submit data from systematic clinical investigations that not only verify the safety and performance of the device but also establish 'clinical benefit' – defined as the positive impact of a device on the health of an individual, specified using meaningful, measurable, and patient-relevant clinical outcome(s). The text avoids the term "clinical effectiveness" but it will nonetheless increase the need for manufacturers to undertake more formal clinical studies. The possibility of getting new devices approved on the basis of equivalence to existing devices will decline.

At every opportunity, health care professionals have stressed that information about the basis of approval for new medical devices must be made publicly available. Now, manufacturers will need to summarise the main safety and performance aspects of all class III and implantable medical devices, and the outcome of their clinical evaluation, in documents that will be made accessible through the EU database of medical devices (Eudamed). The principle has been established that there should be adequate access to information for healthcare professionals to enable them to make informed decisions.

### Commission to appoint expert panels

For the first time in Europe, the Commission will appoint expert panels in the main medical fields, which will have responsibility to assess the clinical evaluation of devices and to produce device-specific guidance, and the Commission will publish their scientific opinions and advice. A scrutiny process is also being established, by which regulators

can seek assistance from these panels to evaluate individual applications from manufacturers.

Managing the new regulatory processes and ensuring that software tools are developed in time to allow efficient collaborations between national regulatory agencies will present major logistical challenges to the European Commission, and so it is planned that establishing and coordinating the expert panels will be delegated to the EU Joint Research Centre in Ispra in the north of Italy. Financial resources will be essential so that expert personnel can be recruited to deliver the new system.

For all physicians and health care professionals, it will be necessary to understand and engage with evidence-based practice concerning the use of high-risk medical devices. An essential feature of the European system, which will be strengthened, is that manufacturers must undertake comprehensive post-market surveillance; all users will need to understand that providing information from clinical follow-up is their duty, allowing some innovative products to get earlier market access while information about long-term safety and effectiveness continues to be collected. The concept of "conditional approval" has not been adopted in the legislation but it will be possible for Notified Bodies and regulatory agencies to specify conditions for vigilance relating to particular devices.

### Conclusion: Deliver on changes

Health-care providers will want to link changes in regulatory practice with systems for health technology assessment, and managers will need to provide resources and systems for selecting and monitoring the devices that are used in their hospitals on the basis of the increased evidence that will be available about performance and comparative impact on clinical outcomes. For everyone, the new legislation will challenge us to reform our practices in order to ensure that patients receive the best medical devices to help them – we now have to deliver the changes that we have been campaigning for.

\*[http://www.emeeeting.europarl.europa.eu/committees/agenda/201606/ENVI/ENVI%282016%290615\\_1/sitt-2571597](http://www.emeeeting.europarl.europa.eu/committees/agenda/201606/ENVI/ENVI%282016%290615_1/sitt-2571597) ■

### Key Points

- ✓ The possibility of getting new devices approved on the basis of equivalence to existing devices will decline.
- ✓ There should be adequate access to information for healthcare professionals to enable them to make informed decisions.
- ✓ New legislation will challenge us to reform our practices in order to ensure that patients receive the best medical devices to help them.

# The inevitable rise of outpatient imaging centres



**By Dr Rowland Illing**  
CMO Affidea

Countries around the world have different relationships to advanced diagnostic imaging in the out of hospital (outpatient) environment. In Australia and Italy, it is not uncommon to find imaging centres in shopping malls, a concept which is anathema to both the United Kingdom & South Africa. A shift from hospital based imaging services to a mixed model of both hospital and outpatient centre imaging is inevitable in the current environment. The reasons for this can be explained from a financial, operational & patient perspective.

Hospitals have traditionally been bastions of capital intensive resources such as computed tomography (CT) and magnetic resonance imaging (MRI); in state healthcare systems it is most common for hospitals to have both the resource and the expertise to run both inpatient and outpatient imaging services. In the USA, greater state reimbursement for imaging taking place in a hospital environment has incentivized the status quo. Indeed, imaging remains important to the bottom line of many institutions, subsidizing less profitable service lines.

However, providing both inpatient and outpatient imaging within hospitals can prove extremely inefficient. Operationally, scanners may be tied up for considerable periods with challenging inpatient requirements. Even with dedicated 'outpatient scanners' it is not uncommon for unexpected downtime to lead to delays in scheduled outpatient imaging. Overheads and fixed costs are also greater within a hospital making a dedicated outpatient diagnostic imaging centre more efficient both financially and operationally.

But do these centres provide advantages for the patient? I would argue they do, both in terms of convenience, emotional experience and in some cases, cost. Bringing imaging closer to the patient is now eminently possible. A centralised booking service can offer a choice of locations within a network, providing flexibility both in time and geography. Establishing an imaging hub to service family doctors or specialist physicians in an outpatient setting also allows potentially less travel time between referral and scan.

The ability to park is an undervalued commodity. Outpatient imaging centres are usually designed with this in mind, whereas parking space is often the first area cannibalized by hospitals expanding inside a limited geographical footprint. Additionally, there is no reason why outpatient imaging centres need to look, or feel, like hospitals. The design concept of modern imaging centres can be more geared around patient experience and workflow, designed to reduce anxiety. Finally, cost savings achieved in an outpatient setting may be passed on to the payer. In the case of private patients, this may mean a direct saving to either the patient or their insurer.

The development of outpatient imaging centres in many countries has often been led by entrepreneurial Radiologists who own and operate the imaging equipment. But this environment is becoming more challenging. Declining reimbursement, alongside increased demand, forces improved efficiency, driving consolidation to larger and more efficient players such as Affidea in Europe and Radnet in the USA.

Surprisingly, arguments against outpatient imaging centres are often made by clinical staff. There is a perceived loss of control, and concern that Radiologists out of hospital will no longer be part of the multidisciplinary team or be available to answer clinical questions.

As those countries with developed outpatient imaging services understand, the answer is not binary. Radiologists will always remain an essential part of the on-site hospital team. Not only has there been an exponential increase in the requirement for inpatient imaging as a central role in the diagnostic pathway, but inpatient imaging is more and more required to guide intervention – both diagnostic (biopsy) and for real time intervention, vascular and radiation therapy in particular.

Another argument against the outpatient centre is that Radiologists must be co-located with scanners in order to correctly protocol and oversee the scans, as well as contrast administration. However, in the last decade there have been massive and well documented technological changes – from centralized radiology information systems (RIS), fully digital picture archiving and communication systems (PACS), to voice recognition and the move towards the electronic patient record. More recently, there have been developments in smart protocolling that remove the need for individual scrutiny of every request, as long as there is sufficient clinical detail and a clear clinical question. This coupled with senior technicians (Radiographers), able to operate independently, have allowed the development of satellite outpatient imaging centres that do not require the full time presence of a Radiologist. Although there must always be a Radiologist available remotely to view scans, answer clinical questions and communicate urgent results, contrast may be administered under supervision of a non-specialist doctor with resuscitation training.

This is of great benefit to patients in remote regions. Radiologists no longer have to be single handed, or be expected to have expertise in every area of Radiology. Reporting hubs offering subspecialty expertise and even home-reporting are massively more efficient, with reduced interruptions, improved workflow and smart worklists. Of course this is contingent upon receiving support by an adequate IT infrastructure. Fear of dissociation from clinical teams can be allayed by regular clinical interaction at meetings either in person or by video conference.

These factors all contribute to an inevitable rise in outpatient imaging centres even in countries where the penetration is currently low. The continued rise of the outpatient imaging centre is inevitable in an era of value based healthcare and in an environment where patient experience plays an ever increasing role in how services are delivered.





# FUTURE LEADERS

## WHAT HEALTHCARE NEEDS FOR THE CYBERSECURITY RISK



**Mansur Hasib**

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### What, in your view, are the greatest threats facing the healthcare sector in cybersecurity?

First, the wrong executives such as Chief Financial Officers are in charge of IT and cybersecurity strategy in half US healthcare organisations. One third have no cybersecurity executive on staff. In too many organisations qualified cybersecurity executives are not empowered to do the right thing. For example, even though strong, yet simple, authentication systems have been around for a while, too many healthcare organisations continue to rely on user/id/password based systems – the weakest form of authentication. Authentication systems need to be easy and should not make life difficult for users. The second challenge is that governance and executive accountability is lacking. In the absence of due diligence, healthcare organisations are falling increasingly victim to ransomware and other similar attacks. Finally, new technology, including medical devices with weak security continue to be implemented without proper vetting – thus increasing the number of attack vectors and risks dramatically.

### What can healthcare leaders do today to start addressing these threats?

Organisations must accept digital strategy as integral to organisational strategy. They need to hire qualified digital strategists, put them in charge at the highest levels of organisations to implement continuous innovation, data governance, and digital risk strategies. Importantly, leaders have to incentivise and engage the entire organisational workforce toward the solution. Cybersecurity is not a one-brain sport.

### In your book *Cybersecurity Leadership*, you describe what you call ‘ethical leadership’. Can you define this?

Ethical leadership is the principle of sharing the fruits of innovation and productivity with the very people producing this. This is also the very foundation of capitalism. Cybersecurity is essentially perpetual innovation. People innovate – machines do not. People will not innovate if they do not have an incentive to do so. Ethical leadership inspires a cybersecurity culture through higher levels of engagement, loyalty, and innovation. In this manner, a people-focused cybersecurity strategy becomes a powerful innovation, revenue, and profit driver for any organisation.

### What is the biggest mistake healthcare CEOs are making when it comes to implementing effective cybersecurity?

CEOs have ignored people and focused on buying technology. They treat people as the “weakest link” and force them to go through meaningless cybersecurity awareness training based

on an outdated information security model. Instead, people can be our greatest strength. Training should focus on proper usage of all the technology and data that each person uses. In terms of staffing, organisations have been penny-wise and pound-foolish. They are looking for purple squirrels at mouse pay. Instead of setting compensation at market, they are trying to hire based on artificial budget numbers. Hence they have created an artificial “skills gap”. Companies have also been reluctant to develop internal talent with known organisational loyalties. Organisations need to implement strong talent development and retention programmes tied to the concept of ethical leadership.

**“ LEADERS HAVE TO INCENTIVISE AND ENGAGE THE ENTIRE ORGANISATIONAL WORKFORCE TOWARD THE SOLUTION. CYBERSECURITY IS NOT A ONE-BRAIN SPORT ”**

### Can you describe what is unique about the graduate cybersecurity technology programme at the University of Maryland University College (UMUC), and why you think its principles could work for present healthcare executives?

The main problem in executive education is that business schools do not teach cybersecurity and digital strategy and most cybersecurity education focuses on technology and ignores business concepts.

Executives are taught to think of people as expenses. Of course this kills innovation, productivity and loyalty. As a result, people become a major source of internal threats – both accidental and intentional. Many academic cybersecurity programmes are really computer science or engineering programmes or teach a small aspect of cybersecurity. At UMUC we are holistic and transparent in our approach and deal with all aspects of cybersecurity. We understand that cybersecurity is a vast interdisciplinary field with people, policy, and technology aspects. To cover this range, we have four Masters Degree tracks providing clarity in career possibilities: Cybersecurity Management and Policy, Cybersecurity Technology, Digital Forensics and Cybersecurity Investigations, and Cybersecurity Operations and Information Assurance. However all students go through cybersecurity leadership, decision-making, and analytics. As an open university we believe education should be available to anyone. Therefore we leverage technology to offer our programmes to 93,000

students worldwide with 12,000 students in our graduate and undergraduate cybersecurity tracks. In most programmes we accept people from a wide range of disciplines because we believe in an interdisciplinary business approach to digital strategy. Our students are mostly working professionals and they apply what they learned by completing projects in their courses. Professors, with deep real world experiences, teach and mentor our students. We feel we are producing the next generation of business executives at UMUC.

#### Is there anyone leading the way in healthcare cybersecurity?

Healthcare organisations, which embraced digital strategy as a business driver, have done well. These organisations have very strong CEO/CIO partnerships going back decades. Technology, data, and analytics have been powering the mission of Kaiser Permanente for a long time. They have used digital strategy to make better decisions, improve healthcare, reduce errors, and engage partners and patients.

#### You have a particularly strong stance against CEOs and CFOs who do not engage with IT or CIOs/ CISOs – and vice versa. Do think this may be harsh?

I have been more vocal lately since my earlier polite advice has been largely ignored. In the meantime, three organisations with the wrong executives in charge have breached my own personal information and offered very little protection or remediation. I have seen and heard of executives in profitable companies lay off thousands of people just to increase their annual bonus. They have even fired CIOs and CISOs for pointing out issues instead of doing the right thing. I am disturbed that executives are not learning from incidents. For example breaches like Community Health Systems and later Anthem should never have happened. These were all failures in leadership and governance. In the meantime, the digital identities of half the US population have already been compromised and the rampage continues unabated. Offering to monitor credit for a year or two is an irresponsible response. A large number of victims are children who will face problems several years from now. I am particularly disturbed that money drives healthcare organisational strategy instead of strategy driving money. Having a CFO drive IT and cybersecurity strategy makes no sense. They do not believe technology is core to their mission. CFOs also tend to view technology as an office automation function.

Since they feel inadequate managing this function, many of them have completely outsourced IT – resulting in even higher costs and perpetual stagnation. When IT got outsourced, internal IT talent and innovation also vanished with it. Outsourced IT will only do what you tell them to do.

The industry appears to believe in the myth that CFOs “save” money by controlling IT and cybersecurity costs. Yet I see countless examples of CFOs wasting money on inappropriate technology at “discount” prices or leaving critical positions unfilled in their efforts to “save” money. Most often they do not invest in continuous improvement to avoid problems. They spend money after a problem occurs – often on inappropriate technology and solutions – just to show that they did something.

#### If you had to write a job description for the ideal healthcare leader, what would it look like?

The modern healthcare executive needs to understand the new world of electronic health records, health information exchanges, health insurance exchanges, digital patient identities, patient and partner engagement through technology, integration of medical instruments and the entire spectrum of patient care, data analytics and business intelligence and data driven decision making – all while maintaining confidentiality, integrity, and availability of data and systems using a balanced mix of people, policy, and technology, while perennially improving over time. In other words they have to be a true healthcare digital strategist. We also need ethical leaders who understand that ethical leadership is not only profitable for business, it is the only way to achieve perpetual innovation and long term success in any organisation. ■



Dr. Mansur Hasib is the author of *Cybersecurity Leadership* where he shares a unique cybersecurity governance and culture model based on his research and 12 years experience as a Chief Information Officer. This book was cited in a US Senate hearing and is used by universities and government and private cybersecurity leadership programs.

Dr. Hasib serves as Programme Chair, Cybersecurity Technology in the Graduate School at University of Maryland University College (UMUC) and has a Doctor of Science in Cybersecurity. He also holds the prestigious CISSP, PMP, and CPHIMS certifications. With 30 years experience in healthcare, biotechnology, education, and energy, Dr. Hasib is a frequent speaker at conferences. Dr. Hasib developed a holistic graduate academic programme, which blends business, information technology and cybersecurity. In 2013, Dr. Hasib conducted a national study in US healthcare cybersecurity and published the book *Impact of Security Culture on Security Compliance in Healthcare in the U.S.*

#### Key Points

- ✓ Digital strategy is the same as organisational strategy today. Yet education of executives is focused on finance, marketing, and accounting.
- ✓ Cybersecurity is perennial innovation.
- ✓ People innovate.
- ✓ Cybersecurity leadership is critical for long-term success of organisations.





# IMAGING WITH EOS®

## The Radiologist's View



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The Hospital for Special Surgery (HSS) acquired the EOS® imaging system because the technology gives us biplanar capability with a single exam, with no distortion in the image and most importantly, it is low-dose. Our orthopaedic surgeons wanted to reduce radiation dose for their patients, particularly the pediatric patients who need repeated x-rays for limb-length discrepancies or for scoliosis.

Previously, in order to get a long field of view of the patient, such as the pelvis to the ankles or from the skull to the pelvis, you would have to take two different exposures from the anteroposterior (AP) or frontal view, and another two from the lateral or side view. Both images of each view then had to be digitally stitched together. Sometimes there was poor stitching so you would not get an accurate image length. EOS® vertically scans the desired length and has the ability to image from head to toe in one exam. Moreover, the system has two detectors and two tubes so you can get both the frontal and lateral views in one shot, greatly reducing the time required for a full exam.

### Joint Replacement Research

We are using this technology for research with Dr. David Mayman on total hip and knee replacements (Carroll et al. 2016; Esposito et al. 2016a; 2016b). For example, we want to find out what the anatomy is beforehand, and discover why some patients dislocate following hip surgery. That may be a function of how the pelvis orientation changes between sitting and standing, and EOS® lets us see this. The relationship of the patient's spine to their pelvis is something people have been looking at for years, but it's been difficult to research, especially in 3D, until now with EOS®. This system gives us that ability to look at the entire spine and the lower extremities from front and side in a single exposure. It allows us to see the relationship between the spine and pelvis changes between standing and sitting, and that's very important. We were not able to do this very well with conventional x-rays. EOS® opens up a whole new area not just for patient care, but research as well.

### Conclusion

EOS® is a tool that is especially adapted to long-axis imaging in weight-bearing, functional positions (standing, sitting), for children (scoliosis, leg lengths) as much as for adults (scoliosis, leg lengths, joint replacement). Scans with EOS® are quicker and more accurate than doing the traditional radiograph stitching, and the fact that you get a frontal and a lateral view with a single exposure also gives a considerable time advantage. It has improved our patient care and opened up an important area of research. ■

“WE HAVE A LOT OF POTENTIAL  
USERS WANTING ACCESS TO THIS  
TECHNOLOGY”

Theodore T. Miller



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With EOS®, in addition to getting a longer field of view and simultaneous frontal and lateral acquisitions, we have the ability to image patients in functional positions either standing or sitting. With this, we can see how a patient's lower limbs (hips, knees) are positioned and aligned when standing and how this changes when seated. We acquired this technology originally for our pediatric patients. It quickly became very popular with orthopaedic surgeons, because they realized how important it was for all patient groups – adults with scoliosis, limb length discrepancies, etc. We have a lot of potential users wanting access to this technology.

### 3D Modelling

Once the biplanar images, frontal and lateral, are acquired simultaneously, and since the system is pre-calibrated, the sterEOS workstation can be used to build a personalized 3D model of the patient's lower limbs or spine. These models are accompanied by automatically calculated 3D measurements of the patient's anatomy, all from a single pair of low-dose radiographs.



Ultra low-dose 2D imaging system with no stitching and total exam cycle less than 4 minutes

## The Orthopaedic Surgeon's View

The EOS® orthopaedic imaging device uses low-dose, biplanar radiographs to capture full body, lower extremity or spine images without stitching or vertical distortion. Furthermore, it provides images in functional positions.

EOS® replaces standard preoperative radiographs, and at the Hospital for Special Surgery (HSS), we have found EOS® to be extremely accurate in predicting component positioning when compared to computed tomography (CT).

I have been using EOS® for the past two and a half years. I use it for all preoperative templating for total hip and total knee arthroplasty to predict intraoperative implant sizes and component positions. The corrected image magnification results in more accurate templating than traditional radiographs. In the case of total hip arthroplasty, EOS® is very user-friendly and accurate with excellent inter-observer agreement.

“EOS® SHOULD BECOME  
THE PREOPERATIVE IMAGING STANDARD  
OF CARE FOR ARTHROPLASTY  
PATIENTS”

David J. Mayman

The ability to use hipEOS, the 3D pre-operative surgical planning software, for patients with increased native version has been very helpful. In certain cases, after preoperative planning with hipEOS, I have changed my plan and used different components. The 3D models allow us to gain more knowledge preoperatively to save intraoperative time. This has enabled me to be more efficient in the operating room and decrease the time spent requesting different implant sizes.

The technology has changed my practice. I have been able to decrease radiation exposure to my patients and decrease the number of radiographs that are required for surgery.

### Value of 3D

Especially when combined with hipEOS, 3D models can be used to create a patient-specific plan where the surgeon is able to visualize and manipulate various implants. This is not possible with standard radiographs or even 2D EOS images. The 3D models allow us to see rotation of the femur and to identify patients with varying offset and neck anteversion that may change our preoperative planning. Most commonly, patients with arthritic hips stand with their femur externally rotated, which makes it very difficult to template. However, the 3D capabilities of hipEOS takes this into account.

We can now accurately measure component position in two planes such that we can consider flexion contractures at the knee or pelvic tilt at the hip. Additionally, this allows us to measure implant position in functional positions such as standing and sitting. The ability to evaluate standing/sitting

and spine radiographs with one low-dose 2D-3D system provides additional information that will help us determine which patients may be at high risk for dislocation. Absence of variation in pelvic tilt between standing and sitting positions reduces posterior acetabular coverage, which may put patients at higher risk of dislocation in the sitting position. The ability to identify these patients and plan accordingly will provide better patient outcomes.

### Benefits for Pediatric, Arthroplasty, and Spine Patients

The HSS acquired the EOS® system originally for pediatrics. However, we found it to be extremely useful in arthroplasty, and we acquired two additional units for adult and spine patients.

EOS® has been a valuable tool for our surgical cases and for the patient, it provides an alternative to standard imaging with less radiation exposure. In difficult cases, the 3D model EOS provides us to plan specifics such as leg-length and version that radiographs are unable to do.

EOS® should become the preoperative imaging standard of care for arthroplasty patients to decrease radiation exposure and provide a patient-specific, 3D model of each patient so that their surgery is planned based on their individual anatomy. ■



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EOS scanning booth

### DISCLOSURE:

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# RADIOLOGY AT THE CROSSROADS



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**R**adiology is now at a crossroads. Let us expand the metaphor. If we are to proceed we are to be mindful of the traffic in our direction and be aware of the dangers of crossing the divider, ie the median where we have been trained to avoid and therefore not interfere with the flow of commerce conducted by other specialties. What we must also be aware of is what we may not see at first—coming at us from the side streets and seeking the right of way, thereby halting our progress. These side streets are not quiet lanes today but have become major conduits.

## Two Challenges Lie Ahead

We refer to the two initiatives, which are going to challenge us now and in the medium term at least. They are artificial intelligence (AI) and genomics. We must recognise the profound interest of these two dynamic innovations (which are most likely to be irresistible) and their strategic implications. And we should also address the tactical changes we must make to maintain a niche in the caregiving enterprise, which involve where we physically situate ourselves and how we regard our specialty vis-à-vis our clinical colleagues.

We explored in a recent talk presented by the first author at the Management in Radiology meeting in Barcelona in 2015

the computerisation of interpretation of head CTs and head MRIs, ie the rendering of diagnosis by application of algorithmic patterns to findings of normality and disease within the crania, including the brain and its coverings (HealthManagement.org 2015). The continuing advances in deep learning, ie the manifestation of the capabilities of AI, have already been applied to these common procedures placing before us a formidable competitor. We have no doubt that computer-determined diagnosis will supplant us as the diagnostic interpreter in this regard. A recent review of AI in the 25 June-1 July edition of the Economist highlights its application to imaging (Economist 2016). It has become a watchword in public discussions of the expected imperatives of AI that the radiologist will be the proverbial “canary in the mine” in this respect, as medical problem solving for the recognition of the presence and severity of disease will become like other forms of intellectual work, a function of the capability of non-human actors.

Similarly, the incorporation of genomics into medical practice will in its own way revolutionise the paradigm of diagnostic investigation. Consider this taxonomic analogy: a disease can be classified by the family it is in, the species it is a part of, and the unique identity it possesses. If a sample of blood

can identify the individuality of a disease and recognise its pattern and potentiality for spread and patient survival, then the macroscopic delineation of family and the pathological labelling of species becomes irrelevant. Staging will have a new meaning in a genomic-based rendering of classification and new protocols derived from it will to a considerable extent bypass radiology. Genomics is not as far along as computer-based diagnosis, but both are hot topics and have stimulated heavy investment by many companies with deep pockets, who see in each a technological winner.

## “THE INCORPORATION OF GENOMICS INTO MEDICAL PRACTICE WILL IN ITS OWN WAY REVOLUTIONISE THE PARADIGM OF DIAGNOSTIC INVESTIGATION”

### Public Aware of Cutting-Edge Science

These threats have reached the section of the public knowledgeable about headlines heralding exciting applications of cutting-edge science. Among this public are senior medical students in the U.S. and abroad. As a residency programme director the first author has been tuned into their thoughts and fears. The spectre of coming technological irrelevance of radiology is disturbing to them as they project 40 years or so of hopefully financially and intellectually satisfying employment. That is the main reason why our specialty has become less attractive to them.

What to do? First of all we must recognise these worrisome prospects. Radiology has had a glorious 40-year run, a happy conjuncture of technological discovery in the service of clinical imperialism. That, we believe, is not a negative phrase, as we have been both the managers and leaders of the incorporation of imaging in all aspects of contemporary practice. However, imperialists tend to be imperious not so much in attitude as in actions and assumptions.

The role of radiologist as it is presumed in many practices in the U.S. will soon become obsolete. The radiology department is distinctly defined spatially in a clinic or a hospital. For the radiology group such a setting is convenient and collegial. There all our machines and offices and reading areas are

in a conjoined agglomeration. In the days of film where the viewed image was tangible as an object, such images were at the same time diagnostic information, archival material and in the U.S. a billing record. So our referrers came to see us. Alternators made those consultations more fulfilling than simple view box demonstrations. But with the advent of electronic depictions our clinicians no longer needed to traipse down to see us. So we have now become physically remote and we dare say philosophically distant. Many of us regard our function primarily to make diagnoses from afar rather than to interact continually and in person with our referrers.

That has to change. Image reading venues must be relocated. Paediatric radiologists must be situated in paediatrics, the neuroradiologists should be situated in the neurosurgery-neurology complex, the emergency room (ER) radiologists must be as close to the ER as possible. The abdominal radiologist and the musculoskeletal radiologists should relocate themselves and their viewing computer as close to the doctors' lounge or dining room as possible so they can be sure that in-person dialogues can be fostered.

### Warning Residents to Avoid Subspecialty

Still, in all these are necessary but not sufficient manoeuvres to staunch the flow of intellectual capital we will forfeit as new and powerful AI and genomic interventions sweep over medical practice. We have warned residents, to whom we have a responsibility as mentors, to avoid neuroradiology and abdominal radiology (the latter at cancer-based hospitals predominantly) as subspecialty choices, because we want them not to pick a job for which the prospects will soon shrink. ■

### Key Points

- ✓ Artificial intelligence and genomics are going to challenge us now and in the medium term.
- ✓ The spectre of coming technological irrelevance of radiology is disturbing to medical students.
- ✓ Radiologists have now become physically remote and philosophically distant.



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# CLINICAL USE OF CORONARY CT ANGIOGRAPHY

## CHANGE OF PARADIGM



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**D**uring the last decades we have witnessed a tremendous progress in imaging technologies. Probably the most impressive results have been achieved in cardiac imaging. The landscape of diagnostic tools used for cardiovascular diagnostics has dramatically changed. All cardiovascular imaging technologies have improved, but the most spectacular changes have occurred in echocardiography, coronary and cardiac computed tomography (CT) angiography, cardiac magnetic resonance and hybrid modalities (positron emission tomography computed tomography [PET-CT] and positron emission tomography magnetic resonance imaging [PET-MRI]). These have moved from the area of research tools into routinely used ones.

Several trends in this area are obvious. First of all, progress of cardiac imaging is related to amazing improvements in scanning technology. In some ways cardiac imaging is a kind of 'probing stone' for scanners. For example, it is quite difficult to show improvements in diagnosis of pulmonary nodules using wide-detector or dual-source scanners in comparison with 'traditional' low-end 16-row systems (here we are speaking about diagnostic accuracy, not radiation exposure to patients or image quality). In the case of cardiac computed tomography angiography (CTA), the difference for the better in the case of technically more advanced scanners is quite obvious.

It is interesting to note that the ability to detect and grade coronary stenosis performance of 'traditional' 64-row scanners in general is quite similar to newer and more expensive scanners. Latest trials have shown that neither coronary catheterisation nor cardiac CTA are perfect in grading coronary lesions into haemodynamically significant and not significant ones. First of all this fact concerns so called intermediate stenosis, causing luminal narrowing to 50-70 percent. This is why one of the major directions in cardiac radiology is functional imaging. In case of CCTA it can be done with the help of perfusion myocardial CT or noninvasive assessment of coronary blood flow. The last one could be done with help of CT fractional flow reserve (CT FFR) analysis or assessment of transluminal arterial gradient (TGA).

Both these approaches (especially CT FFR) are promising tools for studies of coronary flow through stenotic lesions.

New generations of CT scanners can perform both CCTA and myocardial perfusion CT with fewer non-interpretable scans. It is their major advantage over standard 64-row scanners.

In the past results of CCTA in multiple single- and multi-centre trials had been compared with invasive coronary angiography (ICA) using the latter as a 'gold standard'. Quite naturally CCTA was inferior to ICA in grading of coronary lesions. But after accumulation of a wealth of practical and scientific data, today we are witnessing a quite different situation.

In cardiology and cardiac surgery we are witnessing a rapid transition from the 'traditional' approach to grading of individual coronary artery lesions towards the 'modern' one, which is based on a combination of anatomy and physiology to determine the physiological consequences of coronary stenosis: does it cause myocardial ischaemia or not?

**“ ONE OF THE MAJOR DIRECTIONS IN CARDIAC RADIOLOGY IS FUNCTIONAL IMAGING ”**

With the introduction and rapid evolution of invasive fractional flow reserve (FFR) technology, a new gold standard has been developed to invasively assess the physiological severity

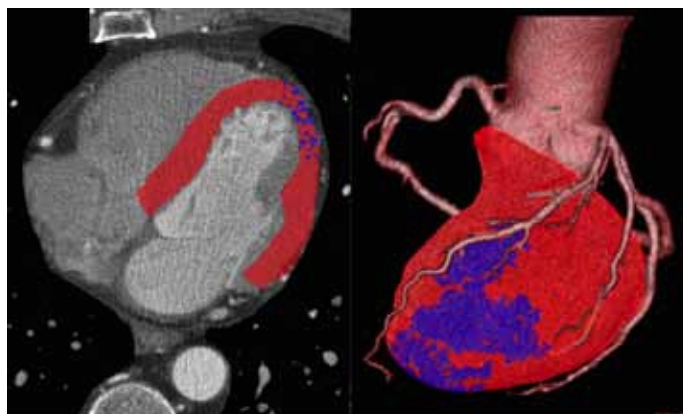
of a coronary artery stenosis. Several trials using FFR have demonstrated that ICA also has limited capabilities to determine the physiologic significance of intermediate (50-70 percent) coronary stenosis. In some recent trials it was shown that in case of head-to-head comparison of ICA with CCTA using FFR as a new reference, the diagnostic performance of both modalities for grading of coronary stenosis was comparable (Budoff et al. 2016).

What is even more important is that CCTA has the ability to see the vessel wall, to assess the structure of atherosclerotic plaques and even to detect (in some cases) the vulnerable plaques. CCTA provides three-dimensional imaging of the whole heart, including the myocardium, all the heart chambers and valves.

So it looks like the answer to the popular question: "When does CCTA replace ICA?" is "Tomorrow!". Why tomorrow, not today? As has been said earlier, even the best models of modern scanners still cannot provide artefact-free anatomical



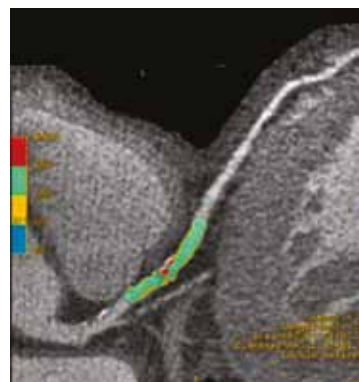
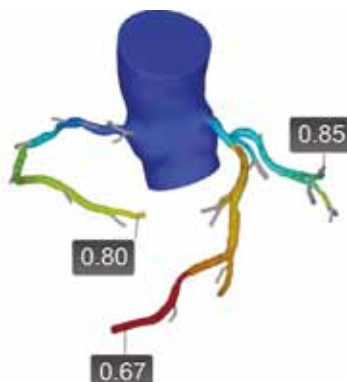
**Figure 1.** Normal CTA



**Figure 2.** Single-Shot Perfusion CT  
Blue areas indicate decreased myocardial blood flow



**Figure 3.** CT FFR. a - CCTA b - CT FFR  
Decreased blood flow in the distal part of LAD (marked with red colour)



**Figure 4.** CCTA, Coronary Plaque Analysis

Image credit: Federal Center of Treatment and Rehabilitation, Moscow

and physiological imaging in one hundred percent of cases, and most of them are not so common in public healthcare. Usually they are used in medical centres dedicated to cardiac imaging and research.

But having almost 30 years' experience in cardiac imaging, I am quite enthusiastic about this transition. Let's look back: a long time ago (in the 1980s) both CT and MRI replaced catheter angiography for diagnostic workup of aortic disease. After the appearance of spiral and multislice CTA this modality practically replaced catheterisation in diagnosis of pulmonary thromboembolism, carotid and peripheral arterial disease. The next target is coronary imaging and we are almost there. Hunting for vulnerable plaques will continue and hybrid cardiac imaging (PET-CT, SPECT-CT, MRI-CT) is steadily developing from a research tool into a clinical one.

Use of cardiac imaging is rapidly expanding and today we have plenty of scientific data providing us with reasons to use CCTA more widely in clinical routine. It is important to notice that CCTA has proven independent prognostic value and it can even improve patient outcomes (SCOT-Heart Trial) (Williams et al. 2016). Indications for use of CCTA are given

in modern U.S. and European cardiological and radiological guidelines (one can refer to publications from the American College of Cardiology (ACC), Society of Cardiovascular Computed Tomography (SCCT), the European Society of Cardiology (ESC) and the American College of Radiology (ACR) - plus the recent iGuide from the European Society of Radiology (ESR). But it looks like even these modern recommendations and guidelines would be substantially changed and updated in favour of CCTA when some recent important trials of 2015-2016 are taken into consideration.

Generally speaking, technical progress of CCTA in combination with rigorous research in this area has resulted in rapid transformed use of this diagnostic modality. Probably in the next few years we will see the situation when imaging of all vessels - big and small - will be done noninvasively with the help of CTA (or MRA) and ICA will move completely into the area of intervention (placement of stents, grafts, artificial valves, occluders etc.). It is going to be a 'win-win' situation both for physicians and patients because it will increase the number of right procedures performed rapidly and effectively for the right patients. ■



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# MEDICAL DEVICE CYBERSECURITY

## WHEN WILL YOUR PACEMAKER BE HACKED?



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In 2013, the Washington Post (among other news outlets) reported that Vice President Dick Cheney's cardiac pacemaker had its wireless capabilities disabled when implanted in 2007 to eliminate any potential cyberintrusion threat (Peterson, 2013). This old headline, with the more recent U.S. Food and Drug Administration (FDA) cybersecurity alert that the Hospira Symbiq Infusion System was hacked in 2015 (U.S. Food and Drug Administration, 2015), has many hospital leaders wondering whether they have the risk of medical device cyberhacking under control. General consensus is they don't.

Many information technology (IT) leaders certainly have many cybersecurity risks under control: passwords are required, servers are secured behind locked doors, policy has been established if any protected health information is sent to a wrong e-mail address or hacked. However, these practices have largely been applied to network infrastructure and the electronic health record (EHR). A medical device, such as a vital signs monitor or an infusion pump, is a cybersecurity threat vector that probably has not been subjected to the same risk-mitigation scrutiny.

To start addressing these issues, FDA hosted a public workshop January 20 and 21, 2016, called "Moving Forward: Collaborative Approaches to Medical Device Cybersecurity" (U.S. Food and Drug Administration, 2016). The FDA, in collaboration with the National Health Information Sharing Analysis Centre, the U.S. Department of Health and Human Services, and the Department of Homeland Security, brought together diverse stakeholders to discuss complex challenges in medical device cybersecurity that affect the medical device ecosystem.

### Know Where the Threats Lurk

As we know, medical devices are no longer just machines attached to or used by the patient. They are often connected to the EHR—either hardwired or wirelessly. A typical patient in a critical care unit could easily be connected to ten or more networked devices. While the information on the medical

device may not be useful to a hacker, the medical device can be used as a conduit for accessing patient information in the EHR, like home address and social security number, which can be used to perpetrate identity theft or real theft in the patient's home while the patient is hospitalized. Potential threats in medical devices include the physiologic monitor that runs on an outdated operating system, the ventilator with a USB port, and usernames and passwords for the vendor's field service engineers and in-house technicians that are hard-coded. Other industries largely solved these types of issues years ago.

As a further example, in-house biomedical engineering technicians and vendor field-service engineers typically have administrative rights to access performance records and to apply service diagnostics. These are typically not a managed credential and at many hospitals are the same for everyone with this level of access to the device. What happens if a technician or field-service engineer leaves the hospital or the vendor? The password leaves with the person, with no hospital policy or procedure to update the access codes. In its 2015 Cybersecurity Survey, the Healthcare Information and Management Systems Society (HIMSS) noted that user-access-

control security solutions were implemented in just 55 percent of responding hospitals and mobile device management tools and that access control lists were implemented in only 50 percent of respondents (Healthcare Information and Management Systems Society, 2015).

Also, at many hospitals, no clinical engineering or IT staff can tell you which medical devices connect to the EHR, how they connect, or what version of operating software is running on each device. Often, basic security information is nowhere to be found regarding medical devices used in patient care.

### What to do

- Include clinical engineering, IT, and risk management staff when creating cybersecurity policies and procedures;
- Proactively assess medical device cybersecurity risks.

**“MANY HOSPITAL LEADERS ARE WONDERING WHETHER THEY HAVE THE RISK OF MEDICAL DEVICE CYBERHACKING. GENERAL CONSENSUS IS THEY DON'T.”**



ECRI Institute, a nonprofit organisation, dedicates itself to bringing the discipline of applied scientific research in healthcare to uncover the best approaches to improving patient care. As pioneers in this science for nearly 45 years, ECRI Institute marries experience and independence with the objectivity of evidence-based research.

ECRI's focus is medical device technology, healthcare risk and quality management, and health technology assessment. It provides information services and technical assistance to more than 5,000 hospitals, healthcare organisations, ministries of health, government and planning agencies, voluntary sector organisations and accrediting agencies worldwide. Its databases (over 30), publications, information services and technical assistance services set the standard for the healthcare community.

More than 5,000 healthcare organisations worldwide rely on ECRI Institute's expertise in patient safety improvement, risk and quality management, healthcare processes, devices, procedures and drug technology. ECRI Institute is one of only a handful of organisations designated as both a Collaborating Centre of the World Health Organization and an evidence-based practice centre by the US Agency for healthcare research and quality in Europe. For more information, visit [www.ecri.org.uk](http://www.ecri.org.uk)

Working with manufacturers as appropriate;

- Keep up with the latest updates and patches for operating systems and anti-malware software;
- Limit network access to medical devices through the use of a firewall or virtual LAN;
- Audit the log-in process to all medical devices to ensure that an access-control method is being followed;
- Set up a process to monitor and report on cybersecurity threats and events.

that includes clinical engineering, IT, and risk management personnel to assess what the vendor has done regarding design and policies for patch and update management. One resource to aid in this process is the Manufacturer Disclosure Statement for Medical Device Security questionnaire developed by HIMSS and the American College of Clinical Engineering, and then standardised during a joint effort between HIMSS and the National Electrical Manufacturers Association. It provides medical device manufacturers with a means for disclosing to healthcare providers the security-related features of the medical devices they manufacture. ■

### Include the Right Stakeholders to Create Policies and Procedures

In its *Top 10 Health Technology Hazards for 2015*, ECRI Institute recommended that a hospital or health system clinical engineering, risk management, and IT departments jointly take these steps to mitigate cybersecurity threats. Also, medical device security should be thoroughly vetted during the purchasing process of all medical devices and equipment, with a team



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# ADVANTAGES OF 3D PRINTING IN HEALTHCARE

ONE INSTITUTE'S COLLABORATIVE PROCESS IMPACTS MEDICINE



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The Jacobs Institute (JI), a non-profit medical innovation centre in Buffalo, New York, is using 3D printing to further its mission of creating the next generation of medical technology to treat vascular disease, such as heart attack and stroke. One of the ways it achieves this is by partnering with researchers at State University of New York at Buffalo (UB) and surgeons at the Gates Vascular Institute (GVI) to plan for complex vascular surgeries.

A few years back, UB biomedical engineers, in consultation with neurosurgeon and JI chief medical officer Adnan Siddiqui, PhD, MD, FACS, FAHA, developed a way to 3D-print brain arteries to better understand brain aneurysms and stroke. As technology and the team's creativity evolved, so

- Medical device industry's physicians and engineers to learn more about successfully deploying devices inside the arteries, whether in the heart, brain, or peripheral vasculature;
- Entrepreneurs to bring their endovascular device prototypes and deploy them inside the models, to see how the device performs in a life-like environment;
- Gates Vascular Institute surgeons requesting a 3D replica of a specific patient's anatomy to practice surgery—whether to make an appropriate device selection or to practice the surgical approach in a particularly complex anatomy—before touching the patient in an actual catheterisation lab. These models are only created for select patients with complex anatomies, not every patient.

Showcasing the collaborative accomplishments with the university, the hospital, and building a relationship with Stratasys allowed the JI to advance 3D printing further. It was designated as a Stratasys "3D Printing Center of Excellence in Healthcare" in April 2016. The JI acquired a new 3D printer because of the Stratasys partnership and a grant from the James H. Cummings Foundation.

Thus, the JI is poised to transform patient scans into operable models for surgical planning. Its 3D printers, engineers, and surgeons are uniquely and strategically located in one facility. Its Stratasys Objet 500 Connex 3 multi-color, multi-material, 3D printer produces top-quality vascular phantoms.

**“CUSTOMISING SURGICAL PLANNING FOR COMPLEX CASES BOLSTERS HOPE FOR BETTER OUTCOMES WITH PATIENTS SUFFERING FROM VASCULAR DISEASES”**



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did the realism, complexity, and specificity of the 3D-printed models. It began in a university lab as an experiment, where the biomedical engineers painted layers of silicone over a Play-Doh model of a brain aneurysm. Once the Play-Doh was dissolved away inside the silicone, it created a single, hollowed-out blood vessel. This was a tedious process. It was improved rapidly by a technology called additive manufacturing, also known as 3D printing. The UB lab purchased a Stratasys Eden 260V 3D printer, which took brain artery modeling to the next level.

## Making Progress

In the last two years, UB and JI engineers collaborated to create 3D-printed models of arteries to be used in various ways, including physician training, device testing, and surgical planning. These arterial models, known as "vascular phantoms", can be used for:

## Patient in Mind

In order to create the patient-specific vascular phantom, there are steps that the team of biomedical engineers must follow. It is a process largely reliant on various computer programmes to render a final file that can be loaded into the 3D printer.

Biomedical engineers take a patient's MRI or CT scan and, using specialised computer software (Toshiba Vital Images), they identify the patient's individual brain arteries in a process called "segmentation". Next, another computer programme (Autodesk Meshmixer) is used to hollow-out the vessels and add support and connectors, which attach the printed model to a cardiac pump to simulate blood flow. Afterward, the fully-refined and translated computer model is loaded into a program called Objet Studio, which is what the Stratasys Objet 500 Connex 3 multi-material printer reads to create the 3D



Dr. Adnan Siddiqui, JI chief medical officer, removes a blood clot from a 3D-printed brain artery model.

model. Once printed, the biomedical engineers then clean and physically hollow out the model using a clean station, which removes support material and transforms it into a useable model. The model then accurately replicates the structure, texture, and fragility of human vasculature. The physicians have a model of human vasculature on which they can train other surgeons, test endovascular device prototypes, or even plan and practice for a complex surgery.

### Surgical Application

In the case of surgical planning, the surgeon assembles the surgical team in the Jacobs Institute Training Centre to perform the procedure on the model under fluoroscopy. The surgeon's team is joined by JI engineers, who can converse about the model's properties or structure. The JI also documents the procedure, capturing surgeon feedback on the models and the surgical approach. The JI take photographs and videos, to further catalogue the experience. The surgeon and the surgical team use the models to crystallise the plan in several ways during a practice surgery.

First, the surgeon must determine the optimal path to deploy the device. Using the model can help the surgeon recognise if using a certain vessel pathway is helpful or problematic. It can also assist the surgeon in recognising which vessels are twisted, or tortuous, and exactly how to handle the catheters and wires to navigate the bends and turns.

Then, once the surgeon reaches the affected area of the blood vessel, they can try using a particular device to treat it—whether it is a device that will retrieve a clot in the case

of a stroke, or a stent and coil duo to treat an aneurysm. After deploying the device, a surgeon may find deployment is too difficult or that a different device might be better suited for treatment of that particular case. Finally, the surgeon would use the original or try an alternate device during the actual surgery, with greater confidence that the original device would have been unsuccessful.

There are numerous advantages to patients, surgeons, and hospitals in using a 3D-printed model to devise an optimal surgical plan. It:

- Allows surgeons to try a particular approach or device in a risk-free environment;
- Provides the surgeon with practice time before performing the actual surgery, much like medical simulation;
- Minimises the time a patient is on the table, being exposed to harmful radiation, as a surgeon tries to figure out the best approach;
- Reduces surgical cost associated with longer surgery;
- Reduces cost associated with incorrect device selection (catheters, wires, or devices types and sizes);
- Determines which are the best tools for the specific patient's case;
- Helps the surgeon choose the appropriately-sized device;
- Identifies complications so they can anticipate them in surgery.

### The Future

The use of 3D printing in healthcare remains a novel practice with room for increasingly sophisticated applications.



Dr. Vijay Iyer monitors a cardiac valve placed in a 3D-printed heart model.



A 3D printed vascular phantom, with a manufactured blood clot to simulate a stroke.

The Jacobs Institute judiciously applies this technology to advance physician training, improve device testing, and strengthen surgical planning. Surgical planning is still done on a case-by-case basis for highly complex surgeries to reduce complications and, hopefully, to improve patient outcomes. Patients, physicians, and hospitals will reap the benefits, as 3D printing and the JI's experience and processes evolve.

The future is bright for 3D printing and health care. Customising surgical planning for complex cases bolsters hope for better outcomes with patients suffering from vascular diseases. The JI is uniquely positioned to push the envelope in developing this technology. By leveraging its relationships with surgeons, researchers, the medical device industry, and other companies such as Stratasys, the JI can impact the future of vascular medicine in Buffalo and beyond. ■

The JI's was designated a Stratasys 3D Printing Centre of Excellence in Healthcare in April 2016

#### **Michael Springer Director of Operations & Entrepreneurship The Jacobs Institute**

**Michael** is the director of operations and entrepreneurship for the Jacobs Institute, focusing on innovation, business development, and operations. Michael is a biomedical engineer with extensive strategic planning and operations management experience in the medical device space, having worked with several companies in the sector. He oversees the JI's team of biomedical engineers, as they implement and improve 3D printing in healthcare. Michael interfaces with the medical device industry, the hospital, and the university to achieve the JI mission. He is currently preparing to launch the JI's Idea to Reality Center, or i2R, which will be a proof of concept center for neuroendovascular devices.

#### **Richard L. Izzo Graduate Research Assistant, State University of New York at Buffalo**

**Rick** graduated from the University at Buffalo (UB) in May 2015 with a double degree, B.S. in biomedical engineering and B.A. in chemistry. Rick is currently pursuing his PhD in biomedical engineering, specialising in 3D printing in healthcare, under the advisement of Ciprian Ionita, PhD. In this capacity, he works collaboratively with the JI. Previously, he was a JI intern. While in undergraduate school, he worked as a researcher in UB's Lovell Nanomedicine Laboratory and under Renee Reynolds, MD, in his senior year to understand paediatric neurological conditions. Rick served as first author on one journal article. He has also given presentations at five conferences, presented two webinars, and was a featured speaker at the Virtual 3D Printing in Medicine Summit.

### Key Points

- ✓ The JI uses 3D printing in a variety of ways, including physician training, device testing and surgical planning.
- ✓ Biomedical engineers can transform patient scans into realistic, anatomically-specific 3D printed models of patient vasculature, using sophisticated computer software.
- ✓ 3D printers, engineers, researchers, and surgeons located in one facility, facilitates a collaborative planning approach to impact patient outcomes for complex vascular surgeries.
- ✓ Surgical planning for complex vascular surgeries benefits patients, physicians, and hospitals.



# THE ROAD AHEAD



*Physicians are going to look at you sideways if you ask them to align, but if you ask them to be the leaders and determine what the future will look like, they will rise to the challenge.*

**Lucy Hammerberg, MD,**  
Chief Quality Officer

Source: Beckers Hospital Review (2015) 15 quotes from healthcare executives reporters knew they had to write down. <https://iii.hm/4rr>



Few health care leaders would disagree that the U.S. health care industry needs to drastically change. But do we have leaders in place who have the courage to raise their hand and lead the change? In the classical theory of disruption, reform from within is almost impossible. It is hungry, fast-moving new entrants that upend slumbering incumbents.

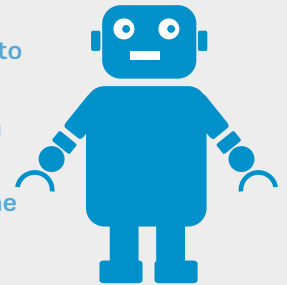
Source: Harvard Business Review (2015) The Biggest U.S. Health Care Challenges Are Management Challenges. <https://iii.hm/4rr>

## THE 21 BEST JOBS OF THE FUTURE & PROJECTED NEW POSITIONS BY 2024:

<b>#1</b>	Registered nurses 439,300	<b>#10</b>	Physical therapists 71,800
<b>#4</b>	Computer systems analysts 118,600	<b>#11</b>	Medical and health services managers 56,300
<b>#5</b>	Physicians and surgeons, all other 51,700	<b>#17</b>	Licensed practical and vocational nurses 117,300
<b>#8</b>	Computer and information systems managers 53,700	<b>#20</b>	Nurse practitioners 44,700

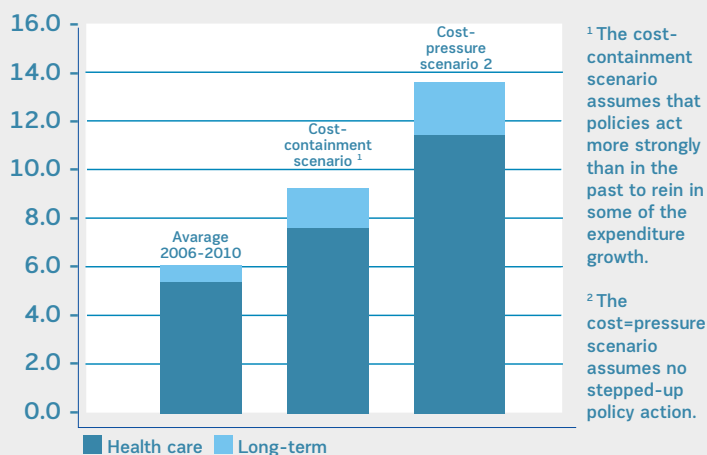
Source: Business Insider (2015) The 21 best jobs of the future. <https://iii.hm/4rt>

Hospitals globally have been slow to adopt robotics and artificial intelligence into patient care, although both have been widely used and tested in other industries. Medicine has traditionally been slow to change, as safety is at its core. Financial pressures will inevitably force industry and governments to recognise that when robots can do something better and for the same price as humans, the robot way will be the only way.



Source: The Conversation (2016) Robots in health care could lead to a doctorless hospital. <https://iii.hm/4ru>

Projected public health and long-term care expenditure in the OECD countries as a percentage of GDP, in 2060.



Source: Maisonneuve, C., and J. Martins. 2013. Public Spending on Health and Long Term Care: A New Set of Projections.\* OECD Economic Policy Paper No. 6. Paris: OECD. <https://iii.hm/4rw>

## THE KEY WAYS THE GARFIELD INNOVATION CENTRE SUPPORTS THE DEVELOPMENT OF NEW SOLUTIONS:



Teams learn by doing - our process and coaching push innovators to leave their comfort zones and get hands-on to try out ideas;

We bring together collaborative teams from all disciplines - engineers, architects, technologists, physicians, nurses and even members - to ensure solutions make sense across the whole system;

Our centre offers a unique, simulated care delivery environment for safe testing of new technologies, processes and facilities.

Source: Kaiser Permanente Garfield Innovation Center <https://iii.hm/4u2>



# ADVANCED PRACTICE

## MAXIMISING THE POTENTIAL OF THE MODERN RADIOGRAPHER WORKFORCE



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Successful delivery of radiology and radiotherapy services is reliant upon a multiprofessional workforce capable of delivering high-quality, patient-centred care in a timely and cost-effective manner. In the UK, the traditional relationship between the radiology and radiography professions has changed, resulting in a radiographer with a much-expanded scope of professional practice. Indeed the radiographer role today is far removed from that promoted by of the early radiography pioneers such as Furby (1944) [see quotation].

While there are many professional titles in use across Europe, the European Federation of Radiographer Societies (EFRS) published its definition of a 'Radiographer', following approval by the EFRS General Assembly (EFRS 2011a).

In order to be recognised under this definition, the level of knowledge, skills and competence of a radiographer should be at Level 6 of the European Qualifications Framework (EQF) (EFRS 2014; European Commission 2008), which is equivalent to the European Higher Education Area (EHEA) Qualifications Framework (2005) Bachelor level. For this purpose the EFRS definition is:

*Radiographers are medical imaging and radiotherapy experts who are professionally accountable to the patients' physical and psychosocial well being, prior to, during and following examinations or therapy; take an active role in justification and optimisation of medical imaging and radiotherapeutic procedures; are key-persons in radiation safety of patients and third persons in accordance with the "As Low As Reasonably Achievable (ALARA)" principle and relevant legislation (EFRS 2011)a.*

Within this document, the EFRS also identified the term 'Radiographer' as the single title at the European level, yet it is clear that the scope of practice of radiographers varies considerably from one country to another. Cowling (2008) offered a global overview of the changing roles of radiographers, suggesting that the UK is unquestionably the world leader in advanced practice. She outlines four different levels of role advancement (**Table 1**) with the UK sitting at Level 1 followed by countries such as Australia, Canada, Japan, South Africa and New Zealand, together with a growing number of European countries (based on more recent EFRS data) sitting at Level 2. Despite 90 percent of EFRS national societies stating that they actively promote and support radiographer role development (EFRS 2015a) there remains limited evidence of the successful implementation of advanced practice across many countries. The majority of European countries remain at Level 3.

Analysis of a number of historical role developments suggests that a range of overlapping drivers are necessary to ensure widespread adoption of an extended scope of practice (**Table 2**). Arguably, the most important driver is a significant and long-standing service need. In the UK there has been exponential growth in demand for radiology, alongside a shortage of radiologists and increased public expectations. A 2015 report showed the stark differences in the radiologist workforce in the UK (7 per 100,000 population) compared with the European average (11.7); indeed, the UK has less than half of the radiologists/population ratio of Finland and France (RCR 2015) (**Figure 1**). The European Society of Radiology (2009) also published data indicating a European average of 10.4 with national figures ranging from 0.15 to 21.5 per 100,000).

**“A 1940s PERSPECTIVE: "...THE PRIMARY FUNCTION OF THE RADIOGRAPHER IS TO BE OF THE UTMOST POSSIBLE SERVICE TO THE RADIOLOGIST" (FURBY 1944) ”**

From the UK data, the radiologists appear to be working to capacity using a limited physical resource; the UK has less than half the number of CT and MR systems and radiotherapy treatment systems per million population compared to many European countries (National Audit Office 2011). However, they are performing more scans than these other countries, with less equipment, whilst also coping with a 10-12% increase in CT and MRI procedures every year (NHS England 2014). Maximum utilisation of limited equipment and staffing resources has only been possible in the UK with the routine adoption of radiographer advanced practice. That is not to say that all hospitals have embraced advanced practice fully; indeed many teaching hospitals have been slower to embrace skills mix, probably due to higher radiologist ratios. A review of the successful adoption of one particular advanced role (gastrointestinal imaging) acknowledged the vital role of nationally-recognised gatekeepers: in this case radiologist champions, promoting radiographer role development both within and beyond radiology (Nightingale and Hogg 2003b). However, it is clear that for the vast majority of National Health Service hospitals within the UK, radiographer advanced roles are now completely embedded in service delivery. Even with higher numbers of radiologists in training,

**Table 1.** Levels of Role Advancement in Radiography (adapted from Cowling 2008)

	Description
Level 1	Countries which have implemented an effective system of role advancement.
Level 2	Countries where the driving forces are the same, but implementation has not yet happened to any great degree.
Level 3	Countries which have made moves towards having formal recognition for their profession, with role development being their next step.
Level 4	Countries which have yet to achieve formal acceptance of radiography as a distinct profession.

it is difficult to imagine radiology departments removing these posts, assuming they deliver high-quality patient care.

### Confusing Range of Terminology

One of the difficulties in interpreting the success or otherwise of the advancing role of the radiographer is the range of terminology that is used, often interchangeably, which may have created confusion (Hardy and Snaith 2006). Role developments can be an expansion of practice, whereby radiographers take on new duties that confer the same level of practice and responsibility; these role developments can become part of the normal scope of practice of radiographers over time. Role extension refers to roles which were traditionally undertaken by other professionals, usually radiologists. Such roles may result in a higher level of practice and increased responsibility and autonomy. Hardy and Snaith (2006) argue that the extended role is a natural development for a professional radiographer.

Until recently, a lack of clarity has persisted around a definition of advanced role in the radiography context. Early attempts to define radiographer advanced practice roles were made by Nightingale and Hogg (2003a; 2003b) and Hardy and Snaith in 2006. These authors suggest that 'advancement' does not purely indicate an increase in the nature or complexity of skills; a radiographer who performs an extended role, whilst having increased responsibilities, will not necessarily be working at an advanced practice level.

To perform at this higher level (as expected of an advanced practitioner) would require them to be actively developing practice for the benefit of their patients. While expert clinical practice in a clearly defined area is a key component of their role, advanced practitioners should also demonstrate:

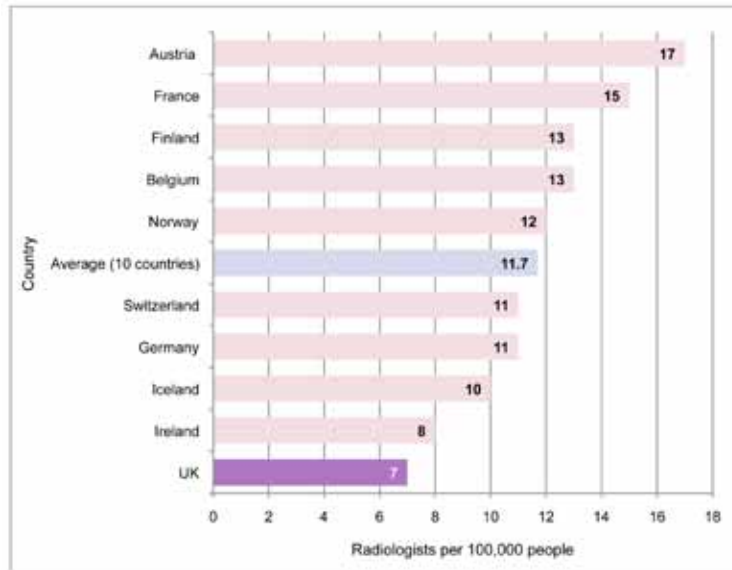
- Delivery of specialist care to patients;
- Contribution to, and evaluation of, the evidence base to develop practice ;
- Education and training of other staff;
- Recognition of knowledge and expertise – expert resource;
- Team leadership, including service management and planning. (EFRS 2011b; Hardy and Snaith 2006; Kelly et al 2008; Snaith and Hardy 2007)

**Table 2.** Drivers Required for Adoption of an Extended Scope of Practice (adapted from Nightingale and Hogg 2003a; Kelly et al. 2008)

Drivers promoting successful introduction of new roles
1. A perceived deficiency in the service
2. A proposed solution
3. A legal framework within which to introduce the change
4. A "champion" of the change, at national and local level
5. Evidence (research) that the change will be effective
6. A benefit to stakeholders (interested parties)

### Working Across Traditional Healthcare Boundaries

Advanced practitioners often work across traditional healthcare boundaries, being fully integrated into new care pathways and the multidisciplinary team. This clearly delineates the advanced practitioner from the largely uniprofessional focus of the radiographer practitioner grade. The transition from practitioner to advanced practitioner requires significant investment at the individual, service and organisational level if it is to succeed and become firmly embedded within healthcare practice. To achieve this status requires additional knowledge, skills and expertise, and this is most compatible with Masters level (EQF Level 7) study (SCoR 2005), with evidence of successful integration of advanced clinical competences within a postgraduate framework (Piper et al 2010; 2014; 2015). Lack of formal education has several potential consequences, including lack of transferability between hospitals, reduced recognition, and lack of opportunity for career advancement. Radiographers should be encouraged to see postgraduate study as an essential component of advanced practice (EFRS 2011b), though currently only 39% of educational institutions with a pre-registration radiography programme currently offer Masters programmes for radiographers while only 14.6% offer doctoral programmes (McNulty et al. 2016).



**Figure 1.** Radiologist Workforce across Europe (Royal College of Radiologists 2015) based on data available from [http://ec.europa.eu/eurostat/web/products-datasets/-/hlth\\_rs\\_spec](http://ec.europa.eu/eurostat/web/products-datasets/-/hlth_rs_spec)

In summary, an advanced practitioner is:

*An individual who has significantly developed their role and who consequently has additional clinical expertise in a defined area of practice, accompanied by deep underpinning, evidence-based knowledge related to that expertise. They make appropriate clinical decisions related to their enhanced level of practice, directly impacting on the patient care pathway (EFRS 2011)b.*

and is:

*...autonomous in clinical practice, defines the scope of practice of others and continuously develops clinical practice within a defined field (College of Radiographers 2005).*

and:

*...has an essential role in enabling the advancement of innovative practice where this can contribute to improvements in service delivery and quality patient care (EFRS 2012a).*

### Benefits and Limitations of Advanced Practice

As the interest in adopting radiographer advanced roles grows in many European countries, a clearer picture has emerged about the benefits and limitations of advanced practice in countries which have embraced it (Kelly et al. 2008). There is empirical evidence to demonstrate that radiographers are competent to perform advanced roles, with many studies comparing radiographer performance directly to that of radiologists (Judson and Nightingale 2009; Woznitza et al. 2014; Torres-Mejía et al. 2015; Reid et al. 2016; Moran and Warren-Forward 2016). Evidence of the wider impacts of advanced practice is growing, but more is required (Law et al. 2008; Hardy et al. 2013; Lockwood 2016; Snaith et al. 2015; Clarke et al. 2014). There is also evidence to demonstrate the successful uptake of advanced roles (Price and Le Masurier 2007; SCoR 2012), but few articles consider why advanced practice may have failed to be fully adopted in some regions.

One exception is a recent article by Henderson et al. (2016) that highlights the current status of advanced practice of radiographers in Scotland, which did not compare favourably to the adoption of such roles in the rest of the UK.

### Boundaries Between the Professions Begin to Blur and Reposition

As radiographers adopt new advanced roles, the boundaries between the professions begin to blur and reposition. For example, a decade ago there was a clear demarcation between the role of the radiographer in trauma imaging (producing the images) and that of the radiologist (reporting the images), whereas this distinction is now less clear, with 41 percent of UK imaging departments in 2012 employing radiographers to report trauma images (SCoR 2012).

Similarly, radiographers in many centres in the UK are now performing and reporting a range of contrast gastrointestinal procedures (SCoR 2012), yet for some examinations such as CT colonography there is still considerable debate amongst the radiologist community about whether radiographers should be involved in reporting (Boellaard 2012). While radiologists may be concerned that radiographers are encroaching upon their domain, radiographers may have similar concerns about assistant practitioners (non-registered healthcare workers) encroaching on the radiographer scope of practice. One of the concerns regularly expressed is that as roles are delegated by one professional group to another, reduced exposure to practice will lead to a change in the baseline skills of the delegating profession. The 'expert' will shift from one profession to another: radiologists will need to be prepared to 'let go' of some professional expertise, and radiographers must be prepared to shoulder this increased expectation.

The *Radiography* journal, which is the official journal of the EFRS and the Society and College of Radiographers, has been the main conduit for dissemination of evidence related to advanced practice, and it continues to engage with the European radiographer community to encourage evidence-based practice and radiographer research and to develop publishing and dissemination skills. Published articles within this and other journals have shown tangible benefits of radiographer advanced practice, including improvements to examination waiting times and report turnaround times with no adverse effects in terms of patient safety and outcomes.

Radiographers in the UK have embraced these new opportunities to utilise their skills and expertise—the most highly skilled radiographers are now being retained via a lifelong career pathway, rather than them moving to management or education posts due to a lack of challenging opportunities in clinical practice. While other countries are working towards the adoption of advanced roles, they do not all have the critical drivers that have been apparent in the UK.

### Immense Benefits Through Implementation of Advanced Practice

Nevertheless, the benefits to radiographers and their patients could be immense through the implementation of advanced

practice across a wide range of areas such as musculoskeletal (MSK) reporting, breast imaging, gastrointestinal imaging, interventional procedures and radiotherapy. For this to happen on a large scale there needs to be a clear professional steer. In the UK, by stating that the modern scope of radiographer practice is “that which the radiographer is educated and competent to perform”, the Society and College of Radiographers (2009) is making it clear that it sees no boundaries to the practice of a radiographer. Similarly, the EFRS as the umbrella organisation for 39 national radiographer societies and 55 educational institutions, representing over 100,000 radiographers and over 8,000 radiography students across Europe, has a role in guiding member organisations. Through its Statements on Education (2012b) and ongoing work on establishing EQF Level 6 (2014) and Level 7 benchmarking documents for radiographers, the EFRS continue to highlight the need for the wider consideration of role development,

role extension and advanced practice. Raising the profile of the radiography profession and of radiography education, together with the continued development of its relationship with the European Society of Radiology, are some of the essential ingredients to facilitate this at the European level. However, national and local opportunities to improve patient care and outcomes will always remain the critical driver for the development of the radiographer scope of practice. ■

## Key Points

- ✓ As radiographers adopt new advanced roles, boundaries between the professions begin to blur and reposition.
- ✓ A range of overlapping drivers is necessary to ensure widespread adoption of an extended scope of practice.



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# EXPLORING THE FUTURE OF RADIOLOGY

ESR TO LAUNCH NEW JOURNAL, EUROPEAN RADIOLOGY EXPERIMENTAL

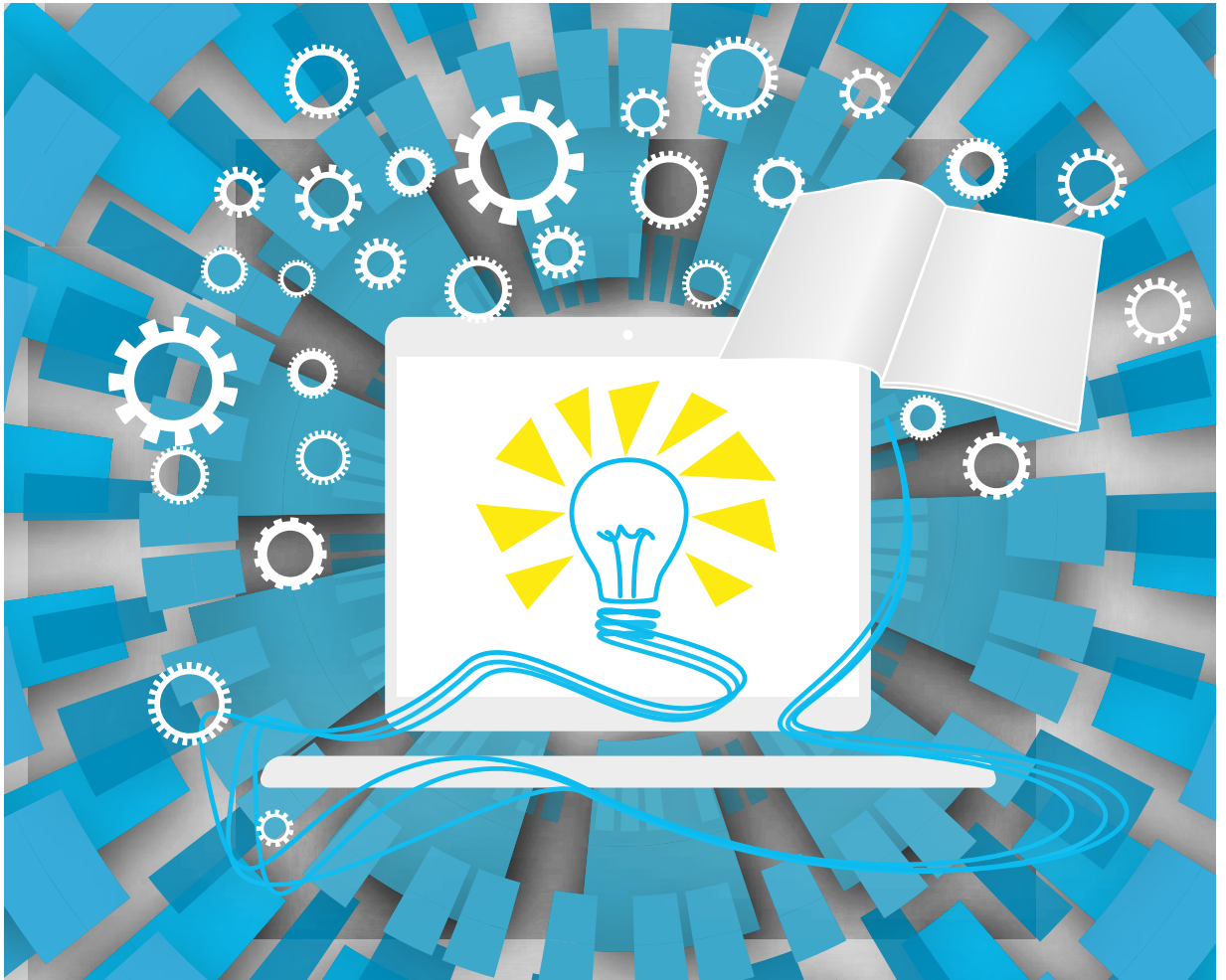


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**M**edicine is facing an increasing rhythm of innovation. Without any doubt, those medical specialties who will guide the innovation will have the best professional position. This is true also for medical imaging. The role of radiologists in the next decades depends on their ability to be a major force driving the introduction of new imaging modalities and techniques to be used for individual risk stratification, diagnosis, prognosis and image-guided therapy (interventional).

In this context, the Board of Directors of the European Society of Radiology (ESR) decided to expand the ESR journal family, launching a new journal, online-only and fully open access, published by Springer: *European Radiology Experimental*. Submissions to the new journal will be possible as of

September 2016, and the first articles will be published by the next European Congress of Radiology (March 1-5, 2017).

The main aim of the new journal is to foster a stronger and stronger connection of radiology with the experimental setting and basic science. This connection is evident for imaging research concerning phantom studies, cell models and radiobiology, animal models, new modalities/techniques (including molecular imaging, hybrid imaging, optical and opto-acoustic imaging), new contrast materials, tracers, and theranostics, and all their interplays. However, the new journal will also welcome reports on: three-dimensional modelling, printing and simulation; advanced teleradiology (including virtual interaction between physicians and patients); and new image reconstruction algorithms and post-processing.

Moreover, the term “experimental” has also a general meaning as opposed to observational, thus including those studies in which one experiment is performed to observe one outcome measure, reducing the underlying variability: a planned variation under controlled conditions. This applies also to studies on humans, especially if they are proof of concept or explorative studies, such as those reporting secondary endpoints of large clinical trials, or those regarding automatic detection and diagnosis where, even using retrospective datasets, new methods are prospectively applied for a better performance. Also new methodological approaches

Great attention will be paid to imaging biomarkers, from the proof of principle to standardisation (the latter being an unresolved issue, especially for MRI-derived parameters), and to radiogenomics, exploring the correlation between radiological phenotypes and genotype of individual patients and individual lesions, with a future role especially in cancer imaging. Last but not least, the journal will offer a window also to another piece of the future: clinical decision support systems for patient management, including decision making for ordering imaging studies. The amount of knowledge of medicine and medical imaging is superior to any human ability to memorise and correctly exploit it in favour of patients. Every day, hundreds of new reports appear online. Only a smart use of information technology can help us.

All these goals imply a strong commitment to include also non-radiologists as journal board members, reviewers, and authors, with a special welcome to physicists, biologists, chemists, information technology experts as well as pathologists, geneticists, or colleagues from other medical specialties, or any other professionals with an interest in innovation in radiology.

Finally, *European Radiology Experimental* will be an online-only fully (gold) open-access journal. The European Union asked all papers deriving from projects supported by public funds to be freely available as soon as possible for reading and redistribution, an approach already used in the United States. The debate about free availability of the results of scientific research is ongoing also outside medical journals and accessibility has to be combined with economic balance. The new journal will work for this.

Charles Darwin said: “It is not the strongest of the species that survives, nor the most intelligent that survives. It is the one that is most adaptable to change.” *European Radiology Experimental* will try to be a pivotal force in reporting and debating the change in medical imaging. ■

## “THE ROLE OF RADIOLOGISTS IN THE NEXT DECADES DEPENDS ON THEIR ABILITY TO BE A MAJOR FORCE DRIVING THE INTRODUCTION OF NEW IMAGING MODALITIES AND TECHNIQUES”

to the design of clinical studies will be considered. In the current era, when typical randomised controlled trials and also large prospective comparative studies imply a high cost, we should perform big data analysis of the huge amount of information we have in our RIS-PACS systems, thus transforming already stored information into new knowledge. This approach may allow offering a low-cost contribution to demonstrate the crucial role of radiology in modern evidence-based medicine, which is a key factor for a patient-centred high-quality healthcare.

A special place will be reserved to those manuscripts reporting innovation for interventional radiology, as this field is a major asset to increase the clinical role of radiology.



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# ORGANISATIONAL CHANGE IN NEWLY INTEGRATED MEDICAL IMAGING DEPARTMENTS

## INCREASE COMMITMENT BY TEAM INVOLVEMENT

In Europe, departments of radiology and nuclear medicine are typically independent centralised organisations with different cultures and values. Some imaging departments are being developed that integrate existing radiology and nuclear medicine departments. When planning integration, a key success factor is the relationship between the respective leaders and alignment on a strategy towards excellence.

When our hospital moved to a new location, five radiology and nuclear medicine departments were merged into an integrated imaging organisation employing more than 380 personnel. The original structure and teams (with their specific cultures, technical orientation, high degree of independence for professionals, modest research activity, and barely any care process integration) were restructured. This required a strategy update because of the new clinical orientation, organisation, facilities and equipment.

Our aim is to describe the process of fostering organisational change for a unified medical imaging department, through active staff involvement and shared ownership. The impact of the change process on organisational culture was evaluated by survey measurements before and after the initial strategy refinement and deployment workshop.

### Materials and Methods

#### Initial Discussion

Two basic prerequisites were identified during the initial dialogue:

1. A core team to guide the work on process improvement, standardisation and integrated patient management;
2. Creation of teamwork between staff members, to establish a common understanding and shared ownership about the goals of the new department.

The programme plan for this collaborative partnership included a three-step approach (Figure 1):

1. **Step 1** (main topic for this paper) focuses on vision and strategy definition and deployment, shaping the conditions for cultural change via a team coaching approach.
2. **Step 2** involves a series of Kaizen events aiming to optimise specific clinical workflow processes and to establish a continuous improvement mindset (Coleño 2000). Kaizen events are rapid workflow improvement projects through intensive teamwork based on the Lean and Six Sigma quality improvement principles.
3. **Step 3** comprises a “closed loop imaging” project to facilitate the implementation of a dashboard clinical decision support system based on relevant clinical processes.

#### Team Coaching Approach

The process started with deep analysis of the existing strategy document prepared by the department director, followed by team activities to refine the vision and strategy articulation. A series of team workshops was organised to create a common sense of direction. The team coaching encompassed a five stages approach (Figure 2), aiming to engage key stakeholders to work together as one team through the vision and strategy refinement and deployment processes (Erasmus Medical Center; Integrated Service Improvement Programme).

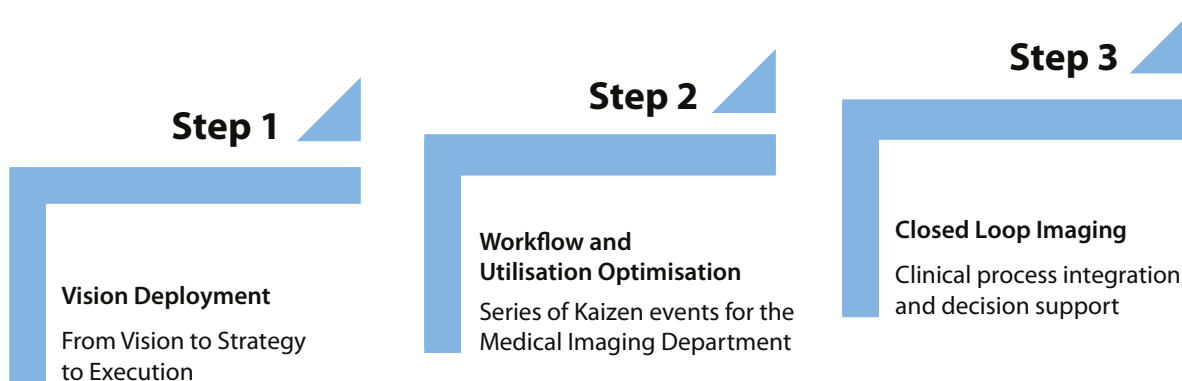
“QUICK WINS ARE ONLY THE BEGINNING OF WHAT NEEDS TO BE DONE TO ACHIEVE LONG-TERM CHANGE”

The core team involved in this coaching initiative had a balanced representation of members of the imaging department (28 participants, including 11 radiologists, 5 nurses, 3 radiographers, 3 administrative employees, 2 nuclear medicine physicians, 1 cardiologist, 1 paediatrician, 1 resident in-training, and 1 transporter). Participants were selected based on personal attitude and aptitude, job category, experience and gender balance. Suggestions were also obtained from other individual department coworkers from all job categories.

#### Model Towards Action Planning

A model by Mintzberg (Mindtools n.d.) was applied as a process-oriented approach. This model shows all relevant influences in a process way, starting with a mission and vision statement, followed by an exploration through internal and external analyses connected via a strengths-weaknesses-opportunities-threats (SWOT) evaluation (Wikipedia). Scenario and strategy discussions support the prioritisation process, finally leading to an action plan for organisation-wide deployment.

Internal analysis of organisation culture was performed with the Organizational Culture Assessment Instrument (OCAI) (OCAI Online) (Figure 3). External analysis was achieved by studying vision and strategy documents published by other major European academic hospitals. SWOT and Gap analyses



**Figure 1.** The three steps' project plan worked out as a result of the collaborative partnership dialogue between the hospital and the main imaging technology provider to create a staged approach towards vision and strategy deployment, improving the quality of care and the department efficiency.



**Figure 2.** A five-stage approach for the Vision Deployment workshop aims to engage key stakeholders, create ownership and improve collaboration and teamwork.

(Mindtools n.d.) were constructed and evaluated during the workshops to identify differences between the present state and desired state of the company culture.

A workshop was conducted based on the existing vision and strategy document, the results of the initial survey on OCAI and a series of individual interviews with all 28 participants. Four agreed clinical pathways were utilised as pilots (paediatric, fast track, oncology and emergency). Workshop results, issues and opportunities were translated into an action plan.

#### **Stakeholder Engagement**

The OCAI survey provided an indication of the perceived present situation of the organisation's culture in comparison to the perceived desired situation. The survey results were discussed in a deep dive session during the two workshop days. The OCAI survey suggested that "ad-hocracy" was the dominant influence in the present situation, characterised by a dynamic and creative working environment where leaders are seen as innovators and risk takers, promoting individual initiative and freedom (Dolan 2010). For the desired situation, the survey showed a dominant influence for a "family or clan culture", suggesting a preference for a friendly and close community environment, leaders being seen as mentors.

#### **Enhance and Sharpen Vision**

All 28 participants were encouraged to picture a desired future state for the organisation (*dream your future*) as well as to describe the current situation (*agree on reality*), in order to identify gaps between the current and future state to understand where action is needed.

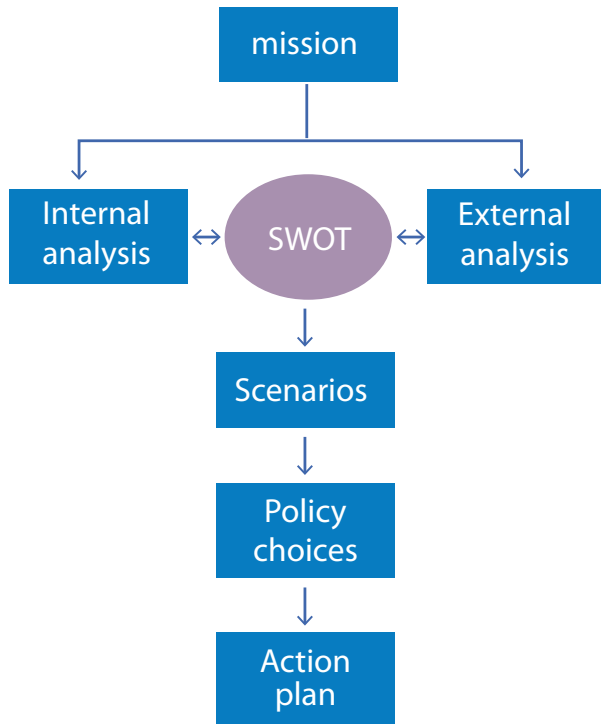
The team identified a series of opportunities, the most relevant being:

- State-of-the-art technology provided huge medical, clinical and research opportunities.
- People would recommend the new hospital to relatives and friends as a good place to work, behaving as real promoters of their workplace.
- There was a very enthusiastic team ready to work together to create opportunities.
- The new department improves clinical innovation, attracts more and better residents, and expands synergies between other clinical departments.

The team also mentioned a number of concerns, of which the most relevant were:

- The reasons to create a single imaging department when employees keep working in small groups were unclear. The team feeling of being one single department was weak.
- Effective collaboration within the team and knowledge management was a concern. Central coordination, management meetings, key performance indicators and communication were not clearly defined.
- The style of competition was seen as a threat.
- The faculty concern was about moving away from their professional clinical work because of administrative tasks and management issues.

Interviews were clustered and mapped on the prerequisites for successful change of the Knoster model (Knoster 1991). Knoster distinguishes 6 organisational prerequisites for a successful approach to change (**Figure 4**). The model shows



**Figure 3.** The Mintzberg model mechanistic assessment of the strategic process shows all relevant influences on strategy, displayed in a structured fashion. This model was applied in order to achieve a process-oriented approach towards strategy development and action planning.

the relationship between successful change and a variety of conditional elements such as Vision and strategy, Consensus on the strategy, Skills to execute it, Incentives to make it worthwhile (what’s in it for me), the Means to help execute it, and finally a clear Action plan to deploy the strategy. All conditions are critical to a successful change process; all prerequisites must be in place; and all identified actions have to be accomplished along the journey.

**Agree on Current Reality**

The organisers inspired participants to draw the image of an ideal service organisation around four selected care pathways: paediatric, fast track (stroke, heart failure or bowel attack), oncology and emergency. Facilitators explicitly asked the participants to assume the role of a patient, which helped to identify many patient-focused improvement opportunities. The current situation was evaluated with cause-effect analysis (Ishikawa diagram), SWOT analysis and Gap analysis. Communication is crucial within a large imaging department, and therefore it was recognised as essential to have an effective communication tool for procedure planning and execution.

**Developing Strategies and Action Plans**

Final sessions were dedicated to developing action plans. Several quick win opportunities were identified to support internal processes to identify areas for process improvements. A Kaizen approach (Colenson 200) was considered effective to perform detailed analysis and achieve process improvement for specific modality workflow and/or specific patient/clinical pathways. Combining respective change models by Knoster (Colenson 2000; Mindtools n.d.) enabled creation

Knoster+Lewin+Kotter combined						
Vision	Consensus	Skills	Incentives	Means	Actions	
+	+	+	+	+	+	acceptance
UNFREEZE: prepare change from current state 1. increase urgency 2. build guiding team 3. get vision right 4. communicate for buy-in						acceptance
CHANGE: develop strategy into programme 5. empower action 6. create short-term wins						acceptance
Freeze: implement with SMART PLAN 7. build on change 8. make change stick						acceptance

**Figure 4.** Combining respective change models from Knoster, Lewin and Kotter, an actionable plan with a phased approach was created.

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of an actionable plan with a phased approach (Figure 4).

Our combined model shows the relationship between successful change and a variety of the conditional elements identified by Knoster (Vision, Consensus, Skills, Incentives, Means and Actions). Lewin (Mindtools n.d.) divides a change process into three consecutive time phases; each phase requiring focus on specific prerequisites of the Knoster model.

Kotter (Mindtools n.d.) proposed an 8-step actionable approach to leading change (create urgency, form a powerful coalition, create a vision for change, communicate the vision, remove obstacles, create short-term wins, build on the change, and anchor the changes in corporate culture). All these steps were mapped on the three phases distinguished by Lewin.

Lewin and the 8-step approach introduced by Kotter have structured the action plan according to the three phases distinguished in our adapted model. Knoster shows which elements need to be in place as prerequisites for a successful change process, indicating that more is needed for successful change than just vision and strategy. The ultimate goal was to find ways to fill the gaps identified by the Knoster analysis.

## “ BRIDGE THE GAP BETWEEN MANAGEMENT AND STAFF AND ALIGN THEIR VISIONS ”

### Results

According to the developed steps and following the combined Knoster+Lewin+Kotter modified model, the following 8 recommendations were constructed (Figure 4).

**Step 1:** Develop a sense of urgency around the need for change and inspire people to move, making objectives real and relevant. The suggested actions were:

- Identify potential threats and develop scenarios showing what could happen in the future.
- Examine opportunities that should or could be exploited, collect facts and develop arguments for strategic workshops.
- Start honest discussions and give dynamic and convincing reasons to get people talking and thinking within the management team and young talented individuals.
- Request support from “customers”, apart from stakeholders and industry people, to strengthen the department argument.

**Step 2:** Get the right people in place with the right emotional commitment, and with the right mix of skills and levels. The following actions were suggested:

- Identify the true leaders in the organisation and incorporate talented, powerful, change promoter young individuals to construct an extended management team.
- Ask for an emotional commitment from these key people.
- Check for weak team areas, ensuring a good mix of people from different areas and with different levels within the department.

**Step 3:** Get the team to establish a simple vision and strategy and focus on the emotional and creative aspects necessary to drive service and efficiency. Here, the suggested actions were:

- Determine the values that are central to the change.
- Develop a short summary, capturing what is “seen” as the future organisation, sharpening the existent department strategic document.
- Create a strategy to execute that vision, developing scenarios during a vision workshop.
- Ensure that the new coalition can briefly describe the vision.

**Step 4:** Involve as many people as possible, communicate the essentials, simply, and appeal and respond to the people’s needs. The following actions were suggested:

- Speak frequently about the change vision and further develop the communication plan.
- Openly and honestly address peoples’ concerns and anxieties, including “soapbox” sessions.
- Apply the vision to all aspects of operations, from training to performance reviews, by establishing success factors and performance indicators linked to objectives.
- Lead by example with actions such as “walk the talk” (manage by walking around, be present on the work floor and give a good example to motivate people).

**Step 5:** Remove obstacles, enable constructive feedback and lots of support from leaders - reward and recognise progress and achievements. The suggested actions included:

- Identify leaders whose main roles are to deliver the change, investigate midterm opportunities and assign quick win project to core team members.
- Check the organisational structure, job descriptions, performance and compensation systems to ensure they are in line with management vision.
- Recognise and reward people for making change happen, communicate about best practices.
- Identify people who are resisting the change, and help them see what is needed.
- Take action to quickly remove barriers, human or otherwise.

**Step 6:** Nothing motivates more than success. There is a need to set aims that may be easy to achieve and within a short timeframe. Some suggested actions were:

- Implement easy surefire projects, such as Kaizen events for specific issues that address impacts and objections early, for example patient routing and examination planning.
- Avoid early targets that are expensive and whose investment cannot be justified in each project.
- Reward people who help you meet targets by celebrating their successes.

**Step 7:** Many change projects fail because victory is declared too early. Real change runs deep. Quick wins are only the beginning of what needs to be done to achieve long-term change. The team identified and proposed the following actions:

- After every win, analyse what went right and what needs to be improved. Define SMART goals (Specific, Measurable, Attainable, Relevant and Time-bound) to

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Implementation complexity

		LOW team can do with limited €	HIGH extra resources and/or € required
HIGH	Impact to goal	Define 'Core Team' (eg: extended management team – MT+), include new change leaders to promote collaboration, bring in new energy and fresh ideas, and obtain commitment to change.	Develop leadership competences of young managers (eg: deploy the Leadership Framework as developed by the NHS; create job descriptions and performance measurement is in line).
		Start regular meeting with 'Core Team' focusing on vision and strategy development; use step-by-step approach to sharpen the vision, conduct environment analyses and create action plan.	Conduct a 2-day vision & strategy development workshop with the Core Team to sharpen the vision, present it in a visually-attractive way, formulate strategic objectives and a detailed plan.
		Lead by Example ('walk the talk'), explain the vision whenever possible, take sufficient time to answer questions and handle objections.	Further develop communication plan and execute step-by-step (eg: department meetings, periodic newsletter, intranet site, social media involvement).
		Set up a 'Task Force' to evaluate improvement ideas and define quick-win opportunities (eg: patient traffic through corridors, examination planning process).	Conduct a series of Kaizen events to implement operational improvements to integrated patient care, f.i. for emergency patients, oncology patients, fast-track patients or paediatric.
		Set clear objectives for quick-win opportunities and define a measure of success; after every project, analyse what went right and what needs improvement.	Establish success factors and performance indicators tied to objectives; communicate to clarify expectations.
LOW	Impact to goal	Celebrate success! Recognise and reward people that make change work. Evaluate every time what went right and what needs improving.	Establish a track record of success! Celebrate success! Involve everyone and publicly recognise key members! Talk about progress every chance you get.
		Start a 'Suggestion Box' to collect improvement ideas and to involve the entire La Fé imaging team.	
		Identify people who are resisting the change and help them see what's needed.	

Figure 5. Actions and recommendations were mapped onto an implementation matrix, implementation complexity versus impact to goal.

make improvement measurable.

- Set goals to continue building on the momentum that the team achieved.
- Make sure that people are well trained in the idea of continuous improvement.
- Enable people to experience the benefits of the changes.

**Step 8:** To make any change stick should become part of the core of the organisation. The corporate culture often determines what gets done, so the values behind the vision must be shown in day-to-day work. The following final actions were suggested:

- Establish a track record of success! Celebrate success! Involve everyone and publicly recognise key members! Talk about progress every chance you get!
- Create plans to replace key leaders of change as they move on to ensure that their legacy is not lost or forgotten.
- These recommendations were translated into tangible actions, which were mapped onto an implementation

2x2 matrix, implementation complexity versus impact to goal (Figure 5).

**Success Measurements**

Different measurements were obtained to measure the result of the change management process in the organisational culture. One year after the workshop, the OCAI survey was repeated among the team members of the Vision Deployment workshop. The analysis performed before and after the change process showed that the perceived adhocracy was taken over by hierarchy as the perceived dominant organisation culture. This indicates that the imaging organisation became a much more structured work environment.

An external 5-point scaled survey (1 to 5, 5 being extremely good) was sent to all medical staff and medical residents of the hospital, outside the imaging department, to evaluate different aspects related to the organisation. There were 168 complete answers before (2012) and after (2013) the

change management initiative. Analysis showed an overall improvement in our organisation regarding assessment of the new clinically-oriented department ( $3.56 \pm 0.97$  versus  $3.61 \pm 0.94$ , mean  $\pm$  SD, before and after the change process respectively); ability of imaging specialists to solve clinical problems ( $3.97 \pm 0.90$  versus  $4.00 \pm 0.90$ ); availability and quality of imaging results and reports ( $3.69 \pm 0.90$  versus  $3.81 \pm 0.95$ ); departmental collaboration in educational and research programmes ( $3.59 \pm 0.89$  versus  $3.66 \pm 0.88$ ); and participation of imaging specialists in clinical guidelines and appropriateness criteria proposals ( $3.53 \pm 0.98$  versus  $3.57 \pm 0.96$ ). The only slightly negative trend was observed in the accessibility of imaging specialists for clinical consultancy ( $3.87 \pm 0.98$  versus  $3.87 \pm 1.04$ ).

## “EFFECTIVE ALIGNMENT BETWEEN MANAGEMENT AND STAFF VIEWS”

The organisation kept working on the implementation of the three step global approach (Figure 1), and started to focus on further process improvements. Kaizen events were implemented to optimise specific clinical workflow processes and to initiate a continuous improvement work attitude (Colenson 2000).

### Discussion

The process of fostering major organisational changes in a large European university hospital is a challenging task. Many departments are evaluating merging with related ones (such as radiology and nuclear medicine within the same hospital or linked large areas) to improve operational efficiency, eliminate waste and optimise the value of their services (Kruskal et al. 2012). Critical success factors are a clear direction (ie consolidated strategy), process analysis and intensive involvement of the clinical staff in the deployment of this strategy (Kruskal et al. 2012; Thomson et al. 2016).

The five-day Vision Deployment workshop was instrumental to engage a representative core team of key opinion leaders from all levels of the organisation. Individual interviews gave the team ample opportunities to share their ideas and concerns, while the right level of trust and buy in was created for the workshop. Although team size (28 participants) and constitution (most participants were unfamiliar with concepts of strategy development) made it challenging to achieve the objective of strategy refinement, many good ideas were generated as a starting point for process improvements in our imaging department. These practical elements have all been captured in a midterm action plan that will be implemented via several rapid process improvement activities (Kaizen events).

The combination of proven change models (Knoster, Lewin and Kotter) allowed the development of a phased plan with clear recommendations, actions and ownership. The core team was able to initiate several key actions, important aspects for the future success of the new department. We showed it was possible to bridge the gap between management and staff and align their visions, by carefully integrating all stakeholder opinions and visions. We created active involvement of staff in the strategy refinement and deployment process, and obtained their increased commitment in return. All the workshop activities logically led to an increase in contact and communication between staff that previously had little contact, yielding much improved understanding and appreciation for each other. Finally an action plan was developed that will guide further midterm improvements.

The outcome of our organisational change process was an effective alignment between management and staff views, and this yielded renewed commitment to an ambitious but realistic plan to implement the necessary changes. The new department really had to go through this change facilitation program to create sufficient awareness and commitment to start working on important integrated care initiatives, as well as patient experience and process improvement initiatives.

### Acknowledgements

The corresponding author's department and hospital has a Master Research Agreement with Philips Research. Part of this work was done within this grant. Ené Regos was working for Philips Healthcare Transformation Services in Spain, currently working for Philips HealthTech LATAM as Customer Service Sales and Business Manager for Hispanic countries. André van Est works for Care IQ Group BV, an SME located at The Netherlands. ■

### Key Points

- ✓ Encourage organisational change process by developing an integrated imaging department is needed in the academic professional organisation.
- ✓ Industry change management practices (Mintzberg management of change with Knoster, Lewin and Kotter models) can be adapted.
- ✓ An effective alignment between management view (desired state perspective) and staff view (present state perception) can be successfully implemented.



# KLAS TOMOSYNTHESIS - HOLOGIC

CAN GE HEALTHCARE AND SIEMENS COMPETE WITH HOLOGIC?

**KLAS**  
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**Monique Rasband**  
KLAS Research

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klasresearch.com  
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**Although the report is focused only on the U.S. market, is the outcome indicative of a worldwide trend?**

We have not had deep discussions outside of the US so I am not able to speak about the worldwide situation. As a side note, there was adoption earlier for GE & Siemens outside of the US because they did not have to go through FDA, which is what slowed adoption down here.

**Have you also calculated a cost-benefit ratio, or is it based purely on practical use?**

We did not calculate a cost-benefit ratio because of the variety of payment and reimbursement. It may be of interest to you to note Centres for Medicare & Medicaid Services (CMS) does reimburse for Tomo. This was not the case in the past. The mix still consists of insurance and payers.

“IT WILL BE FUN TO SEE WHAT HAPPENS IN THIS MARKET. HOLOGIC HAS RAISED THE BAR”

**You mentioned “key differences among vendors in regard to implementation, development, and relationships”. Can you elaborate?**

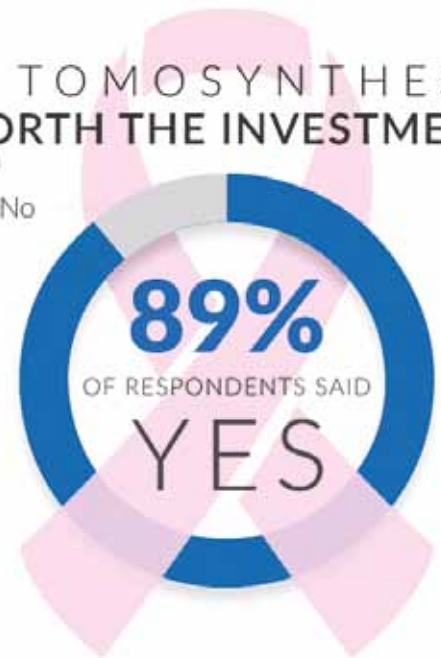
Hologic had a head start in the U.S. because they were FDA-approved early in the game. Breast imaging/ women's health is also their niche so they have really nailed it down. This includes implementations, development and building relationships with the right people. As it is their world, they are deeply involved with decision makers as well as the departmental heads and are also communicating with the technologists within the women's imaging departments and breast centres. They have deep roots within an organisation.

**You mentioned the advantages/challenges of upgrades. On the cost issue again, are consumer/buyers factoring-in this cost, calculating the longer-term benefits, or do**

IS TOMOSYNTHESIS WORTH THE INVESTMENT?

(n=46)

11% No



**they need efficient results today?**

On the consumer end, we do hear about this being handled two ways. Some providers are adding in the Tomo and not charging the patient and others are offering it as an additional service for a fee. There is a range but those who are changing have told us on average it is around 50 dollars per exam.

In most cases where patients are given the option, we have had providers tell us it is well received and many patients choose to pay the additional cost to add Tomo. Of course there are areas where this is not the case, but overall we hear from providers it is well received.

We have also heard from many providers that they added Tomo because they were losing business to others who did offer the 3D technology. It is a technology that consumers are aware of and it can determine where a patient chooses to get their mammogram.

**In other areas, we have seen healthcare organisations buy second-hand equipment, making a cost-saving in the short-term, only to discover lack of compatibility or software upgrades at a later stage. Do you care to comment on this?**

We have not seen this in Tomo because it is so new. A unit has to be Tomo-ready in order to be capable to be upgraded from 2D to 3D. Not all 2D units can be upgraded to do Tomo.

**“ WE HAVE ALSO HEARD FROM MANY PROVIDERS THAT THEY ADDED TOMO BECAUSE THEY WERE LOSING BUSINESS TO OTHERS WHO DID OFFER THE 3D TECHNOLOGY ”**

**Both GE and Siemens have a legacy of a widely diverse industrial colossus backing their healthcare sectors. Would you say that Hologic is a modern-day Hercules or is it a case of David and Goliath? Did this also work to Hologic’s advantage, in that it has been more focused on its activities, as opposed to GE that builds a range of products from fridges to space satellites, while Siemens makes cell-phones to high-speed trains?**

We don’t hear providers mention GE or Siemens in other spaces. Both companies are known for cutting-edge technology in the medical equipment space. They are however having to play catch up a little in breast imaging.

**Alternatively, is Hologic’s advantage due to its headstart only, whereby, other equipment makers will soon catch-up?**

Hologic definitely had a big headstart. However, their

customers also give them credit for excellent customer service and communication. Providers/ customers also appreciate the investment Hologic has made in this market. While a handful of customer talk about Hologic sticking to their guns on pricing, they also recognise Hologic has made a large investment in the industry so providers appreciate the advancements being made. It is often mentioned that Hologic has been a leader and helped raise the bar. We have also started to hear positive things from the early adopters who have GE and Siemens. It will be fun to see what happens in this market. Hologic has raised the bar but the other vendors seem to be up for the challenge.

**From the responses for your survey, is there an indication of what future needs are being imposed on equipment makers? Any indication where we are going in this area (Tomo and other breast-imaging)?**

Reimbursement is top of mind for the future and almost everyone we spoke with was surprised Tomo is still a mixed bag on reimbursement. Providers across the board feel it makes a difference so the majority of those we spoke to said they would absolutely buy Tomo again- despite the uncertainty with reimbursement.

**Bottom line, what determines an equipment purchase – cost, quality or flexibility?**

Quality. For Tomo, most providers we spoke with said they felt like they needed to get it to be competitive. Once they had it, many were converting other units over to Tomo because they could see it was making a difference. If a provider has a 2D unit that can be upgraded it does help with cost as they do not need to purchase a full net new unit.

The full report by Monique Rasband, Tomosynthesis 2016 Can GE Healthcare and Siemens Compete with Hologic? is available at [klasresearch.com](http://klasresearch.com). ■

### About KLAS Research

KLAS is a research and insights firm on a global mission to improve healthcare delivery by amplifying the provider’s voice. Working with thousands of healthcare professionals and clinicians, KLAS gathers data and insights on software, services and medical equipment to deliver timely reports, trends and statistical overviews. The research directly represents the provider voice and acts as a catalyst for improving vendor performance.



# SOCIAL MEDIA OPPORTUNITIES IN RADIOLOGY



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## Why should radiologists engage in Twitter?

As the term "social media network" implies, using Twitter is about networking. The type of networking depends on your own or your group's needs. In the academic world, Twitter can serve as a tool to forge connections with other radiologists (not to mention physicians or even patients). As an individual, Twitter can be used to promote your work or your opinions. In this manner, it acts as a platform for individuals to have a voice in the medical community. In fact, the Mayo Clinic recently added social media scholarship as one of the potential means by which a faculty may be promoted.

Departmental or practice-based accounts have similar benefits. A departmental Twitter account can be used to promote faculty research, departmental education, and societal involvement. In private practice, Twitter can serve as a means of advertising by which you differentiate yourself from competitors based on the services you provide.

For the budding social media radiologist, join Twitter and follow some of the prominent names in radiology. You will soon find yourself learning about the current state of radiology, not only on a medical level but especially on a policy level. There is much to learn and Twitter will connect you to the important conversations in our field and the people who are most well respected in addressing those topics.

## What are your top social media tools for radiology?

**Twitter:** As described above, it is the foremost social media network for academic discussion. While there is significant discussion concerning policy, education is another huge focus.

**Facebook:** While Twitter serves best as an inter-professional network, Facebook is often the best way to connect with patients. Creating a business page on Facebook can give your practice/department a landing page that is

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accessible to the demographics most likely to be using your services.

**Instagram:** Our personal favorite, Instagram, is visually based and engages users in a completely different way. Radiology is well-suited for this platform. We have used Instagram as a means to focus on radiology education. We incorporate a single teaching point with a characteristic image.

**Figure 1 – Figure 1** is an Instagram for medical professionals. This network has a large, engaged community. While we post the same content on both Instagram and Figure 1, we find that the discussion is much richer than the discussion on Instagram.

**Blog:** We use our departmental blog to communicate with patients. A blog allows us the most freedom; however, it takes the most time to prepare content. The main benefit of the blog is that it serves as a platform for us to host enduring content. You can find our blog at <http://blog.cincinnatichildrens.org/radiology/>

“AS PHYSICIANS, WE ARE BEING PULLED IN A NUMBER OF DIFFERENT DIRECTIONS EVERYDAY. WE HAVE FOUND THAT IT IS IMPORTANT TO DEFINE GOALS WITH EACH SOCIAL MEDIA NETWORK BEFORE BEGINNING”

**What are the main challenges for radiologists in using social media? How can these be overcome?**

There are a number of challenges. Perhaps the biggest challenge is being well versed in the nuances between the different social media networks. It can be hard to grasp something new and with the multitude of different networks, it can be daunting to know where to begin. Facebook is probably the most popular social media network across the demographic of radiologists. However, it is not well suited for a discussion among professionals. Twitter is a bit more difficult because of the constraint of the platform – each Tweet must be composed of 140 characters or less. Even with this constraint, Twitter is the most engaging social media platform for professional discussion.

Time is the other main challenge. As physicians, we are being pulled in a number of different directions everyday. There are ways to make your time on social media more efficient but your time will likely be related to the goals of your social media use. We have found that it is important

to define your goals with using each social media network before beginning.

**How do you organise your own professional social media activity - once a day or as needed?**

We have planned content everyday across all of our platforms. For this content, we use social media tools like Hootsuite and Schedugram to autopost prepared content. However, we are also responsive to interactions throughout the day and engage other users regularly. Prescheduled content allows us the time to be able to respond during the day as we would not otherwise have the time to interact.

Each social media channel has its own schedule. We post content on Instagram and Figure 1 five days a week. This content is organised around daily themes: #MSKMonday, #TummyTuesday, #NeuroWednesday, #ThoraxThursday, and #FridayQuizDay. Blog content is posted 2-3 days a week. Each Blog post is promoted using Facebook. Finally, all content, on all channels automatically flows to Twitter. In addition to this content on Twitter, we live-tweet educational content most Monday mornings and post a large volume of material during large societal meetings.

**How do you measure or evaluate social media activity for a radiology department?**

Analytics vary across different platforms. Basic analytics such as followers, likes, comments, or retweets are often cited. However, Twitter and Facebook provide most robust data giving detailed information on engagement. Instagram has very recently opened up its API and is now also providing more detailed analytics. Using these analytic platforms, we know that we receive more than 20 million impressions per year on our content. ■

### Social Media at Radiology Department at Cincinnati Children's

**Twitter:** @cincykidsrad

**Facebook:** facebook.com/cincykidsrad

**Instagram:** @cincykidsrad

**Figure 1:** @cincykidsrad

**Blog:** <http://blog.cincinnatichildrens.org/radiology>

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# BREXIT'S BRUTAL BLOW TO THE NHS



Rachel Clarke

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Oxford University Hospitals  
NHS Foundation Trust

@doctor\_oxford

doctoroxford.com

**“** I'm sorry. I'm just so sorry.”  
It's 8am. Two junior doctors, one English, the other Italian, embrace in tears on the steps outside their hospital. We've saved lives together, lost patients together, run cardiac arrests, sought to comfort grieving families, seen patients make miraculous recoveries, witnessed death at its most unforgiving and ugly - all of it together. But as of June 23, 2016, while one of us remains fully entitled to be a doctor in England's National Health Service (NHS), the other may be stripped of her right to live and work here.

Brexit is a brutal blow for one of the most cosmopolitan of UK workforces. The NHS is an extraordinary melting pot of nationalities, and all the richer for it. On my ward alone, the doctors and nurses making up the team are British, Spanish, Nigerian, Portuguese, Canadian, Kiwi, French and Filipino. Overall, up to 35 percent of health professionals come from outside the UK, with 55,000 of the NHS England's 1.2 million staff being citizens of other EU countries. Small wonder one of the UK's most senior economists, Stephen Nickell of the Office for Budget Responsibility, has stated that the NHS would be “in dire straits” without migrant workers.

**“STEPHEN NICKELL OF THE OFFICE FOR BUDGET RESPONSIBILITY, HAS STATED THAT THE NHS WOULD BE “IN DIRE STRAITS” WITHOUT MIGRANT WORKERS”**

Much was made of the ephemerality of the *Leave* campaign's 350 million pounds a week promise to the NHS in the event of Brexit - a pledge that lasted barely an hour beyond the referendum result before pro-Brexit UKIP leader Nigel Farage dismissed it as a 'mistake'. Worse, our underfunded NHS now faces potentially catastrophic financial consequences of Brexit. But the most immediate threat to the NHS is not financial but human: the risk that members of its most precious, most undervalued asset - its workforce - may now wonder what on earth they are doing here in the UK.

Already, nursing and medicine in the UK are perilously understaffed. Every day, in every hospital, doctor and nursing rotas are riddled with gaps - unfilled slots - leaving patients exposed to dangerously overstretched staff. If patient safety matters, we simply cannot afford to lose any more doctors and nurses. Yet now, vast numbers of them have been made to feel unwelcome and unwanted: first by a campaign based on prejudice, propaganda and xenophobia, second, by the fact that the majority of voters actually embraced this narrative of fear.

We have a long and grubby history of politicians and newspaper editors exploiting Britons' love of the NHS to indulge in immigrant bashing. You know the drill. Why can't you get an appointment at your GP? Because hordes of migrants are clogging up the surgery. Why have you been denied your groundbreaking cancer drug? Because all those brazen 'health tourists' are screwing us out of scarce NHS resources.

The irony is, the NHS's job of caring makes it in one sense our most egalitarian institution. In death lies the ultimate equality and, when treating sick patients, you are only one step removed from that. Medicine transcends difference. Hearts still pump, blood still flows, whatever skin they're clothed in. My job is to help people, irrespective of race, religion, sexuality, nationality. When you lie before me in a hospital gown - vulnerable, frightened, disorientated, in pain - as your junior doctor I don't care if you are English, Spanish or Outer Mongolian. You could be a communist, a Scientologist, a Prime Minister, an axe murderer. You could even be UK Health Secretary Jeremy Hunt and still I would treat you the same.

Doctors, like nurses, treat one thing alone, the patient, the person in front of them. The values that infuse an NHS ward - kindness, tolerance, decency, humanity - should surely be virtuous large? I thought my country was inclusive, all-embracing. I've never felt more foreign. To my non-British colleagues, every one of you an asset to the NHS, I'm sorry, so sorry, please stay. ■

**Dr Rachel Clarke** is a junior doctor who cares passionately about the NHS and standing up for her patients. She works in one of Oxford's largest hospitals and teaches clinical medicine and communication skills. She has a particular interest in palliative medicine, believing that helping patients at the end-of-life have the best quality life possible is priceless.

UK Statistics	
Total population (2015)	64,716,000
Gross national income per capita (PPP international \$, 2013)	35
Life expectancy at birth m/f (years, 2015)	79/83
Probability of dying under five (per 1 000 live births, 0)	(N/A)
Probability of dying between 15 and 60 years m/f (per 1 000 population, 2013)	88/55
Total expenditure on health per capita (Intl \$, 2014)	3,377
Total expenditure on health as % of GDP (2014)	9.1

Source:  
World Health Organisation

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“To be simple is to be great.”



### CURTIS P. LANGLOTZ

PROFESSOR OF RADIOLOGY AND BIOMEDICAL INFORMATICS, STANFORD UNIVERSITY

My #1 highlight is my long-time service on the Radiology Informatics Committee (RIC) of RSNA. It has been such a pleasure to work with this incredibly talented group of volunteers and staff.

“If there is no solution to the problem then don't waste time worrying about it. If there is a solution to the problem then don't waste time worrying about it.” *Dalai Lama*



### ERIC POISEAU

IHE EUROPE TECHNICAL PROJECT MANAGER INRIA

#### What is your top management tip?

Create an environment of constant learning and development—be sure to include yourself in this process.

“If it is to be, it is up to me”.



### ROLF GOMES

FOUNDER, HEART OF AUSTRALIA

#### What would you single out as a career highlight?

Launching the Heart of Australia mobile clinic in October 2014. That was the culmination of a five-year journey to transform a vision into a reality.



### JORGE MUNIZ

CEO MEDCOMIC

“Inaction breeds doubt and fear. Action breeds confidence and courage. If you want to conquer fear, do not sit home and think about it. Go out and get busy.”

*Dale Carnegie*

#### What would you single out as a career highlight?

The year I was designated as a Distinguished Scientist by the American Heart Association and receipt of an endowed chair in gerontology at the University of Pennsylvania, School of Nursing.

The full Zoom On interviews with these and other healthcare leaders can be found online at [healthmanagement.org](http://healthmanagement.org) or scan the QR codes

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**1** name



—nothing is more important than health