



ABBOTT HEALTHCARE EXCELLENCE FORUM  
SPECIAL SUPPLEMENT

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# Top Killers

In healthcare, the tendency is more on managing events after they happen rather than adopting a proactive approach to prevention. This is a major reason why the number of CVD patients continues to increase each year and why cardiovascular disease continues to be one of the leading causes of death and disability.

Approximately 17.7 million people die from CVD annually. Nearly a third of all deaths around the world are due to heart disease and stroke. Approximately 80 percent of these deaths occur in low and middle-income countries. With the CVD burden increasing consistently, it has now become even more important to tackle this top killer. Both prevention and treatment of heart disease need to be a top priority, a fact that is often emphasised by the European Society of Cardiology.

Prevention and treatment for CVD and other top killers such as cancer, diabetes and even medical errors will partly be dependent on how effectively we can manage public health risk factors including smoking, obesity, physical inactivity and poor diet in the case of the former, and safety in healthcare settings with the latter. Also, conditions like high blood pressure, high cholesterol, and diabetes need to be managed more effectively as they increase the risk of cardiovascular-related complications. People must be motivated to take care of their heart health so that they can play an active role in preventing the onset of this disease altogether.

While there is no doubt that progress has been made in the management of cardiovascular disorders, the reality is that cardiovascular disease remains the number one killer around the globe. There are two major issues that make prevention and treatment difficult. First, treatment of cardiovascular disease remains quite expensive. Second, even though there is constant discussion about risk-factors, management of these risk factors, especially among the younger population, still lacks the right amount of effort and resource allocation. We don't realise that preventing the disease before its onset is one of the most cost-effective ways of dealing with this disease.

One factor underlines healthcare wherever we live; the continuing fight to treat top killer conditions more effectively and to reduce mortalities. In this issue, Joe Kiani, founder of the Patient Safety Movement looks at how we can bring preventable hospital deaths to zero by 2020 while Henk-Jan Aanstoot from the award-winning VBHC Diabeter Clinic shares advice on successfully tackling diabetes. The critical issue of how to approach gender effectively in healthcare policy and treatment is examined by Sinead Hewson, Peggy McGuire, and Kristin Semancik from the European Institute of Women's Health and the potential of mapping use to tackle multi-morbidities is put under the microscope by Hamish Robertson and Nick Nicholas.

In addition to Top Killers, we take a look at the latest Winning Practices including a sustainable business model for general hospitals, how 5G will develop telesurgery, competence in radiology and new methods of patient empowerment through digitisation.

We hope you are as inspired by what you find in the pages of our Top Killers issue as we have been creating it. Happy Reading. ■



**Tienush Rassaf**

Editor, Cardiology, HealthManagement.org

Department Head and Chair of Cardiology  
Westgerman Heart- and Vascular Center  
University of Essen  
Germany

Tienush.Rassaf@healthmanagement.org

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tienush.rassaf@healthmanagement.org

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## What do you think?

What any given person is likely to die of depends on where they live in the world, but wherever we live, the fight continues to prevent and treat top killer conditions. We look at major diseases like heart conditions, cancer and diabetes through the lens of gender, mapping and technology, and tackle the thorny issue of avoidable hospital deaths – a reality that plagues healthcare. What are your views on Top Killers? As a leading digital and print publication on healthcare management and leadership, there are many ways to share your expertise and join our faculty of highly-esteemed contributors. Contact us on [edito@healthmanagement.org](mailto:edito@healthmanagement.org)

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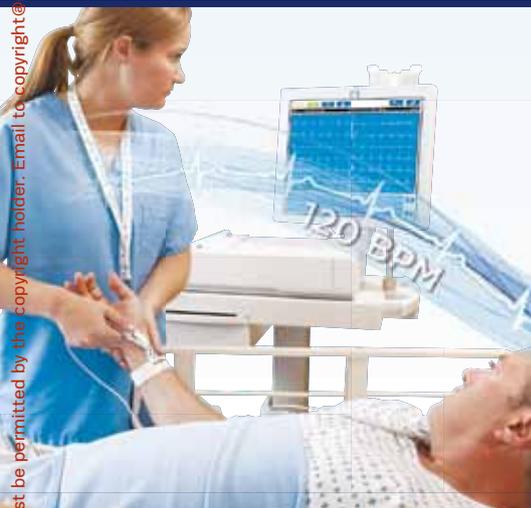
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**María Jesús Díaz Candamio**

*Radiologist - Servicio de Radiología, Complejo Hospitalario de A Coruña, A Coruña, Spain*

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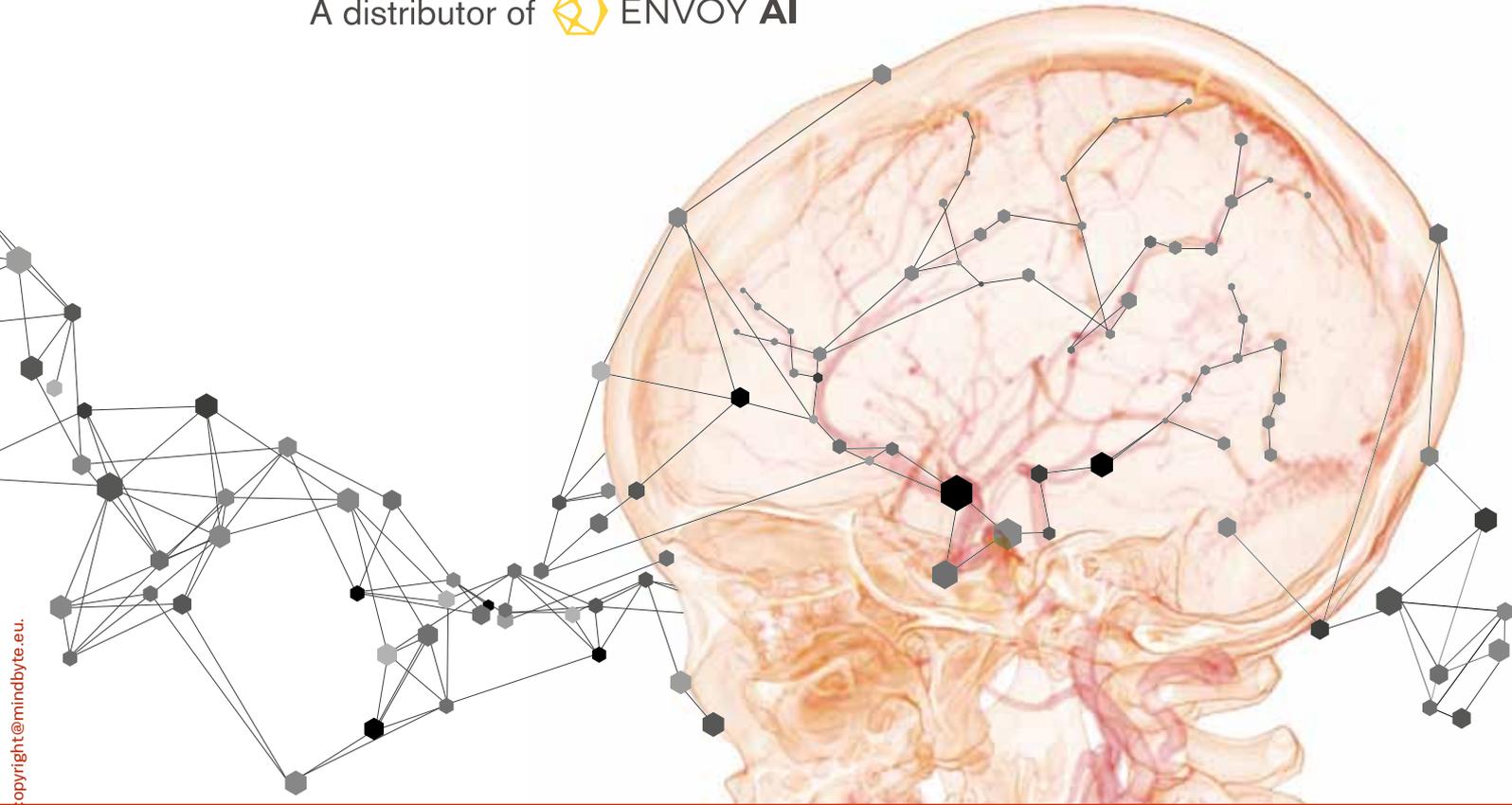
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Nova National School of Public Health Crash Courses

The Future Healthcare Management in Europe (FHME) by IESE Business School, Karolinska Institutet & EIT Health

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Champalimaud Clinical Centre

Portuguese NHS eHealth solutions at the Lisboa Ocidental Hospital Centre

Portuguese NHS Contact Center



## Business Opportunities

### Brokerage Event

The Portuguese National Innovation Agency (ANI) and the Enterprise Europe Network (EEN) have joined efforts with APAH and EAHM to organise a Brokerage Event in parallel to the Congress. Take this opportunity and meet with key stakeholders from the health industry in one-on-one pre-scheduled meetings.

### eHealth Roadshow

A number of promising and innovative SMEs have the opportunity to expose their digital health solutions in short pitch presentations, followed by a Q&A session with direct involvement of an expert committee of key stakeholders from the European hospital and eHealth market.

Alexandre Lourenço

President  
Portuguese Association  
of Hospital Managers  
Coimbra, Portugal

alexandre.lourenco@  
apah.pt

eahm-cascais2018.com



# Redefining the role of hospitals - innovating in population health

The 27th EAHM Congress looks at providing healthcare to a changing population and adapting to digitisation

With the 27th European Association of Hospital Managers (EAHM) Congress being held in Cascais, Lisbon at the end of September, HealthManagement interviews Alexandre Lourenço, President of hosting organisation, the Portuguese Association of Hospital Managers, on the changing face of hospital management and the new era of ‘care.’

## Why have you focused on the theme "Redefining the Role of Hospitals - Innovating in Population Health" for the 27th EAHM congress in Cascais, Portugal?

Healthcare and hospitals are probably the most complex structures ever developed by the human being. Hospital management is one of the most complex management areas that anyone can work in. Nevertheless, our industry is facing several new and old challenges. On one hand, people increasingly look at our sector as unreliable, unsafe and prone to error. On the other hand, we are also increasing our costs without the economy to support it. The changing demographics, the pace of technological innovations, and the changing user associated with consumer expectations drive our increasing health expenditures.

The expectation of the population continues to rise. Actually, this is the greatest challenge we face. We believe that we need to change the way that we provide care, and that's why we will be discussing the role of hospitals, because hospitals need to rethink the way that they are organised and the way that they provide services.

We need to develop a model of care for the people

- an integrated model of care that includes other stakeholders, not only the primary care or long-term care providers, but also social care providers. We need to innovate the way that we provide care, and we need to adopt new technologies and incorporate new providers - new providers that could help us improve the quality of care and the experience of the patient.

At the same time, we need to ensure sustainability, not only financial sustainability but also human resources and environmental sustainability, as an example.

At the end, managers need to understand and accept that this change will happen with them or without them. This is why we need to rethink practices to assure that hospitals find their role regarding the population that they serve; we need to ensure that people really are at the centre and that we provide continuity of care across the life cycle of each individual.

## What health innovations do you believe will really be implemented in hospitals in the next 3 to 5 years?

We have partnered with different organisations that

are also working on this topic including public health and business schools and the European Institute of Innovation and Technology for Health (EIT Health), and we will discuss during the congress innovative provision models. We will talk about big data, remote monitoring for complex and chronic patients, integrated services using AI technologies and of course precision medicine, and new drugs that will change the way that we provide care. The most challenging thing for innovation is to address the demographic shift (ageing), and to provide care outside of the hospital walls.

The goal is to engage with other partners, but also to implement patient-centred services that will allow personalised and individual care. Most of the patients that are seeking hospital services, secondary and tertiary care services, are 65 years and older. They are senior citizens, and we need to provide tailor-made services to them.

I really believe that as far as this segment of the population is concerned – a population that tends to suffer from multiple chronic diseases we should focus on avoiding hospitalisation by developing outpatient services. We need to focus on patients that are seriously in need of care outside the hospital setting. This aged population with multiple chronic diseases and complex needs is where hospitals need to focus on by providing outpatient services so that we can avoid hospitalisations. What we need to do is to really personalise services for this population segment. We need to develop reimbursement models and innovative solutions to do so and we need to do this within the next 3 to 5 years.

### **What are the biggest challenges facing the C-suite in healthcare and how can the sector address these?**

One of the biggest challenges is to acquire competencies; specific competencies to lead the needed change. This is one of the issues that worry me. Our skills and competencies are not sufficient to lead a healthcare system change. The other issue is, of course, sustainability. More than 40% of the European hospitals are at risk of defaulting on their financial responsibilities. Unsustainability is thus a problem that we need to address, mostly regarding waste reduction. We need to develop tools inside the hospital to reduce waste, increase efficiency and avoid unnecessary care.

The Organisation for Economic Co-operation and Development report on wasteful spending will be

discussed during the Congress and we will share several best practices cases on this topic. This is quite relevant for managers to take notice and to develop waste reduction strategies in their own organisations.

We need to develop transformational hospital leaders; we need to develop new patient-centric organisations that will lead through innovation within an integrative health ecosystem thinking. With reference to competencies, a big factor is enhancing digital literacy in all healthcare professionals and improving digital literacy for the new health professionals who are just coming out of medical and nursing schools.

**“ IN THE END, YOU NEED TO DELIVER; MANAGERS NEED TO UNDERSTAND AND ACCEPT THAT THIS CHANGE WILL HAPPEN ”**

The way we provide healthcare is changing, and it will continue to change. The issue of data and technology is a great example. We will soon see new professionals playing a central role in the hospital – health coaches, genetic counselors, disease specific case managers, information management experts and “med-engineers”. Most of the hospitals don’t have them right now, but we need to address the issue of digitisation of systems, digitisation of healthcare. Therefore, managers need to be aware and prepared to lead the change.

During the Congress, we will have several technical visits. Specifically, on digitisation we have prepared a visit to a local hospital that has achieved significant levels of digitisation. This is one of the four hospitals in Europe that have achieved such a high level of digitisation - HIMMS EMRAM Stage 7. Also, on this topic, we have prepared visits to the National Contact Centre where participants will acknowledge several programs on remote care and eHealth solutions.

### **How can digital health innovations support new ways of solving old healthcare problems to maximise patient safety and change how care is delivered?**

First of all, we need to work on avoiding unnecessary

hospitalisation. We can do so through remote monitoring technology. There are several examples, in COPD, cardiac insufficiency, where we can remotely monitor patients with chronic conditions and minimise risks that are related to hospital admissions.

We have several interesting examples that we are going to showcase and discuss at the Congress. We can now certify patients according to the risk of nosocomial infections and actually select those with a higher risk, and work with them to reduce that risk. We will also discuss the Estonian genome project, where citizen's genomes are sequenced. We will probably have really good outcomes in the future by studying diseases and avoiding them in the first place. By harnessing digitalisation, we can really personalise care, adapt technologies to the specific patient, creating a safer healthcare system that avoids unnecessary risk for patients.

“ HOSPITALS ARE NOT SUSTAINABLE, AND THEY ARE NOT PROVIDING GOOD SERVICE IF THEY DO NOT RESPOND TO THE POPULATION'S CHANGING NEEDS ”

**What is the importance of shifting focus to identifying emerging social changes and lifestyle trends to benefit patients and healthcare professionals?**

The issue is that hospitals are not sustainable, and they are not providing good service if they do not respond to the population's changing needs, and this is why these kinds of topics, like lifestyle, are quite relevant. Hospitals have an important role in promoting health, disease prevention, and action in the community.

**What are you most excited about with 27th EAHM Congress? What do you want to see happen there amongst healthcare professionals?**

We are thrilled about this Congress. We have developed a comprehensive scientific programme because we wanted to include the participation of major international organisations relevant to healthcare management; not only healthcare managers organisations but also medical associations and

international organisations as well as the European Commission, WHO or OECD for example, and others that can help us develop a new way of thinking about healthcare.

During this Congress, we will be holding our hospital innovation event where we welcome startups to present their products and connect with hospital executives and CEOs. We are also going to offer a roadshow for SMEs that will have the opportunity to pitch their products and receive valuable advice from hospital CEOs. In addition, during the congress, we will be organising technical visits to hospitals, contact centres, research facilities, and industrial factories. We will run various workshops, like one we are organising with the European Investment Bank, where we will discuss how to use loans and European structural funds to promote and finance hospital investment strategies.

We will also host several pre-congress courses with faculty from medical schools (like Harvard Medical School), business schools (like IESE Business School), and other universities (Karolinska Institutet, Nova School of Business & Economics, University of Twente). We aim to bring together several stakeholders to promote new ways of seeing healthcare and hospital management. Most of all, from this congress we want to create a new agenda from all of these organisations that will be present, giving them an opportunity to take part in creating a European healthcare management agenda that will allow us to deliver a new way of providing better care in a changing Europe. ■

KEY POINTS



- ✓ Hospitals need to change the way that they provide care
- ✓ There is a need to develop an integrated model of care for the people that includes all providers
- ✓ Focus on patients that are seriously in need of care outside the hospital setting
- ✓ Hospital care is not enough and it's necessary to refine the method of development of these models of care

# Crafting a seamless patient journey to provide 360° value that's VALUED

Improving experience and overall performance for patients receiving knee and hip replacements at Sultan Bin Abdulaziz Humanitarian City Hospital (SBAHC), Riyadh, Saudi Arabia

If you've ever been a patient or have had a loved one require care, you'll know that what is valued as a patient – big or small – is unique for each person at every stage of their treatment.

The concept of value-based healthcare doesn't mean much to patients because getting better as quickly and smoothly as possible of course means everything. Thus, I've come to learn that for healthcare to truly deliver value, it must be centered around patients, their experience and ultimately their health outcomes. It's about putting patients at the heart of decision making to provide greater benefits.

SBAHC hospital wanted to find solutions to ensure care reflected exactly this for its hip and knee replacement patients. There is a growing demand for these procedures in Saudi Arabia with cases referred from government hospitals. Unfortunately, there is a long process ahead for patients, from initial assessment to the operating room (OR), then prolonged postoperative hospital stays for rehabilitation.

Johnson & Johnson were proud to work collaboratively with the 510-bed rehabilitation hospital and medical center to design value-based CareAdvantage solutions that were measurable and sustainable.

Reviewing the patient journey, we identified challenges such as double or triple booking clinic time-slots. Patients needed four hospital visits ahead of surgery yet 30% of patients were appointment 'no-shows'. Finally, supply chain inefficiencies meant valuable time was lost.

Based on these insights, we co-created a set of aims and objectives, including:

1. All patients to follow a predefined process when visiting the Out-Patient Department (OPD), aiming for a maximum stay of two hours
2. All patients to follow a 'one-stop-shop'

preoperative assessment after financial clearance

3. Knee and hip replacement surgery demand should be met six months post-implementation

To achieve these ambitious objectives, we worked closely with the hospital and their multidisciplinary team to carry out a comprehensive review using lean management principles – widely acknowledged as a proven and scientifically-based management solution. The results offered a clear picture of the current patient pathway, the biggest hurdles, and what an ideal patient journey could look like. We also co-created measures that would remove non-value adding activities and organize care around the patient.

Following implementation in January 2018, SBAHC has been able to reduce initial patient assessment time (including X-ray) from 3 hours to 1. They've streamlined preoperative assessments bringing patient hospital visits down from four to two (including preoperative anesthesia screening). OR optimization has also been achieved through shortened change-over times between surgeries, e.g. while one patient is in theater, the next is already receiving local anesthesia, saving 45mins per patient.

These SBAHC results are testament to what partnerships can achieve with a value-based approach such as CareAdvantage. The results mean real improvements for patients, which is why Johnson & Johnson is committed to translating what is most valued by patients into value-based solutions for hospitals.

To find out more about creating bespoke CareAdvantage solutions for your hospital, contact [EMECareAdvantage@its.jnj.com](mailto:EMECareAdvantage@its.jnj.com). ■



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# A systems perspective on collaborative care delivery

For collaborative care delivery to be a driver of healthcare transformation, we need to think differently about how we design and manage healthcare delivery.



**Craig Kuziemycki**

Professor and University Research Chair in Healthcare Innovation  
MHA Program Director  
Telfer School of Management  
University of Ottawa  
Ontario, Canada

Kuziemycki@telfer.uottawa.ca

@ckuziemycki

Healthcare systems are undergoing transformation in order to meet the ever-changing needs of modern healthcare delivery. Our ageing population and increased prevalence of chronic disease have created complex patients defined by factors such as poly-pharmacy and comorbidity. Patient complexity cannot be managed effectively by single disciplines or by siloed or acute care delivery models. Rather, we need to embrace models of collaborative care delivery as a conceptual underpinning of healthcare transformation efforts.

Collaborative care delivery is not a single model or intervention but rather a dynamic process that integrates people, processes and technology over time. Collaborative care also has an evolutionary element to it and is an example of a learning health system (LHS). A LHS is characterised as a socio-technical system where data from day-to-day operations are used to evaluate care delivery as part of continuous system improvement (Friedman Charles et al. 2016). Dynamic processes and system evolution means that we do not just run processes in a mechanistic manner but rather we need to study and make adjustments to processes based on system needs. This dynamic system nature is what differentiates healthcare processes from those in many other industries.

For collaborative care delivery to be a driver of healthcare transformation we need to think differently about how we design and manage healthcare delivery. Collaboration is a complex and dynamic system of people, processes and technologies that cannot be managed by focusing on individual aspects of the healthcare system; instead we need to develop collaborative competencies that enable us to manage collaboration from a systems perspective.

This paper presents a systems perspective on collaborative care delivery. It starts by defining

collaboration and then describes how to operationalise and measure collaborative care delivery. We conclude with a systems-based management strategy for collaborative care delivery.

## Defining collaboration

An essential first step is to understand what collaboration really is. While collaboration and teamwork are often used interchangeably, they are in fact very distinct entities. Teamwork refers to the structure by which patients and providers work together during care delivery. A multidisciplinary team involves different care providers who exchange information to coordinate care delivery outcome, but the actual care delivery take place through provider-specific workflows (Casimiro et al. 2015). Multidisciplinary tasks are well defined, an example being a patient recovering from knee replacement surgery where a surgeon, physiotherapist, pharmacist and nurse work independently on their own tasks with little communication across providers. In contrast, interdisciplinary teams require the integration of knowledge and skillsets from different team members to deliver patient-centred care. Interdisciplinary tasks lack definition and may evolve in the context of care delivery. Therefore, ongoing information exchange and communication across team members is needed to define, monitor and deliver team tasks. An example of interdisciplinary care is complex patient care such as palliative care delivery.

Collaboration is defined as “planned or spontaneous engagements that take place between individuals or teams of individuals, whether in-person or mediated by technology, where information is exchanged in some way (either explicitly, ie verbally or written, or implicitly, ie through shared understanding of gestures, emotions, etc), and often occur across different roles (ie physician and nurse) to deliver patient care” (Eikey et al. 2015). Unlike

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team-based models which focus on the structure of a team, collaboration is about the process of engagement between team members. Collaborative goals and outcomes are dynamic and often cannot be predefined, as their context and care delivery goals emerge through communication amongst team members.

### Operationalising collaboration

Operationalising collaborative care delivery is a significant challenge. At its core, collaboration is a group process that is operationalised by individuals. Agency, broadly defined as an individual's ability to make their own decision regarding actions, is a crucial consideration in how we implement collaborative care delivery. Working in a collaborative system requires the establishment of collaborative rules of engagement and it will not be possible to accommodate all individual needs or workflows in establishing these rules. Collaborative care delivery requires us to think beyond individual agency. Aspects of individual agency such as workflow or authority may have to change and individuals may have to make trade-offs about their individual agency in the context of working collaboratively (Kuziemyk 2015).

“COLLABORATION IS A COMPLEX AND DYNAMIC SYSTEM OF PEOPLE, PROCESSES AND TECHNOLOGIES THAT CANNOT BE MANAGED BY FOCUSING ON INDIVIDUAL ASPECTS OF THE HEALTHCARE SYSTEM”

Collaborative agency is how we reframe individual tasks such as leadership and decision-making into collaborative tasks (Raelin 2014). Collaborative agency starts by defining a value statement to define collaborative rules of engagement in order to unite all the disparate individual interests of a care team. Maximising value for the patient should be the unifying concept upon which healthcare delivery is coordinated (Porter and Lee 2013). Maximising patient value would then guide health system transformation to support collaborative care delivery at all levels including micro-level tasks such as communication and decision-making about a patient's case as well as macro-level governance

considerations such as programme and policy development and funding of healthcare delivery.

Operationalising collaborative care delivery requires both a structure and set of behaviours. Structures describe the people, processes and technology involved in collaborative care delivery while behaviours describe how agents interact while providing care delivery within the structure (Kuziemyk et al. 2016). Operationalising collaborative behaviour is challenging because of the dynamic and evolving nature of collaborative care delivery. A key part of operationalising collaboration is nurturing collaborative competencies over time. Two such competencies are common ground and awareness. Common ground is the knowledge and shared understanding needed for collaboration while awareness refers to the information that people need to know about the activities and people they are collaborating with (Eikey et al. 2015).

### Measuring collaboration

Healthcare delivery must be measured using metrics so we can assess whether or not we are achieving our care delivery goals. It is important that we have the right outcomes and the right metrics to measure them. Too often we use proxies for health system metrics such as wait times for access to healthcare services or patient transit time through the emergency department. Such outcomes only assess system access or throughput and do not properly assess system behaviour such as collaborative decision-making or patient engagement.

Proper metrics for collaborative care delivery must be tied to the means by which we operationalise it. As described above, collaboration requires the development and maintenance of competencies such as awareness and common ground. To that end, these competencies need to be the basis for collaborative care delivery metrics. Collaborative care delivery is a prime example of a learning health system and hence the metrics we develop need to be dynamic to account for the fact that collaborative competencies will develop over time.

### A management strategy for collaborative care delivery

To effectively manage collaborative care delivery, we need to understand that collaboration is a complex dynamic system. A first step in managing

collaborative care delivery is to acknowledge and understand the integrated nature of it. Collaboration is a complex system of group activities that are conducted by individuals. Part of managing collaboration is reconciling individual practices into collaborative ones. Individuals cannot all strive to maximise their own agency as that is not conducive to achieving collaborative outcomes. A collaborative value statement such as maximising value for the patient must be defined and used to determine the rules of engagement for how collaborative care delivery is operationalised.

Technology can play a key a central role in supporting collaborative care delivery, but it must be emphasised that technology is only a means to support collaboration and not an end in itself. Implementing collaborative or social media technologies will not achieve collaboration on their own but rather our first step has to be defining collaborative processes and then designing technology to support these processes.

This paper has made several suggestions on improving collaborative care delivery, but there is still much we do not know about it. While studies of collaboration are common in classic healthcare settings such as emergency departments, intensive care units, and surgery, we need more research on collaboration in less traditional settings such as community care centres and patient's homes. We also need research that looks at how collaborative competencies are nurtured in different environments and how to facilitate and engage different combinations of providers, patients and families in collaborative care delivery. Finally, collaborative care delivery is a dynamic learning system that is always evolving. Collaborative interactions spawn new processes, roles and system outcomes and these outcomes must cycle back to inform system learning and redesign.

## Conclusion

Collaborative care delivery is playing a large role in healthcare transformation efforts and is the underlying basis for much of the foundation of modern healthcare delivery such as patient participatory medicine and chronic disease management. However, collaborative care delivery is a complex system of interactions between patients, providers, processes and technologies that is shaped by the unique contexts where care is delivered. Management strategies for collaborative care delivery must be shaped by this complexity and tailored for specific contexts. While collaboration involves teamwork, they are distinct entities. Teamwork defines the structure of how people work together while collaboration is about the behaviours that take place in the structure to enable us to achieve desired outcomes. A key focus on operationalising collaborative care delivery is defining a collaborative value statement and then nurturing collaborative competencies over time. ■

## KEY POINTS



- ✓ We need to embrace models of collaborative care delivery as a conceptual underpinning of healthcare transformation efforts
- ✓ Collaboration is a complex and dynamic system of people, processes and technologies that cannot be managed by focusing on individual aspects of the healthcare system; instead we need to develop collaborative competencies that enable us to manage collaboration using a systems perspective
- ✓ Operationalising collaborative care delivery requires defining collaborative agency in order to reframe individual tasks into collaborative ones
- ✓ Collaborative care is delivered through a structure and an underlying set of behaviours and is a dynamic learning system that is always evolving



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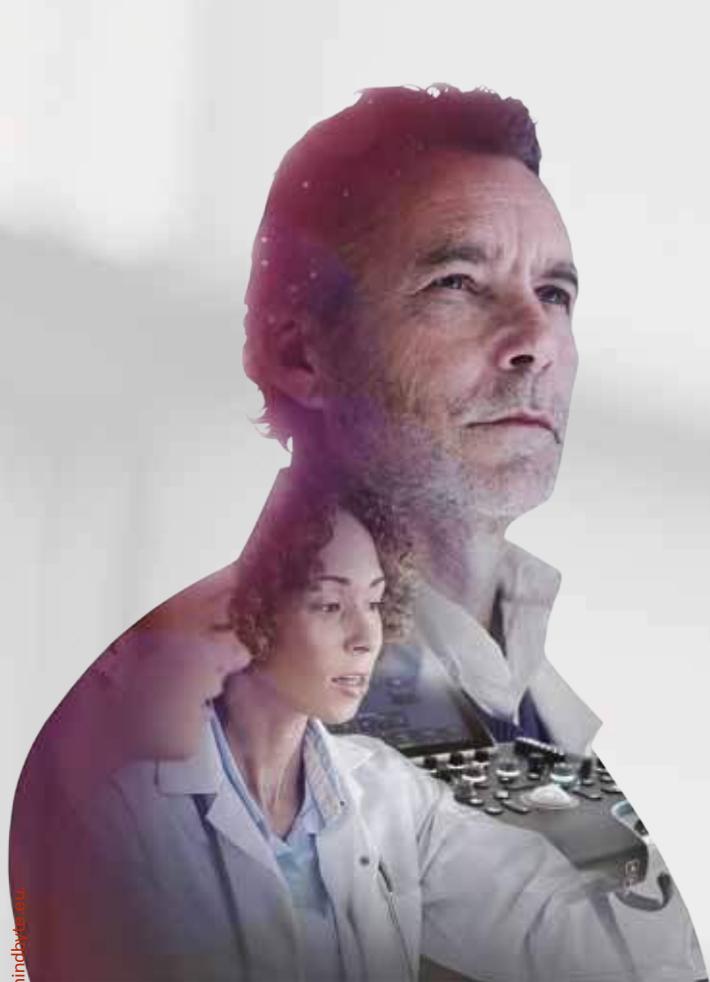
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# Risk and permission

The core of good leadership for the modern day

Roderick Millar shares his innovative approach to leadership, which balances devolved decision-making and retaining overall control.



**Roderick Millar**  
Cofounder and Chief Executive  
Ideas for Leaders  
London, UK

rmillar@ideasforleaders.com

@RoddyMillar

@Ideas4Leaders

The world is awash with leadership advice, and research from countless business schools and consultants frequently lists out the key characteristics of good leaders. These tend to fall into two categories: the lead yourself, lead your team, lead your organisation approach, and then the long ‘to do’ lists of set clear objectives, communicate well, build trust, be adaptable, empower your team etc. Neither of these approaches are wrong, but both fall foul of the tendency leadership developers have, which is believing most people roll out of bed in the morning thinking: “I’m a leader, so what must I do to lead today?”

The truth is most of us do not envision ourselves as leaders, but rather as doctors, anaesthetists, nurses, caterers, engineers, marketers or whatever we may be. We start our days checking off the things left undone from yesterday and prioritising the ‘to do’ list of things to be done today to allow normal service to continue. We have very little time to reflect calmly on our leadership style and actions.

## Limitations of leadership programmes

Leadership programmes are highly valuable in that they create space in frantic schedules for reflection, but they also suffer from the downside of all formal classroom learning, which has severe limitations. The German psychologist, Hermann Ebbinghaus, described his ‘forgetting curve’ in the 1870s, and our brains have evolved very little since then. Our ability to retain new information, without a simultaneous emotional experience to embed it, is very limited. So trying to check-off those lists or explore your leadership self, team and organisation a week after the programme has finished is always going to be a challenge.

There is a further wrinkle in this process too. Much of the advice we give would-be leaders is along the lines of build trust, empower others and create empathy. Trust, empowerment and empathy are all excellent things for a leader to have, but they are not

simple to acquire. Indeed, trust is a ‘gift word’, it is something bestowed on us by others, not something we can acquire ourselves in any direct way.

These barriers go some way towards explaining why, although we know what good leadership looks like, the leadership development sector continues to struggle to develop consistently good leaders. The space to practise leadership skills is very limited, our ability to remember what those skills are is severely restricted, and the process of translating what we know to be good practice into practice is not easy.

“TRUST IS A ‘GIFT WORD’, IT IS SOMETHING BESTOWED ON US BY OTHERS, NOT SOMETHING WE CAN ACQUIRE OURSELVES”

## A new leadership mindset

Having spent the last decade exploring and reviewing leadership development initiatives at top business schools and in large organisations around the world, it becomes ever clearer that what is required is not those ‘to do’ lists of good leadership behaviours and practices but getting people to buy into a new leadership mindset that is clear and simple.

## Devolve decision-making

Research shows that in the vast majority of situations happy people are productive people; so, ensuring your staff are enjoying what they do is important. A very good way to stop people being happy is to reduce their control and responsibility. As Columbia professor Gita Johar has expressed to me and highlighted in a paper with colleagues (Faraji-Rad et al. 2016), the need for control is a basic human desire, and when it is removed either explicitly or implicitly, we lose something—call it energy, enthusiasm, or engagement.

This observation lies at the heart of good leadership. As noted, good leaders have many skills, but ultimately they get people to achieve desired outcomes. In the high-velocity, complex business environment we now have to work in, no-one can understand all the details and know all the facts that are emerging and evolving across our workplaces. It is therefore necessary for everyone at every level to devolve decision-making to the lowest level they dare to. It is the leader's responsibility to assess downside risk and empower people to make decisions as far down the hierarchy as is possible.

### Remove fear through collaboration

By removing fear from the workplace, extraordinary things can happen. Applied neuroscientist Prof. Paul Brown writes extensively on this in his book, *The Fear-Free Organization*. Initially, just giving people the ability to make decisions is great for morale, it then leads to new ideas and concepts emerging, and so procedures can improve and innovation occur. In order for these things to happen, I am not advocating unilateral changes by lots of individuals, as that approach is where chaos and anarchy lies. Changes have to be discussed and collaborative. But they do not necessarily need to be approved and endorsed from above on every occasion. It is the leader's role to be the architect of their working environments, to enable people to feel comfortable taking responsibility and control.

### Responding to the modern work environment

In a work environment where people are constantly changing job and taking on different and varied roles, the old 'work contract' of follow the rules and keep your head down and in return you end up with a stable job and valuable pension no longer applies. Work is less certain and pensions are more flexible (and less valuable), so different motivators need to be offered to keep people willing to give their knowledge and labour in return for employment. Today, these motivators are much more likely to be intrinsic ones, such as purpose and wellbeing, than purely extrinsic ones like pay and promotion.

I call this the risk and permission approach to leadership. The overriding imperative all leaders should have is to devolve decision processes as far down the hierarchy as they feel they can. This requires the leader to assess the responsibility risk: does this level of staff have sufficient access to information to make an informed decision? Do they have enough

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experience to make a sensible judgement call? What might the consequences of a poor decision be? Am I prepared to take that risk?

### Grant explicit permission and control

If the answers to the risk questions are all positive, then it is the leader's task to clearly grant permission to those people to take on the responsibility. This permission granting ideally should be as explicit as possible: "don't ask me, you decide", "you have enough information to make that call yourself, have a think about it and let me know what you decide", "discuss it with the team, and do what you think best."

“ IT IS THE LEADER’S ROLE TO BE THE ARCHITECT OF THEIR WORKING ENVIRONMENTS ”

The vast majority of decisions we have to make are not mission critical. The failures we often encounter come from indecision rather than wrong decisions. Most choices can be iterated and adapted once they are made, so if they are sub-optimal ones they can be improved later on.

### Retain the ability to overrule

The risk and permission approach is flexible—the leader, whilst empowering their followers, must always retain the ability to withdraw permission or overrule. It is important as a leader, that you have 'skin in the game'. If it goes wrong, you remain responsible; therefore, you must be able to step in and change things if you perceive the risk as becoming too great.

Clearly, there are many situations, especially in high-risk, zero-tolerance sectors such as healthcare, where changing work processes cannot be allowed without significant high-level approval. Risk and permission allows for leaders to maintain this, but also allows them to identify those areas where that level of restriction is not required.

### A core leadership focus

By limiting your core leadership skills to just assessing risk and granting (or declining) permission, you set off a domino-like series of other actions. By empowering others, you are trusting them and in return

you will be trusted. It requires you to set clear goals and objectives—otherwise people cannot know what their aim is. You will improve their levels of engagement, and by being more engaged it is highly likely that they will be more adaptive and innovative, and so more productive. Empowered teams tend to be more cohesive and collaborative ones too.

### Develop others

The further advantage of pushing decision-making down the line, rather than up it—as is more traditional—is that it encourages you to ensure that the correct skills have been developed to allow permission to be given. Today's managers have tended to lose the ability to encourage and develop others. The old master-apprentice relationship is making a return, but it can surely happen faster.

The irony of devolving decision-making away from yourself to others is that with greater trust gifted to you, greater influence will accrete to you too. You will also, if you are doing it well, discover that you have more time for other tasks if much of your previous role has been devolved.

I look forward to a time when the sign of a good leader is not how many decisions they have to make—but how few. ■

## KEY POINTS



- ✓ Traditional leadership programmes rarely allow enough time and space for permanent behaviour change to occur, so the process of translating what we know to be good practice into practice is not easy.
- ✓ Control and responsibility is a modern motivator
- ✓ Assessing risk and granting permission produces more adaptive and productive staff and frees more time for yourself

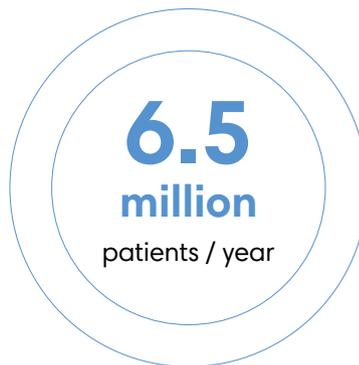
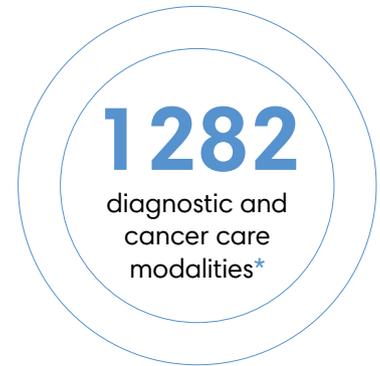


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# Are soft skills important?

Soft skills give a huge competitive advantage when it comes to convincing a prospective employer or a prospect that you are the man or woman for the job.



**Michael R. Virardi**

Speaker. Trainer. Author.  
Cyprus

michael@michaelvirardi.com

michaelvirardi.com

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Just how important are soft skills in helping you advance in life? A study by Harvard University noted that 80% of career achievements are determined by soft skills and only 20% by hard skills.

The term ‘soft skills’ was coined in 1972 by the U.S. Army, which, at the time, assigned more weight to hard skills, as the latter were considered to have a more specific on-the-job application. However, later studies came to strengthen the value of the role that soft skills play in one’s life and accomplishments.

Soft skills usually refer to a wide range of abilities, including people skills, social skills, communication skills, character traits, attitudes, career attributes, emotional intelligence quotients, etc, many of which form the basis of our personality and how we are perceived by others. This set of skills is mostly innate—“in the genes”—while “hard” or “technical” skills are acquired through study and/or practice. It wouldn’t be an exaggeration to say that anyone with a normal, functioning brain can accumulate a certain number of hard skills, such as how to operate a machine or draw up a balance sheet, but the same does not hold true for soft skills, which is precisely why they are so hard to find.

Employers tend to ascribe considerable value to their personnel’s soft skills, especially in those lines of business which call for a great deal of interaction with clients and/or colleagues. They know that there is much to be gained, both in quantitative (increased productivity and profits, reduced costs, etc) and qualitative (heightened morale, increased workplace satisfaction, etc) terms, by hiring and retaining employees who possess a great set of soft skills, such as good manners, optimism, graciousness, honesty, empathy and reliability. Hard skills can be added to complement this much more valuable skill set.

Although soft skills are wide-ranging, below is a “top ten” list of business-oriented soft skills as compiled by Eastern Kentucky University:

1. Courtesy – Having good manners, knowing and implementing etiquette, being gracious and respectful, saying please and thank you
2. Flexibility – Being adaptable and willing to change, a teachable lifelong learner who accepts new things and is able to adjust

3. Communication – Ability in speaking, writing, presenting and listening
4. Integrity – A person who is honest and ethical, with high morals and personal values, and does what’s right
5. Interpersonal skills – Being personable, friendly, nurturing, warm and empathetic, with a sense of humour, self-control, patience, sociability and social skills
6. Positive attitude – Being optimistic, enthusiastic, encouraging, happy and confident
7. Professionalism – This means being businesslike, well-dressed, poised and with a good appearance

“EMPLOYERS TEND TO ASCRIBE CONSIDERABLE VALUE TO THEIR PERSONNEL’S SOFT SKILLS”

8. Responsibility – Being accountable and reliable, resourceful and self-disciplined, this person gets the job done, wants to do well, works conscientiously and shows common sense
9. Teamwork – Being cooperative, getting along with others, always acting in an agreeable, supportive, helpful and collaborative manner
10. Work ethic – This means being loyal, self-motivated, on time, willing to work hard and showing initiative

Remember that impressions—especially first impressions—count a great deal. If you can master most, or even some, of the above soft skills, you will equip yourself with a huge competitive advantage when it comes to convincing a prospective employer or a prospect that you are the man or woman for the job. ■

### Acknowledgements

A very special thank you to my personal friend Spyros Yiassemides for his invaluable help on the research for this particular blog post.

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# Abbott Healthcare Excellence Forum

June 2018, Wiesbaden, Germany

“CLEAR CALL TO ACTION BASED  
AROUND THE VALUE OF PATHOLOGY  
TO THE WIDER ECONOMY”



# Foreword



**Emilie Neukom**

Director of Marketing for  
EMEA, Abbott Diagnostics

The global healthcare sector has been undergoing constant upheaval for over a decade. Aging populations, budget restrictions and a lack of skilled staff are making it harder than ever before to deliver high quality healthcare, and laboratory diagnostic services have suffered disproportionately in this environment. Budget cuts, recruitment freezes and shrinking reimbursements have made it increasingly difficult to maintain the quality of services and meet ambitious turnaround time targets across the disciplines. **Despite the significant advances that have been made in both diagnostic and prognostic testing, senior healthcare professionals, including the laboratory management, still see the laboratory as a vending machine – a sample goes in and a result comes out.** We need to change this attitude and demonstrate how closer integration of pathology with other services can drive up standards of care and improve population health, while offering significant operational savings. By moving from a reactive and adaptive approach to offering proactive and predictive services, we can show the true benefits of pathology in promoting wellness instead of simply treating illness. ■

“ SHARED GLOBAL CHALLENGES AND VISION FOR THE FUTURE ”

## About the Healthcare Excellence Forum

Abbott's Healthcare Excellence Forum brings together leading players from across the laboratory diagnostics sector to discuss the current challenges faced by clinical pathology services. Combining a diverse program of presentations with Q&A sessions, a panel discussion and plenty of networking opportunities, the forum provides the opportunity to explore how medical advances, diagnostic innovations and disruptive technologies can be harnessed to reinvent the laboratory's role in health.

# Changing the status quo – big data and disruptive technologies

# 93%

OF HOSPITAL  
EXECUTIVES BELIEVE  
THE LABORATORY CAN  
IMPACT HEALTHCARE IT  
AND ANALYTICS



## Utilizing big data for better care

'Big data' is currently THE buzzword in healthcare, and there is growing recognition that the vast amounts of digitized data available could be harnessed to improve the delivery of healthcare services and address major public health challenges. Unfortunately, the sector has struggled to manage the myriad stakeholders, regulations and privacy concerns that must be addressed to create a fully integrated healthcare IT system. Overcoming this through increased automation and integration – with the eventual goal of full digitization – is vital to maximize the potential impact of this data, as well as to demonstrate the role pathology plays in improving population health. **Collaboration between the different stakeholders will be essential**, as will robust technologies to collate and analyze the varying types and quality of data available. Ultimately, **this data can be used to deliver more efficient, patient-centered healthcare** and increase oversight of public health – as well as aiding cure discovery and workforce planning – but only if we engage fully with the process and work together to make it happen. **Jan-Philipp Beck**

## Best practices in operational and clinical integration

The global population is growing rapidly, as is the laboratory services sector, but almost nowhere are budgets doing the same. Diagnostic labs have been optimizing processes and lowering costs for a number of years, and in many cases there is little more that can be done. **Unfortunately, laboratory services are still seen by many as a commodity**, rather than a problem solver that can drive better outcomes for patients, healthcare providers and financial stakeholders alike. To overcome this perception, we need to move diagnostics from a reactive model – identifying what happened, when and why – to a more proactive and predictive approach, providing clinically-relevant, actionable insights into what is likely to happen and what course of action should be taken. **Better integration of the laboratory with other healthcare services is essential**, allowing the use of advanced data capture, handling and analysis to offer valuable insights into individual and population health. We already have the tools – AI, machine learning and big data analytics – to achieve this and, in many cases, the only thing missing is the will to make it happen. **Ramiro Roman** ■



**Jan-Philipp Beck**

CEO, European Institute of  
Technology (EIT) Health



**Ramiro Roman**

DVP Professional Services,  
Abbott Diagnostics



# Elevating the clinical laboratory's role in healthcare delivery



**David Humphreys**  
Global Head of Health Policy, The Economist Intelligence Unit (EIU)

Abbott recently commissioned a study by the Economist Intelligence Unit – supported by research partners IPSOS and Acuity – to examine the laboratory's current influence and perception, as well as to explore initiatives that could increase the impact of laboratory services in value-based healthcare.

The research clearly indicates a subordinate role for laboratories, with pathology services generally treated as a low value commodity by other key stakeholders, as evidenced by dwindling investment levels. In part, this perception is due to a rift between the key performance indicators (KPIs) for laboratory success and improving patient outcomes. Despite this, **labs have the opportunity to take a more prominent role in delivering value-driven healthcare**, and it is now widely recognized that timely, high quality diagnostic information can support better clinical decision-making. The unstoppable trend towards data-driven diagnostics, combined with an ever-growing stream of patient data, puts the laboratory at the center of this approach.

Even more striking is the potential for the lab to act as a bridge between different stakeholders in the healthcare ecosystem, resulting in more informed and engaged patients and healthcare professionals and earlier, more preventative interventions to satisfy payers and governments. While this requires better integration of the lab

# 71%

OF PATIENTS ARE NOT VERY CERTAIN THEIR DOCTORS ARE USING THE MOST RECENT DIAGNOSTIC STANDARDS OF CARE



with both hospital KPIs and clinical care decisions – as well as evidence that links lab activities with outcomes – the lab's role is pivotal, and the environment seems prime for this radical change. It is clear that, without shifting the paradigm in which labs operate today, the progress of value-based healthcare will be severely limited. However, if all stakeholders are able to match their willingness for change with action, then the resulting improvements in diagnosis and optimization of resource use will give healthcare the opportunity to catch up with advances in science and technology.

A 'revolution' is coming to healthcare, and mirroring the recent seismic shifts in other industries – such as retail, travel and media. Technology and data are set to take center stage, and the transformation of the telecoms sector should serve as a warning for healthcare. In just two decades, there has been a dramatic swing in communication media – from fixed to mobile to video to social – with nimble, technology-centric new entrants to the market rendering previously strong incumbents to secondary or insignificant positions. The lesson for labs is simple: **disruption in healthcare will impose change**, and those that do not evolve their business models by constantly adding value (especially as the complexity of care increases) will eventually experience a similar marginalization. ■

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# The lab as the 'Uber' of medicine

Healthcare systems globally are undergoing a paradigm shift from 'sick care' to 'well care'. With budgets becoming ever more stretched, cost avoidance through disease prevention and early intervention are the only viable option – **we can no longer afford to simply care for the sick**. Disease prevention is the holy grail of laboratory medicine – analyzing patient data to identify those at high risk of a specific condition or disease, then facilitating early interventions to prevent it. The problem for the pathology sector is: how do you get paid for stopping somebody getting ill?

'Lab 2.0' is designed to answer this question. Unlike the traditional 'Lab 1.0' – which will always be essential for acute care – Lab 2.0 is focused on post-diagnostic computation to provide new solutions to improve pre-care, chronic care and population health. Laboratory medicine can play an integral role in value-based healthcare, by combining longitudinal patient results with population data and the latest medical understanding to 'connect the clinical dots'. By **remodeling this information into real-time diagnostic insights**, Lab 2.0 can guide clinical decision-making and ensure more targeted interventions over the course of a disease or condition, from screening and diagnosis to monitoring, surveillance and prediction.

To achieve Lab 2.0, **we need to move beyond the 'order in, results out' approach**, developing new business and economics models, and aligning incentives across the entire care continuum. Pathology services

interact with virtually every other aspect of the healthcare system, and closer collaboration will allow detection of the onset of a condition or potential comorbidity at the earliest opportunity. Combining this with improved communication and patient education should help to improve adherence with disease management and proactively engage patients (consumers) in maintaining their own health. If we can do this, we have a promising future, and the lab will remain the biggest bargain in managing health!

## Lab 2.0 – a potential roadmap

For too long, laboratories have been concentrating on improving the analytical workflow, while ignoring the pre- and post-analytical areas of diagnostics. We need to diversify the way pathology laboratory services are funded, moving away from a simple '**cost per test**' model. This won't happen overnight, but **there are steps that can be taken now** to start down this road.

Enhanced data analytics is central to increasing the value of diagnostics, helping us move from looking at what has happened to what is going to happen. Some of the tools we need to achieve this already exist, collating data from various sources, recognizing patterns and predicting likely outcomes. These technologies are laying the foundations of '**cost per diagnosis**' services, identifying trends and enabling effective population surveillance.

The next step is to proactively identify changes to patient conditions based on longitudinal testing data. **This will put the laboratory at the heart of the clinical decision-making process**, enabling a more targeted, personalized approach to diagnosis and intervention. The potential downstream savings associated with faster, more accurate diagnoses and earlier, better treatment decisions are enormous, and pathology services need to demonstrate how greater upfront investment in laboratory services and data analytics can be used to reduce the overall '**cost per outcome**'.

Finally, fully integrated electronic records and the development of powerful analytical tools will allow the development of a predictive pathology service which aims to promote wellness, rather than simply treat illness. This holistic approach will enable laboratory services to take more responsibility for the costs of population health, driving the development of a healthcare system that is centered on the total '**cost per life**'. ■

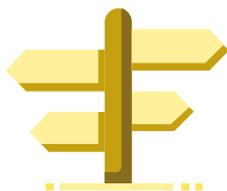


**Khosrow Shotorbani**

CEO and founder of the Lab 2.0 Strategic Services

# 62%

OF CLINICAL DECISION  
MAKING RELIES ON  
LAB TEST RESULTS/  
RECOMMENDATIONS



# European diagnostics under the microscope



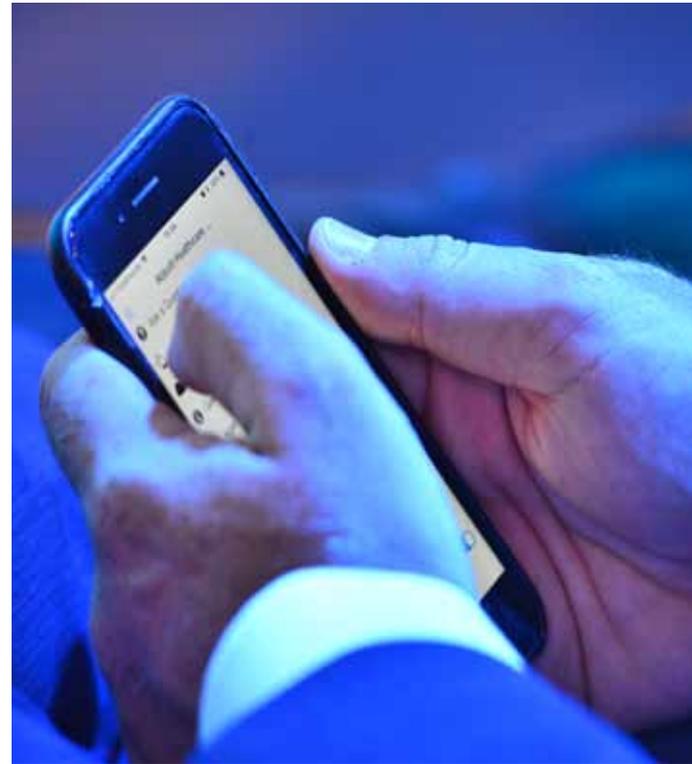
**Saghar Missaghian-Cully**  
Managing Director,  
Northwest London  
Pathology, London, UK

## Leadership challenges for NHS consolidation

Like many markets, **the demand for healthcare services in the UK is constantly increasing, without an equivalent growth in government spending to pay for it.** Consolidation of pathology services is considered an essential element of reducing overheads, and an ambitious project to reorganize laboratory services into 29 pathology networks recently began. Using a 'hub and spoke' model – with shared administrative and management services – will reduce overheads and allow better use of staff resources, as well as improving access to specialist testing. The resulting increase in collaboration and cooperation will also help to ensure that advances in medical understanding and clinical practices are spread more rapidly, leading to improved outcomes, better demand management and reduced turnaround times. To realize these aims, **it is important to engage all stakeholders at an early stage** of the consolidation process, agreeing 'pragmatic' principles and goals and that can realistically be achieved, then working together to update processes to optimize results. Monitoring and measuring ongoing performance is crucial, helping to create a sustainable business model that reduces operational risks and helps to deliver better overall care. **Saghar Missaghian-Cully**



**Dimitris Chatzidimitriou**  
Founder & Lab Director,  
Labnet, Greece



## Opportunities and collaborations across the Greek diagnostics network

The biopathology sector in Greece is highly fragmented, with hospital labs only serving their own patients, and many small labs only offering localized testing for a limited range of assays. This has created a 'gap' in the market for private patients and advanced diagnostics, which is currently served by a few core commercial reference labs. **There is no doubt that good quality pathology services – in terms of both testing and guidance on results – can result in earlier diagnosis,** better treatment and more targeted therapies, but it is becoming increasingly difficult for labs to maintain this quality without becoming uncompetitive in an open market. To achieve this, **labs need to focus on innovation and offering a 'value added' service,** which involves investing in the right staff and training, and working with trusted and reliable partners. In an environment of ever-shrinking margins, we must constantly adapt, improve and innovate to move ahead, and staying focused on quality is essential to long-term success. **Dimitris Chatzidimitriou**



**Alexander Hoffmann**  
(Abbott Diagnostics)  
on behalf of Peter Thorausch Head of  
Laboratory, Limbach  
Group, Cottbus, Germany

# 77%

OF DOCTORS WOULD  
VALUE THE LAB  
PROVIDING ADDITIONAL  
INTERPRETATION TO  
SUPPORT DIAGNOSIS

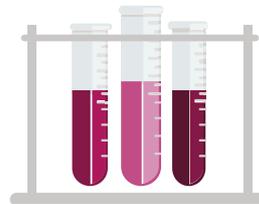


## A role for clinical decision support in Germany

Rapid developments in medical understanding lead to constant changes in clinical best practice, making it virtually impossible for doctors to keep up-to-date on the latest guidelines and recommendations. Clinical decision support (CDS) systems – such as AliniQ CDS – help to guide treatment decisions and improve overall patient care by allowing the collective medical expertise within an institution to be captured, digitized and combined with information from other sources to create treatment pathways that can be applied in a standardized, scalable and safe way. This supports improved clinical decision-making and more effective care, helping to ensure better outcomes and improving operational efficiency. **Implementation of a CDS system can provide benefits across the entire healthcare continuum**, but requires close partnership between the lab, the CDS provider and clinical staff to develop a system that improves patient care and helps healthcare providers to achieve their strategic and management goals. Setting clear and measurable targets for CDS implementation will provide strong evidence to demonstrate the potential for both downstream savings and improved patient care, helping to further demonstrate the central role the laboratory plays in patient management. Alexander Hoffmann ■

# 53%

OF DOCTORS WOULD LIKE TO LEARN ABOUT NEW DIAGNOSTIC TESTS VIA LAB PROFESSIONALS



# Abbott – a trusted partner



**Paul Jülicher**

Director International Health Economics & Outcomes Research, Abbott Diagnostics



**Matt Sawtell**

General Manager Nordics, Abbott Diagnostics

## Unleashing the value of IVD testing

The value of in vitro diagnostic services is like beauty – it's very much in the eye of the beholder. From a community perspective, **we want to pay for better health, not better healthcare**, but accomplishing this goal requires investment in the right tools and services. With IVD results guiding at least 60-70 percent of clinical decisions, there is clearly a role for the laboratory in improving population health, but a poor understanding of what and when to test leads to both over and under testing, undermining this value. Laboratories need to be proactive in addressing this, working with clinical staff to ensure that test requests are both appropriate and clinically indicated, and that the resulting information is meaningful and actionable. This two-way communication is essential to both the continuous improvement of patient management and the reduction of healthcare costs, but it is also vital that we measure the effects of testing on patient outcomes. Unfortunately, **if we can't demonstrate and quantify how IVD contributes to overall healthcare goals, we may not get a seat at the table**, meaning budgets will be set without the perspectives or insights the laboratory can offer. **Paul Jülicher**

## Partnering for better patient care

Changing the way pathology services operate is vital to meet current health and economic challenges, but people, and therefore healthcare organizations, are inherently resistant to change. This can make it difficult to restructure services to meet evolving needs or, in many cases, even recognize and agree what changes are required. To deal with the growing demand for diagnostic testing, pathology needs to be better integrated with other healthcare services, helping to improve test ordering behaviors, manage demand on services and ensure the results of testing lead to better patient care. **Understanding how laboratory services are currently perceived, and assessing current performance according to measurable goals, are the first steps** in this process, and working with a trusted partner outside of your organization can be invaluable to ensure an unbiased assessment, as well as offering insights into improving laboratory practices based on knowledge of other healthcare organizations or industries. Abbott has a wealth of experience across the global healthcare markets, and is committed to helping its customers achieve measurably better healthcare performance. **Matt Sawtell** ■

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# Medical errors: is prevention possible?

## How the Patient Safety Movement is striving for zero preventable deaths by 2020

A patient death is distressing enough, but when the cause is a lack of hospital safety culture and it could have been prevented, healthcare needs to act. Now.



**Joe Kiani**

Founder  
Patient Safety Movement  
Foundation  
California, USA

Twitter: @OX2020

patientsafetymovement.org

A health crisis across the globe is claiming over 4.8 million lives every year. It's devastating countless families and clinicians in every country and across every continent. But because we only hear of an incident happening once in a while in the news, many people believe it's a rare occurrence. The fact is that it happens 500 times a day in the United States alone. Preventable hospital deaths are the third-leading cause of death in the United States and the 14th across the globe. This situation has become so dire that it has caught the attention of the World Health Organization's Director-General, who spoke at the 6th Annual World Patient Safety, Science and Technology Summit earlier this year.

Dr Tedros Ghebreyesus said no one should be harmed seeking care, while acknowledging the reality that, every year, millions of patients die or are injured because of unsafe and poor-quality healthcare. Ghebreyesus stressed that most of these deaths and injuries were totally avoidable and went on to say that adverse events are now estimated to be the 14th leading cause of death and injury globally. He detailed figures of 421 million hospitalisations in the world every year, and how, on average, 1 in 10 of those results in adverse events. Even more disturbing are his words that at least half of adverse events can be prevented.

This last insight should be both troubling yet encouraging because we can put processes in place in our hospitals to avoid preventable harm.

### Leading causes of preventable deaths

Since I launched the Patient Safety Movement Foundation in 2012, we have teamed up with some of the world's leading medical experts, hospital administrators and patient safety advocates to identify

and develop evidence-based solutions addressing the primary causes of preventable patient deaths. Close to 5,000 hospitals across 44 countries have implemented these Actionable Patient Safety Solutions (APSS) or their own novel solutions to reduce preventable mortality. Last year, they reported saving between 81,533 and 200,000 lives as a result of their continuous improvement efforts.

So, what are the leading causes of preventable patient deaths? We've identified at least 16, which include healthcare-associated infections, medication errors, etc. However, the main cause for preventable patient deaths is when hospitals lack a culture of safety. Studies report that hospital departments where staff have more positive patient safety culture perceptions have fewer adverse events (Najjar et al. 2015).

### What is a safety of culture?

What does a culture of safety look like? A strong safety culture promotes the identification and reduction of risk as well as the prevention of harm. A poorly defined and implemented culture of safety may often result in concealing errors and therefore a failure to learn from them. According to the Institute of Medicine, "the biggest challenge to moving toward a safer health system is changing the culture from one of blaming individuals for errors to one in which errors are treated not as personal failures, but as opportunities to improve the system and prevent harm" (Committee on Quality of Health Care in America, Institute of Medicine 2001). Hospitals like Florida's Parrish Medical Center have experienced dramatic improvements by implementing a culture of safety. For example, they've achieved zero ventilator-related pneumonia in 12 years, one catheter-related UTI in 10 years and one central line-associated bloodstream



Joe Kiani: Zero is possible today and it doesn't require limitless resources.

infection (CLABSI) in the past 10 years (Patient Safety Movement 2018). At Parrish, a culture of safety means tracking and monitoring data, continuously using that data to improve their processes so they can achieve their vision of zero harm.

## “PREVENTABLE HOSPITAL DEATHS ARE THE THIRD-LEADING CAUSE OF DEATH IN THE UNITED STATES AND THE 14TH ACROSS THE GLOBE”

Edwin Loftin, Chief Nursing Officer at Parrish Medical Center says when an organisation really commits to a culture of safety and measures relentlessly, then they will know where they need to make changes and they will know how. In other words, it won't be guesswork or based on anecdotal evidence.

Monitoring and reporting preventable harm is critical for hospitals to understand where they can improve. Spain's SENSAR, a nonprofit organisation made up of 108 partner hospitals in Spain and Chile, has leveraged their national reporting tool, the first of its kind in Spain, to help create widespread learning and system improvement following critical incidents. The incident reporting tool is anonymous and

focuses on corrective measures, and lessons learned instead of blame. This innovative reporting tool and their accompanying commitment to education has saved 6,772 lives since their commitment began in October 2016.

### What needs to happen to reach zero preventable patient deaths?

- Every person in the healthcare ecosystem needs to commit and lead his or her institution to make safety the number one priority.
- Hospitals need to implement proven processes that address every identified challenge and create a policy of zero tolerance toward continued practices that are proven to be inadequate.
- Hospitals need to be transparent. Every 3 months, each hospital should report the number and type of preventable patient harms and deaths that have occurred in the institution.
- Hospitals need to implement the Communication and Optimal Resolution (CANDOR) Programme, which is available as a free online toolkit (Agency for Healthcare Research and Quality 2016). CANDOR provides healthcare organisations with a framework for communicating accurately and openly with patients and their families in the event of a medical error, and promotes a culture of safety that focuses on organisational accountability and learning from every mistake.



Dr Tedros Ghebreyesus: at least half of adverse health events can be prevented.

## Which hospitals are demonstrating success?

Hospitals are proving that zero is possible. We're already seeing hospitals getting to zero deaths in certain areas such as hospital-acquired infections. For example, Tri-City Medical Center in San Diego, California, recently celebrated 7 years of zero CLABSI in its neonatal ICU. Intermountain Healthcare System based in Salt Lake City, Utah, hasn't seen a single catheter-associated urinary tract infection in its 160-bed LDS in 6 months. The common thread that these and other hospitals achieving remarkable patient safety outcomes share is that they're putting systems in place to deter anyone from violating patient safety processes while creating a culture focused on what's best for the patient. Participation is mandatory, not optional.

## What life in a hospital with zero looks like

Zero is possible today and it doesn't require limitless resources. In fact, processes that avoid preventable deaths reduce costs. We've seen success in both large hospitals and small ones. It does require fostering a culture of safety from top to bottom and bottom to top. It also requires diligently implementing new proven processes. Once you implement the APSS and start reducing preventable patient deaths in the areas most hospitals find challenging, it will spread to every clinician and unit.

Spreading success will inspire more hospitals to participate in this movement. The best part is that your team will function with the confidence and peace of mind of knowing they're doing everything in their power to protect their patients' wellbeing. Clinicians, pharmacists, administrators, patients and families will benefit from open lines of communication, and any mishaps will be addressed quickly, effectively, and with full transparency. With a goal of zero, every incident of harm will be analysed for a root cause. Hospitals will experience fewer medical liability claims and improved patient satisfaction scores by engaging patients and families throughout the process. Zero is possible. ■

## KEY POINTS

- ✓ 4.8 million people die each year because of a lack of healthcare safety culture
- ✓ Strong safety culture identifies and reduces risk as well as harm prevention
- ✓ Hospitals need to put the CANDOR programme into place for zero preventable deaths
- ✓ The processes that prevent deaths are not costly and, in fact, reduce the bottom line
- ✓ Zero preventable deaths is possible



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# Rising multimorbidity in our ageing world

Mapping the landscape of ageing for more effective healthcare

How can the spatial sciences contribute to streamlined healthcare by addressing multi-morbidity in ageing populations across the globe?

**T**he global population is ageing. This is not only a general demographic pattern but one with a variety of unique trajectories by country and region, and system-specific implications. A successful transition to the status of an aged society has implications for conventional medical approaches and health systems operations, which themselves have often emerged over decades in response to past problems and prevailing assumptions. These include the notion that people become ill from and tend to die due to one specific condition—as illustrated by health and insurance statistical systems globally (Kingston et al. 2018).

“WITH POPULATION AGEING, THE HEALTHCARE NORM WILL BE ONE OF MULTI-MORBIDITY AND A RISE IN INDIVIDUAL AND SYSTEMIC COMPLEXITY”

Under conditions of population ageing, the norm will increasingly be one of multi-morbidity and a consequent rise in individual and systemic complexity. This is, simply put, where older people tend to increasingly accumulate health conditions which contribute to their overall morbidity status and, ultimately, their deaths (Cheung et al. 2018). And while we may still identify a single cause of death on the death certificate, this does not adequately reflect the larger reality of health and illness in an ageing world. This rising complexity has implications for every step in the chain from birth to death and from prevention to treatment and, ultimately, end-of-life care.

## On track to an aged world

Even in sub-Saharan Africa, where fertility rates remain high overall, the total numbers of older people are growing rapidly. In higher income countries, this process is already well advanced and having quite specific consequences (OECD 2017). Population ageing is already having an impact on middle-income countries where infectious and chronic diseases complicate the conventional pathway to a health transition (Gaimard 2014). In short, we can see an overarching pattern underpinned by a variety of local demographic and epidemiological trajectories. The inevitable endpoint of this larger trend will be the rise of the aged society—one in which older people outnumber the young and where ageing becomes the new demographic norm.

## Multi-morbidity and mortality

Multi-morbidity refers to the presence of two or more health conditions experienced by a single individual. Interestingly, the variety of groups potentially affected by such a state is both complex and varied. Older people are commonly seen in this category of patient, and are often on equally complex medication regimes, which may in fact exacerbate their multi-morbid status while treating one (or more) of their diagnosed conditions (Gómez et al. 2015). But many other groups, such as people with a disability, with a chronic pain-related syndrome or those with a long-term workplace injury, may also exhibit features of multi-morbidity (Goodman et al. 2016). Indeed, ageing and disability commonly intersect under the rubric of multi-morbidity and the vast majority of people with a disability are older people (Quiñones et al. 2016).

Not uncommonly, such multi-morbidity may arise as a confluence of a dominant physical complaint in combination with subordinate symptoms



**Hamish Robertson**

Project Manager-Visualising Vulnerabilities Project  
Centre for Health Services Management  
Faculty of Health  
University of Technology Sydney  
Sydney, Australia

Hamish.Robertson@uts.edu.au

[@HL\\_Robertson](#)



**Nick Nicholas**

Faculty of Science  
University of Technology Sydney  
Sydney, Australia

tthedemo@bigpond.net.au



Afshar and colleagues (2015) have produced multi-morbidity prevalence data for 28 countries based on World Health Surveys, which we have mapped to illustrate the variability and impact of multi-morbidity as both a health concept and condition at a global level.

and resulting psychological impacts. In effect, we suggest, multi-morbidity has actually been much more common (and for longer) than is generally supposed, and growing awareness is as much responsible for its rising prevalence as changes in demography and associated epidemiology. This can be seen in the tendency to dismiss the psychological impacts of diagnosable conditions as psychosomatic or, not uncommonly experienced by women, as 'imaginary'. And given that the majority of older people, particular the very old, are female this is another dimension of current healthcare approaches that will require significant improvement.

The effort to operationalise concepts such as 'frailty' illustrates both the necessity and complexity of the position of multi-morbidity in contemporary healthcare environments. We need to see multi-morbidity as not simply a clinical status conferred by medicine but also a socio-political construction of the multi-morbid patient, the extent of their 'needs' and the framing of their entitlements to health and social care services. Such debates are already in play and, we suggest, this will only become more problematic as population ageing grows and disability categories and rates increase (and diversify).

### Multi-morbidity as confounder for conventional systems of care

The World Health Organization (2016) has already identified a need for a rise (or re-emergence) in generalism in medical care for people with multi-morbidity. The contemporary dance between general and specialist care experienced by so many older people, often in a crude hub and spoke model (out and back, out and back) and others with complex conditions, is neither desirable nor sustainable into the future. Continuing increases in healthcare costs cannot simply focus on demographic change as a driver, however convenient for politicians, economists and insurers, but must also consider the current limitations to the design of healthcare systems and the shape of medical and allied healthcare practice.

The economist JK Galbraith coined the term 'the conventional wisdom' to refer to ideas which have become accepted, even unquestioned, in society at large. Many of our healthcare systems exhibit similar levels of comfort with the general status quo of why we provide the healthcare we do and in the way(s) we do. However, we suggest that population-level ageing represents a major disruptor to any conventional wisdom of healthcare. Ageing



In this map, we have added the dimension of age to the prevalence data to unpack the specific impacts of multi-morbidity for individual countries and the relationship between demographic structure and multi-morbidity's actual, and potential, impact. The data is key for consideration in global health policy initiatives.

is already disrupting our assumptions about how we understand the health and wellbeing of older people and the current and impending effects of their growing numbers on current service design and delivery arrangements.

Complexity is on the rise and this must not only be acknowledged more directly but addressed more categorically in healthcare environments. Researchers such as Brian Castellani and colleagues (2015) have been promoting the need for a turn away from reductive strategies in healthcare in order to, finally, address the innate complexity of individuals and their circumstances. This means addressing factors such as multi-morbidity or frailty as they occur in each individual patient and not as a general or overarching diagnostic category.

### A geography of multi-morbidity

One of the viable and practical strategies for addressing multi-morbidity lies in a greater application of spatial science applications. Demography, epidemiological patterns and health services provision are, at least in many countries with good quality data, highly mappable. And all of these factors

display distinctly spatial patterns. In this context, the location of individuals and clusters of people with complex shared symptomologies makes them amenable to spatial analysis. They can in effect be mapped and networked to available bricks-and-mortar healthcare resources or, if those are lacking, to substitute resources in the mobile or telehealth domains.

### Building capacity for an ageing world

The growing impact of multi-morbidities and their association with population-level ageing presents a number of challenges, both philosophical and practical. One of the practical ones is connecting older people, themselves often frailer and less mobile than other community dwelling groups, to the complex web of services that currently exist. The spatial patterning of older people and the health and social care systems, themselves often poorly or inadequately connected, rarely matches up. More than this though is the prevalence in many countries of a health system designed and built around the needs of the past having to reconsider design and delivery to a less mobile, often place-bound, ageing population.

Sometimes the reaction to this is an ageist one. Older people are assumed to be in some way responsible for their inability to meet the system as it currently exists, rather than acknowledging this as an indicator of current design limitations. Indeed, any policy or service provision framework that assumes people exist simply to adapt to it will clearly find population ageing a confounder for established models, and patterns, of care. In other words, population ageing is a driver for change and one which requires a marked degree of capacity-building if older peoples' needs are to be effectively met. Models drawn from the 19th and 20th centuries, with their emphasis on infectious diseases and acute health events, will become increasingly inadequate to meet emerging needs.

### Mapping the ageing/aged world

One of the as yet underutilised strategies for coping more effectively with population ageing and the needs it is giving rise to, lies in the contemporary spatial sciences. The policy literature is replete with concepts around the term 'ageing in place'. But this often simply refers to a person's home or some contracted version of the older person's perceived daily activity space (often conceived quite narrowly as home, shops and health services). Even now, the emerging digital paradigm is poorly integrated, since ageist attitudes conceive of older people as technology shy, at best. This too is going to need to change.

So here we suggest that the spatial sciences offer a potential suite of connecting technologies to support population ageing. These various combinations of hardware and software including geographic information systems (GIS), global positioning systems (GPS), remote sensing (RS); unmanned aerial vehicles (UAV) technology, radio frequency identification (RFID) and so on. While often serving quite distinct purposes, their emerging utility, as expressed in the Internet of Things concept, is one of connection through the digital to the analogue lives they can be used to support.

Typically, this means a greater interoperability between structures such as electronic health records (EHRs), alerts systems, and specific health and social care providers (including acute, sub-acute, primary care, rehabilitation and community social supports). The old policy silo structures will not be sufficient for connecting our increasingly ageing world. Using spatial technology that supports older people where they already are and in where they need or want to

get to, will be an emerging development in this field.

Multi-morbidity, so intimately connected to ageing, can only encourage this increasing embeddedness of spatial technology, methods and concepts. This is especially so as the world's population becomes increasingly urban and intimate local and contextualised knowledge of who is where diminishes. Perhaps the potential exists for this particular kind of technology to help us re-localise for high density urban environments?

“THE SPATIAL SCIENCES, MODERATED THROUGH A GEOGRAPHIC SOCIAL SCIENCES LENS, CAN RESPOND TO THE COMPLEXITIES OF AGEING”

Of course, this is not a call for simply more technological determinism. Instead we are proposing a response to population ageing that uses place-related, and relevant, technologies in association with geographic conceptualisations of ageing and their intimate connection to space and place. Older people, unless dislocated, are highly place dependent/interdependent. They experience local attachments and preferences, which in turn inform both memory and affect. Many aged care facilities seek to mimic the 'home' in their advertising in recognition of this deep and fundamentally human sense of connectedness to place. The opportunity exists to combine high technology and informative social science understandings to assist us in adapting to the emergence of the ageing and, ultimately, aged world.

### Conclusion

Globally, population ageing is a driver for significant social, economic and systemic change. It is adding to the complexity of contemporary societies, in part because we have not designed our systems to accommodate complexity more effectively. The concept of multi-morbidity, and emerging concepts such as frailty, show how we are attempting to capture and respond to age-related complexities. The intersection of these ideas with problems connected to age-related neurodegeneration, such as the dementias, shows just how complex



In this final map, we pair prevalence with GDP per capita data to extend the idea of multi-morbidity's differential impacts on countries with varying capacities to fund interventional responses.

this situation is likely to become as population progresses. And how challenging it will be without a platform for supporting adaptation and capacity building the aged care 'space'.

The conventional wisdom will serve us poorly unless it too becomes increasingly characterised by a complexity focus. Ageing is the emerging focus of many of these complexities. They will also intersect with other forms of complexity and associated adaptation, such as climate change. Our position here is that the spatial sciences, moderated through a geographic social sciences lens, have a great deal to offer in responding to those complexities. And in doing so we may yet produce a new conventional wisdom, one relevant to and informative of the aged society. ■

## KEY POINTS

- ✓ There are implications for healthcare in a successful transition to the status of an aged society
- ✓ The groups impacted by multi-morbidity, the presence of two or more health conditions in an individual, are complex and varied
- ✓ The spatial sciences can offer practical strategies in healthcare as multi-morbidity demographical and epidemiological patterns are highly mappable
- ✓ Population ageing is an engine for social, economic and systemic change
- ✓ Spatial sciences can offer a suite of connecting technologies to support ageing



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# Chronic Inequities

## The top killer of women in Europe?

Women are underrepresented throughout the health policy continuum from research to access and appropriate healthcare. How can this imbalance be addressed?



**Peggy Maguire**

Director General  
European Institute of  
Women's Health  
Dublin, Ireland



**Sinead Hewson**

Board Member  
European Institute of  
Women's Health  
Dublin, Ireland



**Kristin Semancik**

Public Health Manager  
European Institute of  
Women's Health  
Dublin, Ireland

info@eurohealth.ie  
@EIWH  
eurohealth.ie

**W**hat is killing women in Europe today? The list includes cardiovascular disease, cancer and respiratory disease, which account for nearly four-fifths of women's (and men's) deaths on the continent (Eurostat 2017a; WHO 2012). However, data and evidence overwhelmingly indicate that healthcare (health service delivery) and health systems (policies and organisation) are systemically failing women.

Sex and gender—which includes both biological and social influences—are critical to health. Many diseases affect men and women differently, including diabetes, depression and cardiovascular disease. In addition, women do not present with the same symptoms and respond differently to treatments than do men. Women also have higher rates of disease such as breast cancer, osteoporosis and auto-immune diseases (EIWH 2018a; Eurostat 2017b; ENGENDER 2011; EIWH 2017ab).

Many factors that lie outside the health sector—including socioeconomic status, education, culture and ethnicity differences—impact patterns of behaviour, access to resources, affecting both women and men's vulnerability to illness and ability to access appropriate healthcare (EIWH 2018a; ENGENDER 2011; EIWH 2006; 2017b). Biological differences and social factors create inequities for women with regard to access to quality healthcare and better health outcomes.

Health promotion and healthcare delivery have large implications for women's health. The current model predominately employs a "one-size fits all" approach. Equity must underpin healthcare delivery. This does not necessarily mean providing the same treatment, but treatments that result in better outcomes that improve the health of women and men and effectively utilise health resources. The case for sex and gender-based interventions is indisputable. Despite available evidence calling for change, the motivation to transform the fundamental workings of over-stretched healthcare systems is inconsistent and often lacking.

The European Institute of Women's Health recently published the recommendations from its

multidisciplinary expert conference held in Brussels in December 2017. The delegates called for urgent action to integrate sex and gender right from the start in health research, policy, programming and practice through to implementation by employing a life course approach (EIWH 2018b; 2018c).

### Women: the frontline of health

Women are on the frontline of health—and disproportionately so. They comprise the majority of health professionals and caregivers (paid and unfortunately, far too often unpaid). They perform most domestic household chores, essential yet predominantly unpaid or low-paid duties.

As mothers, daughters, wives and friends, women are the managers of health and key health decision-makers, often at the expense of their own health and wellbeing. Women are also patients, particularly during their older years, in an increasingly ageing society where women outlive men but spend their older years disproportionately burdened by ill health (Eurostat 2017b).

Women in Europe have lower pay, often in less secure and informal occupations. They earn 16 percent less than men and receive pensions that are 40 percent lower than men (European Parliament 2017). These accumulated inequities have large repercussions for their health. Equity of opportunities for women and men must be ensured in all policies as enshrined in the European Pillar of Social Rights (European Commission 2018).

### Top killers of women

**Lack of investment in prevention:** Prevention, treatment and care fail to adequately integrate sex and gender differences at a high cost to women and their families. Available evidence must be used to identify entry points for interventions specific to girls and women. Health messaging must be tailored to compete with advertising (such as alcohol and tobacco) that targets women. Vaccination, cancer screening and other vital health promotion require

dedicated budgets, and an overall shift is needed in policy and programming from treatment to a focus on prevention and early intervention.

**Healthcare and health system organisation:**

The utilisation of healthcare services varies across life, and there are differences between men and women in health behaviour and care provision. For example, the symptoms of cardiovascular disease in women can be different from those of men, and women are slower than men to react when these symptoms appear (EIWH 2017b). As women and men use healthcare in different ways, services must be adapted to better meet everyone's needs (EIWH 2018c). Multi-lingual, understandable and accessible information that empowers patients, caregivers and their families is lacking, despite evidence that health-literate patients experience better health outcomes and lower health service usage.

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**Lack of sex and gender in research:** Women are the heaviest medicine users, yet they remain under-represented in biomedical and health research and data. Consequently, the evidence base is weaker for women as well as for older people. Women have more than a 50 percent greater risk of developing adverse drug reactions compared to men (Rademaker 2001). Medicinal products are safer and more effective for everyone when clinical research studies include diverse population groups. In order to provide more individualised care (personalised medicine), sex and gender must be incorporated throughout the process from design of clinical trial protocols, data analysis, health technology assessment and access to care. The inclusion of sex and gender benefits both women and men's health.

**Maternal mortality and morbidity:** Every woman has a fundamental right to high-quality maternity care within the European Union; however, large variations exist within and across Member States. Central issues such as perinatal health; pregnancy, birth, postpartum support; and the safe use of medicines during

pregnancy and lactation must be resolved. Standards for maternal healthcare need to be systematically implemented and monitored.

**Unhealthy ageing:** Given women's essential role, healthcare systems should be highly responsive to women, yet research, programming, policy and practice continue to let them down. Consequently, although women outlive men by more than five years, their healthy life expectancy advantage is less than nine months (Eurostat 2017b). Ageing is a major risk factor for women's ill health. Women are also at the forefront of ageing due to their greater longevity than men and their multiple carer and societal roles. One of the biggest challenges facing European society, which has the highest proportion of older women in the world, is retaining and maintaining health during old age.

**Health is not in all policies:** Women's health and wellbeing includes biological, social, economic and political factors, which must be incorporated into **all policies** that influence health. Sex and gender inequities like violence against women, lack of decision-making power, and unfair work division impact health in the short and long term. Everyone has the right to timely access to affordable, preventive and curative health care of good quality. These principles are enshrined in Article 168 of the Treaty on the Functioning of the European Union, “*a high level of human health protection shall be ensured in the definition and implementation of all Union policies and activities*” (Publications Office of the European Union 2010). This legislation must be enacted and actively enforced.

**Lack of women's involvement and understanding:** There is a lack of understanding of the impact of sex and gender. Healthcare professionals, citizens and women must be educated on the importance of systematically mainstreaming sex and gender and demand access to good healthcare as a fundamental right. Women need to be involved in health from the very start from basic medical research through treatment and care. Women are generally under-represented in clinical trials. The new clinical trials regulation (Regulation EU No 536/2014) is a major step forward in increasing clinical trial data transparency. However, the continued under representation of women in clinical trials needs to be urgently tackled, and the regulation must be enforced. Women are also grossly under-represented in STEM (Science, Technology, Engineering, and Mathematics), with a European average of 17 percent (European Institute for Gender Equality 2018). Investing in women's health makes medical sense as well as being economically

prudent, as closing the gap would increase gross domestic product (GDP) in Europe from €610 to €820 billion by 2050 (EIGE 2018; WISE 2012).

### Europe's health policy—stuck in neutral?

In order to ensure equitable health for women, sex and social determinants must be systematically incorporated into healthcare and health policy from research through implementation. The incremental, slow-moving nature of the policymaking process and budgeting cycles are out of sync with rapid changes of healthcare needs. Transformative thinking must be employed by the political system to make healthcare responsive to women (52 percent of the population). Women's health is a smart investment and should be a political priority in order to guarantee health for all. We must employ an approach to health that focuses on wellbeing and incorporates the impact of the social determinants of health.

Women have and will continue to be society's carers, but women must also care for themselves. Together, women must step up and demand equity—equity in research, access, treatment and decision-making in order to better meet both women and men's health needs.

*“Everyone has the right to timely access to affordable, preventive and curative health care of good quality”* according to Article 168 of the Treaty on the Functioning of the European Union (Publications Office of the European Union 2010). The European Institute of Women's Health calls on the EU Council, European Commission and European Parliament to strengthen health in the Multiannual Financial Framework and fully implement the EU Treaty requirements to protect health in all policies and promote wellbeing and social equity.

Currently, healthcare systems are not sex- and gender-sensitive, which results in costly, ineffective and unjust healthcare for all. Policies need to be made not only for women but also by women themselves. Women need to be engaged and involved throughout the policy process. Women are not looking for special attention, but attention focused on their specific health needs. Society must invest in women's health

and wellbeing today in order to not only combat inequities, but also to lay strong foundations for future generations.

Healthcare systems are letting down the women of Europe—in fact, they are often failing them. Many policy mechanisms to address the top killers of women are available, but few are being implemented. We must work individually and collectively to advance women's health now through improved (personalised) care and better policy design. ■

### About the European Institute of Women's Health

Founded in 1996, the European Institute of Women's Health (EIWH) is a nongovernmental organisation (NGO) that promotes sex and gender equity in health, research and policy across Europe. In striving to achieve the highest standard of health for all, society's policies and programmes must recognise that women and men—due to biological, social, economic and political factors—are faced with different obstacles and opportunities. This requires employing a sex- and gender-sensitive approach. The EIWH uses evidence-based arguments to influence the policy environment and works closely with the European Commission, Member States and the World Health Organization to place sex and gender on the health, research and policy agendas.

### KEY POINTS

- ✓ Healthcare and health systems must be more revolutionary and responsive
- ✓ Diseases and their treatments affect men and women differently; therefore, sex and gender factors must be integrated in biomedical and health research to provide effective, equitable and efficient healthcare
- ✓ Equitable outcomes must underpin healthcare delivery for all
- ✓ Top killers of women fundamentally include a lack of investment in prevention, unresponsive healthcare systems, and underrepresentation in research
- ✓ Women must drive and be meaningfully engaged in designing and implementing future health policies



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# Aiming to heal 80 percent more hearts through the power of partnership

As a leading center in the treatment of cardiac arrhythmias, Oslo University Hospital, in Norway is acutely aware of the increasing number of lives that are being impacted by atrial fibrillation.

Dr. Erik Kongsgård, Head of Electrophysiology at the hospital, shared, “we are the only public center in the south of Norway, with approximately 2.8 million citizens – a huge region. We’ve had to take on more patients this year, and next year it will increase. Resources are limited. If we can’t stay within budget, we’ll get less next year. To increase the number of patients we treat, we need to work smarter.”

Afib is the new millennium epidemic – affecting 11 million in Europe. It places a critical burden on health-care systems as it more than doubles a patient’s risk of stroke and mortality. Yet, only 4% of eligible patients undergo ablation treatment. Oslo University Hospital were committed to do something about this and had a clear goal – to treat more patients, safely, and improve outcomes.

“At six months, our hospital waiting list is too long, as is procedure downtime. I’ve travelled across Europe to other centers and it’s the same wherever you go. For us it’s 60-90 minutes downtime, in other centers its 90-150. Everyone is struggling.”

Rather than hand over the reins of their electrophysiology laboratory to a vendor with an ‘off-the shelf’ solution, they wanted a true partner with whom they could create their own solution. Dr. Kongsgård describes, “We wanted to partner with a large and experienced company, with a global network, meaning quick input on solutions. We had to explore how we could systematically standardize protocols and find a smart way to have multiple afib patients in one lab – efficiently and safely.”

Johnson & Johnson understands that every hospital is unique. Thus, it prides itself on listening first. This was how the CareAdvantage, value-based approach was born. ‘Solving Starts with Listening’ remains central to the process of understanding, supporting and solving challenges collaboratively with hospitals

through innovative, bespoke and co-created solutions.

“If I have a problem, I know I can come to Johnson & Johnson to provide a solution – so we got in contact. We were lucky. It was the right moment for our partnership.”

“There are different barriers between professions in a hospital and sometimes we’re not good at listening.” “The process with Johnson & Johnson has opened our minds to listen, not only talk. So, we involved the whole department in the process and, through follow-up and assessment, they can see we’ve achieved something good by making changes that improve productivity and safety.”

Johnson & Johnson and Oslo University Hospital signed the Biosense Webster ADVANTAGE<sup>SM</sup> Partnership in April 2018 with an objective to increase the total number of patients treated in the electrophysiology lab, including an additional 80% of afib patients treated annually. The key program objectives included:

- Ensuring patients are well-informed pre-operatively, with improved assessments to reduce the number of patients dropping out on the day of procedures
- Reducing down-time of the electrophysiology lab and changeover-times
- Standardizing the afib ablation procedure to reduce the current inter-procedure variability and improve safety and outcomes

Describing changes already seen, Dr. Kongsgård said, “Downtime is shorter, and doctors’ awareness of new standardization processes has improved, meaning the afib ablation procedure is more standardized than before. It’s a major achievement. Patient follow-up, which was previously not that good, has also improved.”

Johnson & Johnson’s CareAdvantage value based approach has been able to offer Oslo University Hospital a custom designed pathway capability for comprehensive afib management, delivering value at every point along the care pathway – ultimately expanding access to heal more hearts. ■



**Erik Kongsgård**

Head of Electrophysiology  
Oslo University Hospital,  
Rikshospitalet  
Oslo, Norway

Interested to hear how  
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Contact:  
EMEAcareadvantage@its.jnj.com

# A moving target: the future of cardiology

In this issue of *HealthManagement*, we shine the spotlight on two leading figures in the field of cardiology—Prof. Dr. Hüseyin Ince and Dr. Giuseppe D'Ancona—to bring together their expert views on key developments in transcatheter aortic valve implantation (TAVI), percutaneous mitral valve repair and more.



**Hüseyin Ince**

Director  
Department of Cardiology  
University of Rostock, Germany  
and  
Director  
Department of Internal  
Medicine –  
Cardiology and Conservative  
Intensive Care  
Vivantes Hospital im  
Friedrichshain and Vivantes  
Hospital Am Urban  
Berlin, Germany

Hueseyin.Ince@med.  
uni-rostock.de



**Giuseppe  
D'Ancona**

Director of Clinical Science  
Department of Internal  
Medicine –  
Cardiology and Conservative  
Intensive Care  
Vivantes Hospital im  
Friedrichshain and Vivantes  
Hospital Am Urban  
Berlin, Germany

rga@hotmail.com

## Transcatheter aortic valve implantation What do you believe to be the most important recent advancements in the field of interventional aortic valve replacement therapy?

**Giuseppe D'Ancona (GD):** Improved valve sealing of the calcified aortic annulus to reduce risk of paravalvular leak and complete valve “reseathability” to guarantee stable valve re-positioning within the optimal landing zone are the most important achievements of the new generation TAVI devices.

**Hüseyin Ince (HI):** We believe that the next frontier will be treatment of pure aortic insufficiency by means of TAVI. Although this procedure has been so far performed mainly as an off-label approach to treating selected patients, technology in the future should make devices available that are optimised for this goal.

## Is TAVI suitable for low-risk patients?

**HI:** Large scale clinical trials involving both the Medtronic and Edwards systems have been approved and are ongoing in the low-surgical-risk category. Moreover, the Nordic Aortic Valve Intervention (NOTION) trial (Thyregod et al. 2013), where 81% of the patients had low-surgical-risk, has shown that the primary endpoint of death due to any cause, stroke and myocardial infarction at one year were similar in TAVI and conventional aortic valve replacement patients. The TAVI group had lower rates of bleeding, acute kidney injury, new or worsening atrial fibrillation or cardiogenic shock, as well as a shorter length of stay and larger orifice areas. Surgical patients had lower rates of pacemaker implantations and paravalvular regurgitation, and had a better New York Heart Association Classification at one year.

**GD:** We have to be realistic about the future expansion of TAVI and we need to understand that we are dealing with a moving target. Although some questions about valve durability, leaflet thrombosis, and higher rates of paravalvular leak and post-procedural

permanent pacemakers (PPMs) implantation have been raised in the TAVI arena, most of these issues will be overcome as TAVI technology continues to improve. In this context, TAVI in low-risk candidates will be just a natural consequence.

## In a recent paper you both (Ortak, D'Ancona, Ince et al. 2018) reported on the development of a structured protocol to reduce the PPM implantation rate after TAVI in general and more specifically after implantation of the LOTUS® prosthesis. Can you tell us about that learning curve? And the resulting protocol?

**GD:** Apart from our experience, there is published evidence that a large majority of patients implanted with PPM immediately after TAVI do not require a PPM at short-term follow-up. In synthesis, we implant more PPMs than necessary after TAVI.

There are some general and specific rules you can apply to reduce the PPM implantation rate after TAVI. Generally speaking, you should implant with PPM only those patients that, after TAVI, present indications to PPM according to international guidelines—that would not include patients with new onset of left bundle branch block (LBBB), for example. Moreover, because the lesion on the cardiac conduction tissue (specifically the AV node) may be temporary, we delay to the fifth day after TAVI the decision to implant a PPM. Of course, in the meantime patients are monitored and a temporary pacemaker lead is left in place (via the jugular vein).

Finally, because the conduction blocks are generally caused by localised oedema and direct trauma—exerted by the catheter during the procedure and by the valve stent—we start steroidal therapy to facilitate oedema reduction. This strategy has already been suggested in the paediatric population after percutaneous closure of septal defects.

**HI:** From a more explicitly technical standpoint, we have learned that aiming for a “high implantation” of the prosthesis within the native aortic annulus will reduce the risk of impingement in the conduction system and minimise the development of AV block. Again, this is not just a personal intuition but has been confirmed by other authors who have used prostheses with a different design.

The implantation depth can be corrected when using completely resheathable and repositionable TAVI prostheses. With the LOTUS® valve, we had a learning curve of more than 30 patients before we could optimise our implantation technique and, in the last series, drastically reduce the PPM implantation rate.

## **Percutaneous mitral valve repair**

### **Which patients should undergo percutaneous mitral valve repair?**

**HI:** We have to operate within the indications of the international guidelines. Because we are mainly addressing patients within the EU, we refer to the EU guidelines. In this context, in primary mitral valve regurgitation, percutaneous edge-to-edge procedure is indicated in patients with symptomatic severe primary mitral regurgitation who fulfil the echocardiographic criteria of eligibility and are judged inoperable or at high surgical risk by the heart team, avoiding futility.

In secondary mitral valve regurgitation, when revascularisation is not indicated and surgical risk is not low, a percutaneous edge-to-edge procedure may be considered in patients with severe secondary mitral regurgitation and left ventricular ejection fraction (LVEF) >30% who remain symptomatic despite optimal medical management—including cardiac resynchronisation therapy (CRT) if indicated—and who have a suitable valve morphology by echocardiography, avoiding futility.

**GD:** In patients with severe secondary mitral regurgitation and LVEF <30% who remain symptomatic despite optimal medical management—including CRT if indicated—and who have no option for revascularisation, the heart team may consider a percutaneous edge-to-edge procedure or valve surgery after careful evaluation for a ventricular assist device or heart transplant according to individual patient characteristics.

## **Implantable electronic devices**

### **With the upsurge in cardiovascular implantable electronic device use, there has been a disproportionate rise in cardiovascular implantable**

**electronic device (CIED) infection. Between 2003 and 2006, the number of CIED implants increased by 12% while the number of CIED infections rose by 57% (Voigt et al. 2010). How has this influenced cardiology medicine, specifically your own decision-making with regards to implanting electronic devices?**

**GD:** For years there has been a fallacious tendency to underestimate the peri-procedural and follow-up risks of CIEDs. In this context, there has been a liberal interpretation of the international guidelines, which are also indirectly driven by the fact that in many medical institutions, CIED implantation represents a source of budgetary income. Moreover, with the improvement of techniques and technology, patients with more complex co-morbid profiles, often leading to a higher vulnerability towards infections, have also been targeted for CIED implantation.

CIEDs often represent a necessary tool *quoad vitam et valitudinem* (with respect to life and to health), and an increase in CIED infection rates also results from a broader application of this type of therapy to borderline co-morbid patients. In light of the not negligible risks, it should be common strategy to adhere even more to the international guidelines for CIED implantation.

**HI:** That said, we should keep in mind that guidelines are, in any case, prone to changes based on the most recent scientific evidence. It should be enough to think, for example, about the recently published DANISH trial (Køber et al. 2016) findings that have emphasised the lack of survival benefits in selected groups of implantable cardioverter defibrillator (ICD) candidates. In this sense, we have to be aware of the fact that in the past years, a more defensive approach has been applied in the field of CIEDs.

### **How have fears about hacking into implantable electronic devices influenced the direction of cardiology medicine?**

**HI:** Cybersecurity in CIEDs is a big challenge, mainly due to the fact that, as healthcare providers, we have limited knowledge and tools to understand and prevent risks of malicious hacking into CIEDs. The Heart Rhythm Society’s Leadership Summit has only recently published a document (Slotwiner et al. 2018) to create awareness and propose solutions.

Cybersecurity vulnerability is not insurmountable, as long as we realise its existence. In fact fear of hacking should not generate panic and immobility but, on the contrary, enhance prompt multidisciplinary solutions.

For the future one of the primary goals should be to educate healthcare providers and patients about the risks of cybersecurity breaching and the actions already taken by stakeholders to minimise those risks. **GD:** From a more technical standpoint, the stakeholders should be incorporating cybersecurity features into the early stage of product design. In this context, they will also need to propose and develop infrastructure to evaluate and limit specific CIED vulnerabilities that may arise after implantation and during the follow-up phases.

We have to emphasise that hacking of CIEDs is only one of the many aspects of potential security breaching in the modern healthcare era. In fact, the digitalisation of medicine and medical information is forcing us to secure the huge amount of medical data that is generated. Again, as healthcare providers, we must put pressure on the policymakers and the technical people to come up with reasonable and prompt solutions that will minimise the risks for healthcare seekers, without impairing their daily medical management.

## Cardiology medicine

**In addition to your expertise in interventional aortic valve replacement therapy, what other areas of cardiology medicine are you most passionate about?**

**GD, HI:** Percutaneous treatment of structural heart disease is a main field of academic and clinical activity of our multidisciplinary department, with a holistic approach to cardiovascular medicine.

**Are there any areas in particular where you believe more research is required?**

**GD, HI:** Although we are mainly acting on the consequences of cardiovascular disease, we believe that more efforts should be invested in the cardiovascular prevention and education field. In this context, our job is mainly technical and we must recognise the limited span of action we may have with our expertise. The impact on the overall population would be much greater if more efforts were concentrated on the earlier stages of disease or before the disease has developed.

**What do you believe are the most promising areas of cardiology medicine, with most changes and discoveries being made?**

**HI:** It is a real challenge to predict the next major breakthrough in cardiology. In any case, the most important discoveries will result from team and collaborative science and multidisciplinary studies. We see a huge potential in translational research, particularly within active and continuous integration and liaison among those involved in big data interpretation, bench experimentation and bedside application. This integration may lead to significant future breakthroughs in the field of cardiovascular medicine.

**GD:** In our specific field of percutaneous treatment of structural heart disease, we are expecting major breakthroughs in the percutaneous management of mitral valve pathology, particularly mitral valve regurgitation, heart failure, and in the percutaneous management of treacherous acute conditions such as ascending aorta dissection.

**In our ageing population, do you think incidences of cardiovascular disease will be on the rise, or do you think changes to the healthcare system can prevent these incidences?**

**GD:** Although we know that most cardiovascular diseases can be prevented by addressing behavioural risk factors using population-wide strategies, cardiovascular pathology is a technical consequence of organism ageing. It has to be emphasised that, in any case, the lethal consequences of cardiovascular disease can be nowadays delayed and buffered by early diagnoses and treatment. As a result, although an increase in cardiovascular disease related to ageing of the population may be expected, its impact upon patients' mortality should be contained.

**HI:** But we have unfortunately a very limited perspective that mainly considers what we call "the developed world". It will be of crucial importance to investigate and monitor what will happen in emerging economies. Certain aspects of cardiovascular disease, in fact, belong mainly to rich economies and may emerge aggressively in developing countries, especially as a result of changing habits in emerging economies. ■



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# What is the future of breast cancer screening?

Advances in technology and the advent of precision medicine point to a move away from 'one size fits all' breast cancer screening.



**Elizabeth Morris**

Chief, Breast Imaging Service  
Professor of Radiology &  
Larry Norton Chair  
Memorial Sloan Kettering Center  
New York City, New York, USA

morrise@mskcc.org

[@DrLizMorris](#)

**B**reast cancer is the most frequently diagnosed cause of death from cancer in women worldwide and the second leading cause of death from cancer in women in developed countries (Ferlay et al. 2014a; 2014b). Breast cancer mortality rates have decreased due to mammographic screening, and hence earlier detection of cancers, including small noninvasive cancers, and advances in treatment. However, advances in technology and the advent of precision medicine point to a move away from 'one size fits all' breast cancer screening.

## Breast cancer screening: U.S. and Europe

The screening environments in the U.S. and in Europe are very different. In the U.S., screening is opportunistic, on the recommendation of a physician, or initiated by the woman. Annual screening is commonplace for women aged 40 years and above and recommended by some authorities (Williams et al. 2015). Screening with digital breast tomosynthesis, or 3D mammography, is increasingly popular. Generally mammograms undergo a single reading by a radiologist, and insurance coverage is variable for DBT. Many European countries have a national screening programme, which generally offer screening every two years to women aged 50 and above. In the UK, double readings by a radiologist are standard. DBT is not as prevalent outside the U.S. yet, and insurance coverage is minimal compared to that in the U.S. However, there are ongoing clinical trials in Europe evaluating DBT in the context of a screening programme in order to assess its cost-effectiveness and performance PROSPECTS trial [medphys.royalsurrey.nhs.uk/prospects](http://medphys.royalsurrey.nhs.uk/prospects), the recently reported Reggio Emilia Tomosynthesis Randomized Trial (Pattacini et al. 2018) and the Tomosynthesis Trial in Bergen (TOBE), Norway - [clinicaltrials.gov/ct2/show/NCT02835625](http://clinicaltrials.gov/ct2/show/NCT02835625)).

## Is 'one size fits all' mammographic screening still valid?

Mammography has been the mainstay of breast cancer screening since the 1990s. Although it is the only imaging modality shown to reduce mortality caused by breast cancer by 25-30% in multiple large randomised clinical trials, it has limitations. Clinical trials have found false negative rates of 4-34%, 10-12% call backs for additional imaging studies, and a 20% incidence rate of interval cancers after a negative mammogram and physical examination. Such limitations are most common in younger women and women with dense breasts.

## Why should women be informed about breast density?

Dense breast tissue masks breast cancer, so by the time cancer is detected it may have grown to a stage at which more aggressive treatment is required. Women with dense breasts are four to six times more likely to develop breast cancer (Boyd et al. 2007). In an analysis of clinical risk factors for breast cancer in more than 18,000 women with invasive ductal carcinoma (IDC) or ductal carcinoma in situ (DCIS) matched with similar numbers of women without breast cancer, breast density was the most prevalent risk factor in pre- and postmenopausal women: 39.3% (95% CI, 36.6-42%) premenopausal; 26.2% (95% CI, 24.4%-28%) postmenopausal (Engmann et al. 2016).

## Screening controversies

There are mixed messages on the efficacy of breast cancer screening—from varying guidelines, articles in the lay press and one large study, the Canadian National Breast Screening study, which cast doubt on the value of annual screening mammograms for women aged 40-59 (Miller et al. 2014). Concerns centre on over-diagnosis and over-treatment as

well as radiation dose exposure from more frequent screening (although the latter can be avoided by use of synthesised 2D images obtained using DBT).

### Emerging screening modalities

Several modalities are used for additional examination in women where a suspicious lesion has been detected with mammography or as initial examinations in women with an increased risk of breast cancer. Their use as a mass screening modality is still to be proven, however.

#### Ultrasonography

Handheld US (HHUS) is widely available and well tolerated, and a large multicentre trial demonstrated that screening with HHUS finds significantly more early-stage breast cancers than screening with mammography alone, providing a cancer detection rate of 0.3%–0.5% (Berg et al. 2008; Buchberger et al. 2000; Kolb et al. 2002). However, HHUS has several limitations, including operator dependence and lack of a standardised technique (Berg et al. 2006). In addition, bilateral whole-breast screening using HHUS is time-consuming and has a high number of false positives.

Automated breast ultrasound (ABUS) has several advantages over HHUS, including higher reproducibility, less operator dependence, and less time required for image acquisition (Kaplan 2014). In addition, ABUS reduces the need for trained operators and it provides both a coronal view and a relatively large field of view. Recent studies have reported that ABUS is promising in US screening for women with dense breasts and can potentially replace handheld second-look US in a preoperative setting (Kelly K et al. 2010; Golatta M et al. 2015; Lander M, Tabar L 2011; The SOMO-INSIGHT study 2013).

#### Abbreviated breast MRI

Breast MRI is not a cost-effective modality for screening women at intermediate risk, including those with dense breast tissue as the only risk. Therefore abbreviated MRI protocols (under 10 minutes) have been developed as a way of achieving efficiency and rapid throughput. It is a less expensive option that offers an exceptional supplemental screening modality. However, MRI scanner availability means that access may be an issue.

Mango and colleagues (2015) found that one pre and post-contrast T1W sequence may be adequate for detecting breast cancer. The Abbreviated Breast

MRI and Digital Tomosynthesis Mammography in Screening Women With Dense Breasts randomised clinical trial (NCT02933489 - [clinicaltrials.gov/ct2/show/NCT02933489](https://clinicaltrials.gov/ct2/show/NCT02933489)) will report on which modality is more effective in cancer detection.

#### Contrast-enhanced digital mammography

Contrast-enhanced digital mammography (CEDM) is an alternative to abbreviated breast MRI. CEDM can highlight areas that may not be detected with standard 2D full-field digital mammography. As with breast MRI, the administration of intravenous contrast in CEDM highlights areas of increased blood flow that may be associated with tumour growth. CEDM has consistently been demonstrated to be more sensitive than standard mammography for the detection of breast cancer. The installed mammography base makes CEDM an attractive option, and the technology is easily integrated in the clinic.

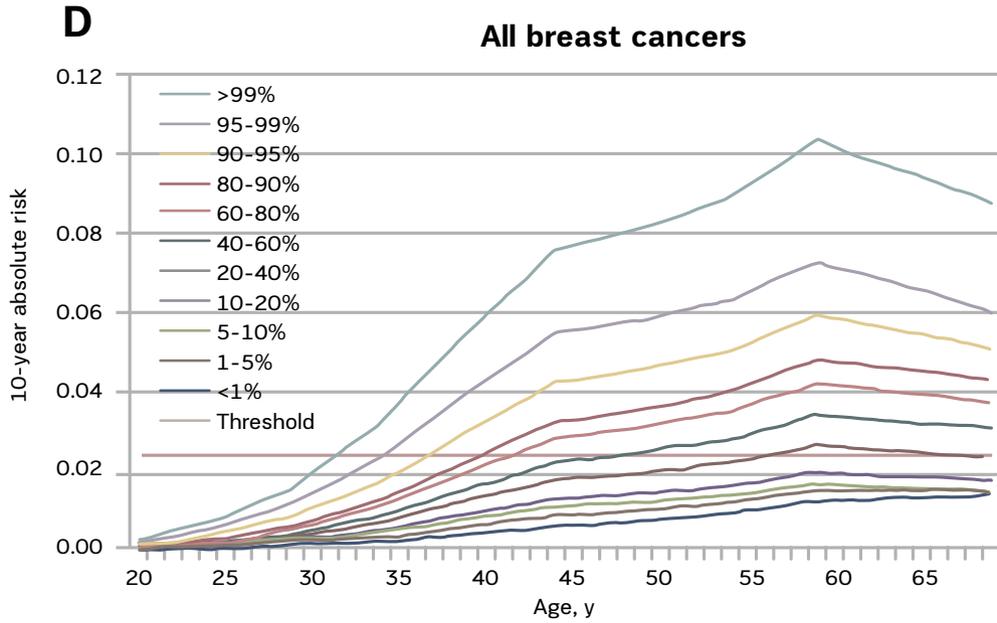
#### Can genomics help?

Ongoing global genome characterisation efforts are revolutionising our knowledge of cancer genomics, tumour biology and treatment methods. Information collected from a number of studies on driver cancer gene alterations—mutations, copy number alterations, translocations, and/or chromosomal rearrangements—can be leveraged to develop a cohesive framework for individualised cancer treatment. Genetic information can give an insight into tumour detection and individual risk and costs have come down considerably.

A 2001 study by Sørli et al. classified breast carcinomas based on variations in gene expression patterns derived from cDNA microarrays and correlated tumour characteristics to clinical outcome. They concluded that classification of tumours based on gene expression patterns can be used as a prognostic marker with respect to overall and relapse-free survival in a subset of patients that had received uniform therapy.

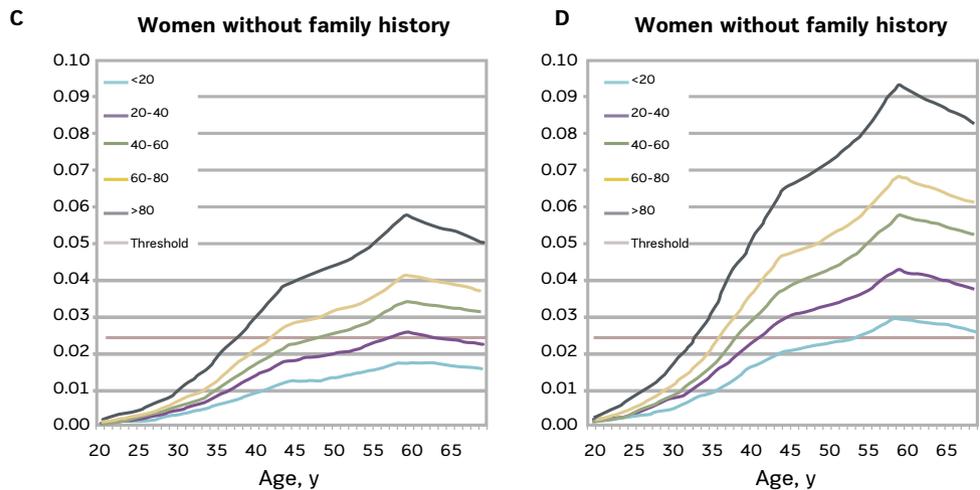
Early cancer genomics detection can indicate treatment approach. More heterogeneous tumours may be more likely to contain treatment-resistant subclones. Resistant subclones survive and propagate to reform a heterogeneous tumour.

When clonal expansion occurs is relevant to selection of a screening technique. If there is early clonal expansion, screening is needed to detect when a tumour is extremely small, whereas in late clonal expansion it may not matter when the tumour is



**Figure 2.** Cumulative & 10-year absolute risks of developing breast cancer for women of European origin by percentiles of the polygenic risk score (PRS)

The red line shows the 2.4% risk threshold corresponding to the risk for women age 47 years who were eligible for screening  
 Source: Mavaddat et al. 2015



Cumulative and 10-year absolute risks of developing breast cancer for women of European origin with and without a family history of breast cancer by percentiles of the polygenic risks score (PRS)

**Figure 3.**

Red line shows the 2.4% risk threshold corresponding to the risk for women age 47 years who were eligible for screening.  
 Source: Mavaddat et al. 2015

detected as a single clone is easier to treat. Different cancers present varying rates of disease dynamics and progression, with the size at which cancer causes symptoms—and death—varying according to type (**Figure 1**). We need to be smarter in our screening recommendations and detect before clonal expansion.

### Liquid screening for early cancer detection

Liquid screening is a promising technique that looks for cell-free nucleic acid (cfNA), which is released from tumour tissues through secretion, necrosis and mostly apoptosis. A cfNA final platform is likely to include SNP array plus whole genome, whole exome

or targeted sequencing. Memorial Sloan Kettering is running the MSK Discovery Study: Use of cfNA To Distinguish Between Benign and Malignant BI-RADS 4 Radiographic Lesions (NCT03372902 - [clinicaltrials.gov/ct2/show/NCT03372902](https://clinicaltrials.gov/ct2/show/NCT03372902)). The STRIVE Study: Breast Cancer Screening Cohort for the Development of Assays for Early Cancer Detection is also based in the U.S. and will collect blood samples from participants within 28 days of their screening mammogram. There are some challenges in ctNA assays, as detection rates vary.

A 2017 study from MSKCC/GRAIL assessed the use of cell-free nucleic acid (cfNA) for early detection using GRAIL's high-intensity sequencing approach (Razavi et al. 2017). It demonstrated that liquid screening can be a key approach to detecting cancer. Of 161 patients studied, 124 (39 breast cancer, 41 lung cancer, 44 prostate cancer) had sequencing results available for analysis from both blood and tumour tissue samples. In 89% of patients, at least one of the mutations detected in the tumour tissue was also detected in the blood (97% in patients with breast cancer, 85% in those with lung cancer and 84% in those with prostate cancer). When evaluating all genetic variations, including those present at high levels in tumour tissue (clonal) as well as those at low levels (sub-clonal), 627 of 864 mutations (73%) detected in tumour tissue were also detected in patients' blood. Most actionable mutations (those with associated targeted treatments) detected in tumour tissue were also detected in cfDNA (54 of 71 actionable mutations detected in tumour tissue were also detected in cfDNA; 76%). In addition, some cancer-related mutations that were detected in the bloodstream had been unidentified in the tumour tissue.

Molecular imaging and ctDNA will enable detection of tumours at the cell and receptor level. Optimal detection of a tumour requires molecular imaging with ctDNA, combined with MRI CEDM and mammography DBT.

### Personalised screening

The goals of personalised screening are early identification of women at high risk for breast cancer. Identifying women at high risk includes genetic testing, single nucleotide polymorphisms (SNPs) from saliva, use of the Tyrer Cuzick (TC) risk model and breast density measurement. The TC model has performed the best at breast cancer risk estimation (Amir et al. 2003), as it allows for the presence of multiple genes of differing penetrance. Risk should be assessed at regular intervals, with 5/10-year risk preferred to lifetime risk evaluation.

### Single nucleotide polymorphism to detect genetic variation

SNPs detect the most common genetic variation among people. Each SNP is different in a single DNA nucleotide. They occur once in every 300 nucleotides on average, which means there are roughly 10 million SNPs in the human genome. Some are associated with disease and they are useful for comparing regions of the genome between cohorts in genome-wide association studies.

A study by Cuzick et al. in 2017 examined the impact of a panel of 88 SNPs on the risk of breast cancer in high-risk women, looking at the results from two randomised tamoxifen prevention trials. Conditional logistic regression and matched concordance indices (mC) were used to measure the performance of SNP88 alone and with other breast cancer risk factors assessed using the TC model. Results show that SNP88 was predictive of breast cancer risk overall (odds ratio 1.37; 95% CI, 1.14 to 1.66; mC, 0.55), but mainly for oestrogen receptor-positive disease (OR 1.44; 95% CI, 1.16 to 1.79) versus oestrogen receptor-negative disease. The predictive power was similar to the TC model (OR 1.45; 95% CI, 1.21 to 1.73), but SNP88 was independent of TC and when combined multiplicatively, a substantial improvement was seen (OR 1.64; 95% CI, 1.36 to 1.97; mC, 0.60). The researchers concluded that a polygenic risk score can refine risk from the TC or similar models, which is important for identifying women who need heightened screening.

A study carried out by Mavaddat et al. in 2015 predicted breast cancer risk based on profiling with common genetic variants and concluded that the SNP77 percentiles of the polygenic risk score (PRS) stratifies breast cancer risk in women both with and without a family history of breast cancer (**Figure 2, Figure 3**). This level of risk discrimination can potentially inform targeted screening.

### Managing risk

To offer risk-based screening, there are questions about risk estimation and management. Who should be responsible for estimating and managing women's breast cancer risk? Who will do the risk counselling? What is the best age to obtain initial risk assessment? What should risk assessment include? Some current clinical trials, for example, will be using personal questionnaires on medical and family history, blood and saliva sampling in order to estimate breast cancer risk. There is also the issue of identifying

women at sufficiently low risk for breast cancer. When is the risk so low that screening becomes inappropriate?

The American College of Radiology recently published recommendations for breast cancer screening in women at higher-than-average risk (Monticciolo et al. 2018), which include use of breast MRI and contrast-enhanced breast MRI and ultrasound to be considered for women who cannot undergo MRI. "All women, especially black women and those of Ashkenazi Jewish descent, should be evaluated for breast cancer risk no later than age 30, so that those at higher risk can be identified and can benefit from supplemental screening", state the recommendations.

A number of trials are in progress in Europe and the U.S. to compare risk-adaptive screening regimens with standard 'one size fits all' screening programmes. The hypotheses for most of these trials are that a risk-based screening programme is safe (non-inferior in terms of Stage II+ breast cancer detected); superior (decreased incidence of Stage II+ breast cancers); equally or more cost-effective; and more acceptable to women, resulting in wider coverage and better compliance with screening invitations.

### Rethinking breast cancer screening

In future women will likely need to be screened based on their risk of breast cancer. Radiologists will be responsible for assessing risk using risk models, breast density measurements, SNPs as well as lifestyle and hormonal factors (reproductive history, BMI, height, alcohol, oral contraceptives).

DBT is the appropriate modality for low risk women, who should be screened every 1-2 years (from age 40?) based on their risk. US is the best modality for women with dense breasts and low risk. MRI is appropriate for women with intermediate and high risk of developing breast cancer (5 or 10 year risk). Abbreviated MRI is a proven technique, although CEDM appears equivalent to abbreviated MRI and is a very promising modality.

### Conclusion

Breast cancer screening in the future will no longer be 'one size fits all'. Personalised screening based on a woman's individual risk profile holds the potential to find 'relevant' cancers, those that could potentially be fatal, and thus decrease over diagnosis and over treatment as well as offer preventive treatment to eligible women. Ongoing clinical trials around the world will evaluate the effectiveness of risk based screening, its acceptability to women as well as its cost-effectiveness. Population-based screening has been a great achievement in healthcare, but precision medicine offers even more. ■

### KEY POINTS

- ✓ 'One size fits all' mammographic screening is not the future of breast screening
- ✓ Advances in genomics and risk profiling mean a shift to personalised screening based on risk profile



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# From treatment to prevention in diabetes care

Diabeter has made strides in type 1 diabetes care with its VBHC model. Co-founder Henk-Jan Aanstoot shares its keys to success.



**Henk-Jan Aanstoot**

Paediatric Diabetologist  
Diabeter  
Rotterdam, The Netherlands

[h.j.aanstoot@diabeter.nl](mailto:h.j.aanstoot@diabeter.nl)

[diabeter.nl](http://diabeter.nl)

At Diabeter, founded in 2006 by myself and Dr. Henk Veeze, our value-based care model specialises in providing comprehensive and personalised care for children and young adults with type 1 diabetes (T1D). We incorporate technological advancements and a transformed care system that adapts to continuous changes and relates to patient needs. With more than 2000 patients in five locations across the Netherlands, we are now one of the largest T1D clinics in Europe, will extend our care to patients of all ages, and are dedicated to extending our network through collaboration.

## Transforming care delivery: the Diabeter model

We realised that we should not base care on traditional clinic visits while the disease is about home care, which is where contact is needed. We went from an airport model, where planes are landing, to a cloud model, where we try to keep the planes in the air. A cornerstone of value-based healthcare is that it helps to maintain good health rather than struggle to fix poor health, and technological advancements make this possible.

The most important difference between the Diabeter model and other models is that it incorporates an integrated practice unit (IPU). If you don't have the decision power in your team, if you don't have the funds for payment around that model, if you don't have the data which you share with each other and with patients, then it's not working. We have an integrated practitioner for everything, focused on each patient's problem. The possibility to change and adapt fast is important.

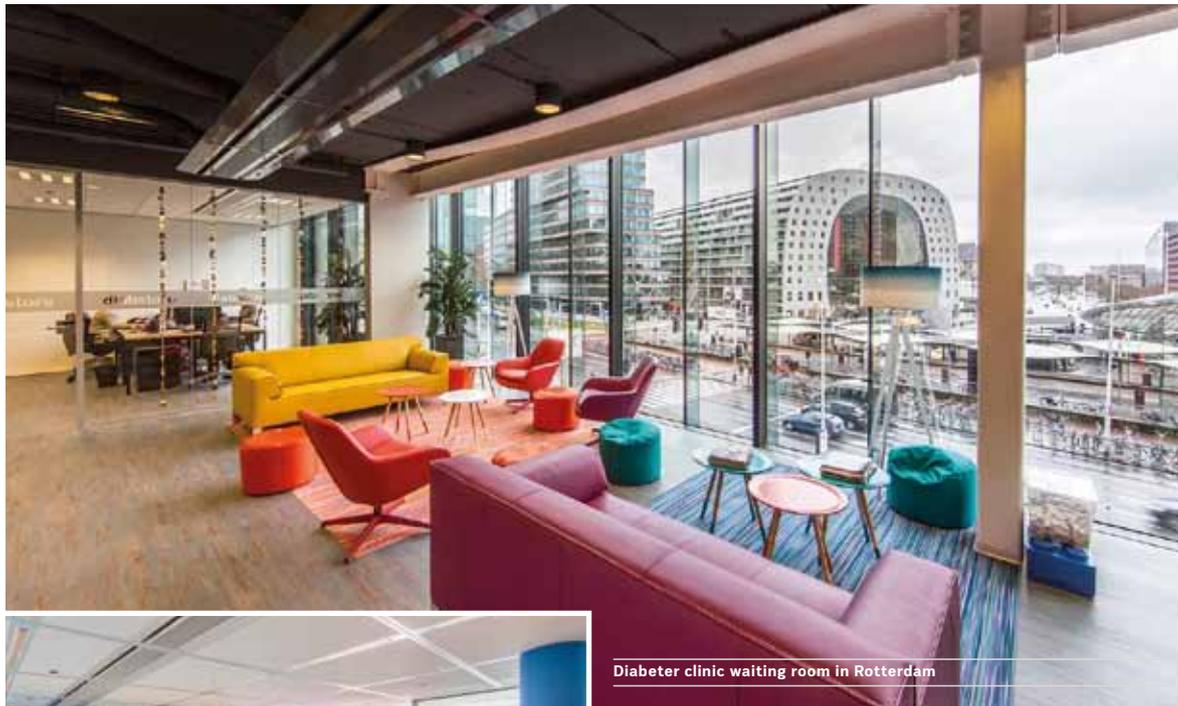
At Diabeter, we are regularly finding new ways to maintain good health, and this includes helping patients to take control of their condition. Psychology and diabetes—especially in type 1—are closely linked. In T1D anxiety disorders, depression, and fatigue take their toll. Once a patient can't manage the disease

there is a snowball effect. New technology can prevent that kind of problem, but we need to invest in evaluating these. Technology works fine if the technology works perfectly with the patient, but diabetes technology still asks a lot of the patient. In perfect control in T1D, which we call an A1C measurement control under 7%, people had to do at least seven measurements of glucose a day and at least seven adjustments. We call it triple 7. As long as the technology asks so much, it will be a burden, which presents a risk of psychological problems.

An important development in T1D diabetes treatment is the hybrid closed-loop insulin pump, which can adjust glucose values automatically. Through a wireless link between an insulin pump and glucose monitor, the system modulates insulin delivery based on glucose sensor readings measured every five minutes. We expect such technology to require another transformation of our care in order to adjust to these developments and make it possible to implement them with maximum value-addition for patients and at similar or lower costs.

Peer-to-peer contacts are a very important step and a driver of shared information and helping patients to stay healthy. Patients talk to each other in the different forums—there are various ways to do that. Patients learn much more and much faster through their peers about what's possible. That also drives our care, because we have to change at the same pace and help get patients on the right care path for them.

There's still a lot to be improved, including asking more about the patient-related outcome. This includes asking questions like: how is school going? How is work going? We know that a third of the parents of children with T1D up to the age of 12 have either diminished their working hours or have even quit doing work altogether. However, to progress, we still need to assess, measure and see if we really add to the patient's life and value. Rather than just looking at the medical outcome, we should go into patient outcomes



Diabeter clinic waiting room in Rotterdam



Diabeter centre in Schiphol

in other domains, such as school, work, income, social health and so on. Quality of life outcome measurement and other patient related outcomes (PROs) are now an integral part of our VBHC contracts with health insurers.

### Value based healthcare is evolving

Our value based healthcare (VBHC) is an evolving model. In the past year we have seen a switch in the Dutch, and maybe also in the Western European attitude of payers and patient organisations. There's much more emphasis on patient-related outcome, and even patient-related experience. Healthcare should fit with patients' lives. In the past, we would ask the patient to adjust to the system.

By initiating 'cloud care', care provision is becoming more efficient. With >95% of patients uploading their glucose, pumps and insulin data to the cloud, we can create additional contacts and create a continuum. In the past, we would just open a system and tell the patient that this is the care they will receive. Now, we are entering an era where we make a service-level agreement with the patient. We collect all kinds of

data, and ask the patient whether they want us to help them deal with it or if they are taking care of it themselves: Do you want us to check your data at an interval? Do you want us to alert you on certain trends? We are entering an era of shared decision-making in healthcare, and that is a new dimension for us as well as for the patients.

The total number of contacts at Diabeter is increasing, but the way of communicating is completely changing. We have a whole spectrum of ways to get in touch with our patients, from traditional visits through to video consultations, email and apps, to automated contacts with pop-ups on phones and in apps. In this technology era, diabetes educators become diabetes-technologists. I believe we will still need dedicated healthcare professionals (HCPs) that not only understand the 'high tech', but still can bring the 'high touch'.

With technological advancements, deep learning and machine learning are pointing towards a fully cognitive artificial intelligence (AI) system that is able to come up with and adapt treatment paths for diabetes patients. This will really help patients to be relieved from providing the disease with constant attention. If patients always have to be careful about where and how they go, what they do, and when they do things for their care, it's debilitating to their lifestyle. It has been calculated that some people with diabetes spend two to three hours a day in total on their disease. At our clinic, we provide means with which to relieve that, via technology. For example, AI understands from the data that you're going to football

training on Friday night, and it will be able to tell you: “Listen, I see that you are going to your football training again. Last time you had a hypo. Do you want me to adjust your insulin pump?”

We are currently in talks with other clinics about introducing the VBHC model for their diabetes care. The development of an IPU, which is able to constantly measure all outcomes and is able to negotiate a bundled price, is the most difficult but most important step here. There’s definitely a tendency for a lot of hospitals in Europe—and this counts for a lot of Western European countries that we visit—to be willing to make changes. The inflexibility of payment systems in healthcare is still another hurdle.

Another hurdle is that healthcare professionals are not trained in adopting new approaches. They always first want to have evidence, publications to show that it works. That’s good, but we should realise that implementing new technologies in old structures has never worked. And complications don’t wait.

The VBHC system is helping us to start with the knowledge case of diabetes, to decide what is needed, and then to create the business case. When you see value being added, it’s not immediately necessary that you reduce costs. But we can reduce and change costs, and then shift funds to where they’re needed. Sometimes adding value will cost you money, but in the long run, and we know that from some insurance company studies conducted in collaboration with Diabeter, it will save a lot.

Diabetes is a costly disease both in terms of the patient and in terms of money. A 20-year-old with T1D lives 12 years shorter and experiences many problems particularly in the last years. What’s the future of hospitals, high-tech for healthcare? There will be disruption, so let’s disrupt this even more with VBHC and ensure that each element of care has the best chance of harmonising with one other.

Recently we started a new system that constantly evaluates our outcomes and adds other value, such as patient-related outcomes, to the equation. This VBHC system will be used for five or 10-year contracts with healthcare insurance companies. We will re-assess the progress and can adapt the contracts every two to three years. This requires full transparency on outcomes and costs, but creates the needed space to implement new technologies. In the past, we were blocked by ‘production ceilings’, as politics calls it here. The VBHC approach has convinced decision makers to change that.

With our VBHC model, we were able to change the care, free up expensive HCP time, increase their

experience and reassessed costs. There is, however, still space for further cost reductions. Between 60–70% of healthcare costs are personnel costs—nurses, doctors etc. By using technology and adopting other systems, like video conferencing with patients and automated contacts, there’s a reduction of time and costs. And the savings in the long run from fewer or less severe complications add to that.

Our patients have been very positive about our new system: more than 95% are happy with the care, see it as an improvement and recommend it to others. The most important reasons for them to move to this model are: first, the level of knowledge; second, the availability of an expert day and night; and third, surprisingly, is the fact that we are doing a lot of research and development, and that’s very important for patients who are handling the disease themselves.

## Conclusion

Our message to healthcare governments and policy-makers is to adapt the funding model to modern technology and modern systems rather than try to squeeze it in; otherwise you end up paying more and more, which eventually means that people cannot use it because there is not enough money.

In my view, in the next years diabetes will fully leave the clinic and enter the cloud. There will of course still be face-to-face visits, but there will also be a lot of high-tech treatment. We are entering a new era, involving closed-loop systems, artificial pancreas systems etc. But we have to completely transform the healthcare system in chorus; otherwise, we can’t afford to make these changes successfully. ■

## KEY POINTS



- ✓ A cornerstone of value-based healthcare is that it helps to maintain good health rather than struggle to fix poor health, and technological advancements enable this
- ✓ Key factors in the VBHC model are changing visit types, more ad-hoc contacts, use of technology, automated contacts and peer-to-peer interaction
- ✓ 95% of Diabeter patients have expressed they are much happier with the assistance they have received from the VBHC system
- ✓ Healthcare governments and policy makers need to adapt the funding model to modern technology and modern systems rather than the other way around

# 14 Nov 2018



EUROPEAN ASSOCIATION  
OF HOSPITAL MANAGERS

## Shaping the hospital of the future

Medicine and Nursing meeting Technology and Research, Prevention,  
Education and Social Welfare

## Through Activity Merging

09:00

Registration

09:30

Welcome

*President of the EAHM*

09:40

Introduction

**Prof. Dr. Jacques Scheres**, *President of the Subcommittee European Affairs of the EAHM*, **Iris Meyenburg- Altwarg** (Nursing) and **Heinz Kölking** (Management)

10:00

Health technology assessment

**Andrzej Rys**, *Health and Consumers DG, European Commission*

10:30

Cancer and chronic diseases : how to meet this permanent challenges?

**Dr. Sophie Beaupere**, *Institut du Cancer Lyon (FR)*

11:00

Smart Disinvestment choices in Health needed?

**Tamsin Rose**, *Senior Fellow, Friends of Europe*

11:30

New challenges for an improved nursing / health care.

Real time indicators in the Emergency Department

**Guðlaug Rakel Guðjónsdóttir**, *Chief Executive, Division of Emergency, Geriatric and Rehabilitation Services, Landspítali University Hospital Iceland*

12:00

Nudging, a useful tool for clinical risk management

**Prof. Dr. Carl David Mildenerger**, *School of Humanities and Social Sciences, Universität St. Gallen*

12:30

Managing in Healthcare and Hospitals of the Future

**Lorcan Birthistle**, *CEO St James's Hospital Dublin (IE)*

13:00

Conclusion and end of the conference

# Robotics and AI to answer healthcare challenges

With healthcare technology developing rapidly, how will it impact on the major conditions? Is complete takeover or a supporting role the best bet?



**João Bocas**

The Wearables Expert  
CEO  
Digital Salutem  
London, UK

joao@digitalsalutem.com

@DigitalSalutem

digitalsalutem.com

As technology explodes in so many industry verticals, healthcare is, most of the time, a puzzle that needs more unveiling and continued experimenting.

Healthcare, as opposed to other sectors, is not a straightforward cut. It is a truly multi-faceted discipline that includes traditional medicine, medical professionals, diseases, patients, behaviours, and systematic issues to name a few features of the complex puzzle. If you are trying to bring innovations and emerging technologies to address all or a few of these facets, it is not an easy task.

The future is here. Robotics and Artificial Intelligence (AI) may fill the gaps. You can witness the overwhelming facts, such as ageing populations straining the healthcare systems. As a result of this, we don't have enough people in adult social care to provide the level of care needed by patients.

AI and Robotics are making advances across the healthcare industry, from genetic testing and robotic surgery to cancer research and data collection. In dermatology AI is already used in practical terms where it is used to detect skin cancer through an experimental mobile version of it by medical professionals.

Many questions still prevail; are we ready to hand

over life and death decisions to the machines? Can personal care bots take over from human caregivers? These are only a few of many major questions that face us right now.

One of the most difficult challenges in healthcare innovation is the application of solutions in clinical settings and day to day life. Having said that, I believe that robotics can assist with many tasks and alleviate the overstraining in healthcare delivery. Assistance with scrutiny and patient priority assessments in emergency services, delivery of medications throughout hospitals floors and medication reminders to improve adherence for patients are clearly possible right now.

Other types of interventions can also be augmented and automated; tracking health remotely and interaction with vocal and facial recognition are realities today. Robotics even allow humans to programme them for multifunctional and personalised health programmes.

In conclusion, many experts agree that robotics and AI will not take over healthcare any time soon because the human factor is still important. A testimonial from a real elderly patient showed, "robots cannot really replace humans because they don't give you hugs and don't give you the feeling of being close to someone". ■



Healthcare tech view: how will AI and robotics impact on major conditions?

## KEY POINTS



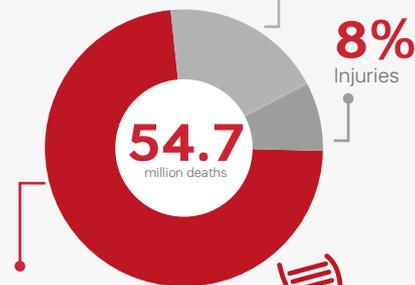
- ✓ Healthcare is a complex sector making innovation no easy task
- ✓ AI and robotics are already proving their worth in healthcare through disease-detection algorithms and with genetic testing
- ✓ Applying tech solutions in clinical settings is a difficult job
- ✓ Healthcare tech will not take over the sector but can play a supportive role

# TOP KILLERS

## GLOBAL DEATHS (2016)

**19%**

Communicable diseases, maternal diseases, neonatal diseases and nutritional diseases



**73%**

Non-communicable diseases (heart disease, stroke, and cancer)

## LIFE EXPECTANCY

**72.5**  
years

Average global life expectancy

**83.9**  
years

Highest: Japan

**50.2**  
years

Lowest: Central Africa Republic

Source: *The Lancet* <https://iii.hm/lfp>

## TOP 10 GLOBAL CAUSES OF DEATH (2016)

<b>1</b> Ischaemic heart disease	<b>2</b> Stroke	<b>3</b> Chronic obstructive pulmonary disease	<b>4</b> Lower respiratory infections	<b>5</b> Alzheimer's disease and/or dementia*
<b>6</b> Trachea, bronchus, lung cancers	<b>7</b> Diabetes	<b>8</b> Road injury	<b>9</b> Diarrhoeal diseases	<b>10</b> Tuberculosis

\* Death due to co-morbidities, chronic medication use  
Source: World Health Organization <https://iii.hm/lfq>

## TOP 10 CAUSES OF DEATH IN LOW-INCOME COUNTRIES (2015)

<b>1</b> Lower respiratory infections	<b>2</b> Diarrhoeal diseases	<b>3</b> Stroke	<b>4</b> Ischaemic heart disease	<b>5</b> HIV/AIDS
<b>6</b> Tuberculosis	<b>7</b> Malaria	<b>8</b> Preterm birth complications	<b>9</b> Birth asphyxia and birth trauma	<b>10</b> Road injury

Source: World Health Organization <https://iii.hm/lfr>

## HEART DISEASE: THE WORLD'S BIGGEST KILLER



Cardiovascular disease kills

**17.7**  
million people a year

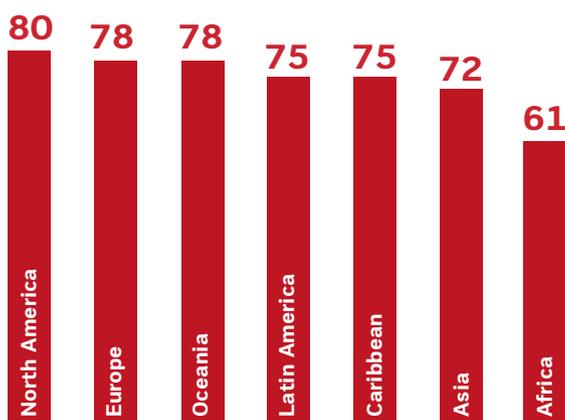
Source: World Economic Forum <https://iii.hm/lfs>

Nearly

**80%**

of these deaths are in low- and middle-income countries

## LIFE EXPECTANCY AT BIRTH (YEARS)



Source: United Nations <https://iii.hm/lft>

## CANCER: A LEADING GLOBAL KILLER

**17.2**  
million reported cases worldwide (2016)

**8.9**  
million deaths (2016)

**Breast cancer**  
the leading cause of cancer death in women



**Lung cancer:**

Leading cause of cancer death in men, cause of **20%** of all cancer deaths in 2016

(Source: *JAMA Oncology* <https://iii.hm/lfu>)

By 2030, **60%** of all new cancer cases will be recorded in developing countries

(Source: International Atomic Energy Authority <https://iii.hm/lfv>)



**Ludwig Kuntz**

Professor  
Faculty of Management  
Economics and Social Sciences  
University of Cologne  
Cologne, Germany

kuntz@wiso.uni-koeln.de

mig.uni-koeln.de

# Separate and concentrate— a sustainable business model for general hospitals?

## Reducing management complexity in patient care

Research shows how to optimise and streamline care in the hospital setting by separating patients into routine and complex groups.



**Stefan Scholtes**

Professor  
Judge Business School  
University of Cambridge  
Cambridge, UK

s.scholtes@jbs.cam.ac.uk

jbs.cam.ac.uk

After years of medical progress, we are now facing the age of precision medicine in which new technologies allow for effective care tailored to the individual patient. Yet, why are the current business models in healthcare subject to inertia and still rely on intuitive medicine? Consider the general hospital for example, which has ever since been providing all kinds of services for all kinds of patients. Its clinical departments, which are predominantly organised along medical specialties, deliver routine as well as non-routine care. Routine and non-routine care, however, encompass substantial differences in the diagnosis and treatment trajectories and therefore require completely different organisational structure and processes. They cannot be blended adequately and their coexistence poses a complex managerial challenge. Standardised routine services are provided in a resource-intensive environment and are thus deploying resources, which are essential for the varying requirements of non-routine services (Christensen et al. 2009).

While redesigning the hospital landscape is a hot topic in the public debate, concrete and appropriate redesign suggestions seem to be lacking. Within the scientific community, however, concrete approaches are already discussed and one idea entails separating routine from non-routine care in general hospitals. Our recent paper “Separate & concentrate: accounting for patient complexity in general hospitals” (*Management Science*, forthcoming) supports that claim. Using data of more than 250,000 patients in 60 German hospitals, we analysed how quality of care is affected by operational factors. For 39 disease segments, we considered how disease-specific hospital volume (ie the number of patients), disease-specific hospital focus (ie the number of patients as a proportion of all patients), and disease-specific degree of concentration (ie the proportion

of patients admitted to the disease-specific default department) are related to the mortality rates within seven days following hospital admission. Our empirical results show that the effects differ depending on the patient’s degree of complexity. We classify patient complexity based upon their emergency status and their co-morbidity level or categorise the extremes as either routine patients or complex patients. Routine patients are, by definition, never admitted as an emergency and do not suffer from more than two comorbidities. Complex patients, on the contrary, are admitted as an emergency and have a high co-morbidity burden, ie at least three comorbidities.

While the disease-specific hospital volume seems to be irrelevant for routine patients, it turns out to be detrimental for complex patients; higher volumes relate to higher mortality rates. These results appear quite surprising given the vast number of health economic and medical studies indicating quality gains due to increased volume. How can these reverse results be explained? In contrast to other studies, our study also incorporates the hospital’s focus, which is also referred to as the hospital’s level of specialisation. Specialisation is not only a highly important determinant for quality but also a factor that is quite often strongly connected to the hospital’s volume – a highly specialised hospital does frequently also provide care for a high number of patients.

Whereas volume does not affect routine patients, our results show that the aforementioned level of hospital focus is crucial. If a routine patient is treated in hospital with specialisation in the patient’s disease segment on the one hand and not too many admissions of patients with different diseases on the other hand, the routine patient experiences a substantial quality gain. Incorporating the findings on the hospital’s volume,



**Sandra Sülz**

Assistant Professor  
Erasmus School of Health  
Policy & Management  
Erasmus University Rotterdam  
Rotterdam, The Netherlands

sulz@eshpm.eur.nl

eur.nl

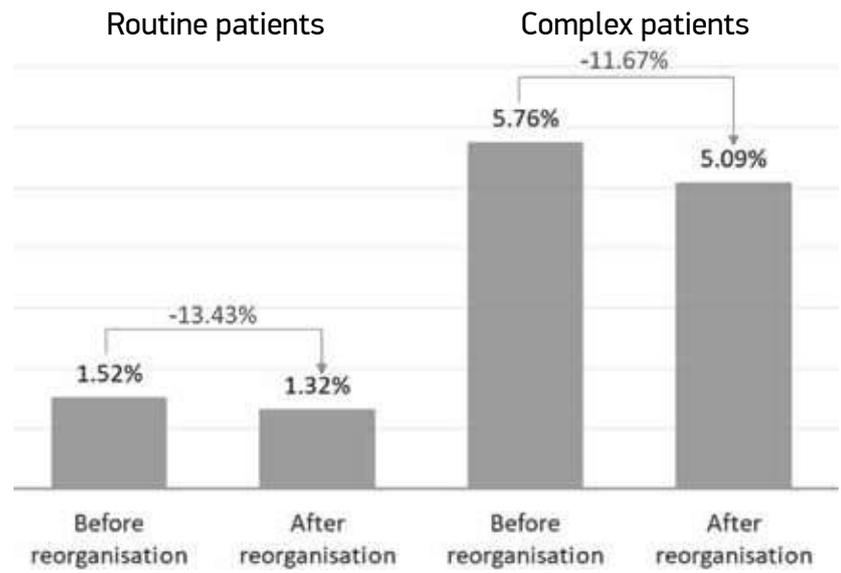
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we can conclude that if routine patients are separated and receive care in a specialised organisation, it would be not only beneficial for routine patients themselves, but also indirectly for complex patients considering that the overall disease-volume will be reduced through the separation.

Moreover, our results show that complex patients benefit from a high degree of concentration within the hospital. To determine the disease-segment's degree of concentration, we consider how patients are routed to and distributed over clinical departments. For example, if 80 percent of the patients within one disease segment are admitted to the same clinical department, it indicates a high level of concentration. If patients of one disease-segment are, by contrast, admitted to four clinical departments in equal shares, the level of concentration is rather low. Our results imply that if hospitals have a disease-specific routing strategy and patients are predominantly admitted to the same clinical department rather than distributed over multiple departments, complex patients experience substantial quality gains.

“ USING DATA OF MORE THAN 250,000 PATIENTS IN 60 GERMAN HOSPITALS, WE ANALYSED HOW QUALITY OF CARE IS AFFECTED BY OPERATIONAL FACTORS ”

Taken together, the empirical results support the claim that reducing the managerial complexity of general hospitals can be achieved via two steps: separate and concentrate. Within the first step, we suggest separating routine care from non-routine care, with routine care consecutively being provided in separate clinics or organisationally distinct facilities. Using our empirical results, we can simulate that such a separation could lead to a 13.43 percent reduction in mortality rates for routine patients. If we then proceed with the second step and increase the level of concentration within the clinical departments, we could reduce the mortality rates of complex patients substantially. If hospitals have admission policies and routing strategies in place that allow them to achieve disease-specific concentration levels of 60 percent, mortality rates of complex patients could drop by 11.67 percent. This is illustrated in **Figure 1**, which shows the expected results of such a reorganisation attempt. Obviously, such a redesign goes along with a variety of implementation challenges that are not captured in our simplified counterfactual simulation. Yet



**Figure 1.** Predicted mortality within first seven days after hospital admission

our analysis should demonstrate the potential clinical effect size if general hospitals change their business model towards the separate and concentrate design. Now it's up to the scientific community and health policy makers to refine the approach.

In a nutshell, we can therefore state that if general hospitals engage in the “continue-as-it-is” vein, we do not end up with the optimal quality of care for any patient. Routine patients have to be separated consistently and their care has to be organised in dedicated organisational units. The remaining complex patients should be allocated consistently to clinical departments that are equipped with the required interdisciplinary resources. ■

## KEY POINTS

- ✓ New technologies are allowing for precision medicine to tailor care yet present-day general hospital business models rely on intuitive medicine
- ✓ The co-existence of routine and non-routine care encompasses substantial differences presenting critical managerial challenges.
- ✓ Quality of care for routine and complex patients is impacted by operational factors
- ✓ A reduction in managerial complexity of general hospitals is achievable through two steps: separate and concentrate



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# Obstacles to establishing competence in radiology

Competence in radiology: difficult to define, more difficult to establish.



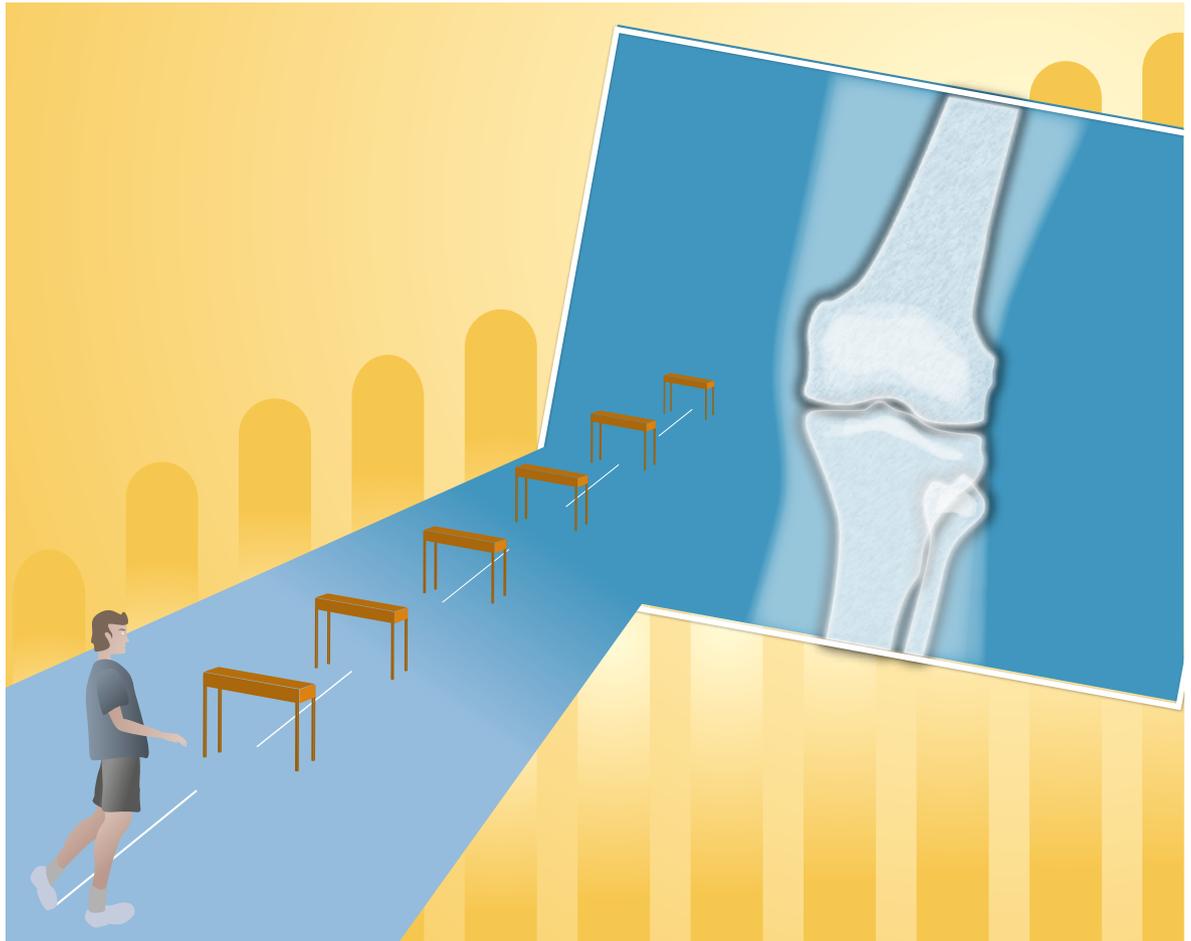
**Pablo Valdés Solís**

Head of Department of Radiology  
Agencia Sanitaria Costa del Sol  
Marbella, Spain

President  
Sociedad Española de Radiología Médica - SERAM

pabvalsol@gmail.com

@seram\_rx



Since the publication of McClelland's 1973 work (McClelland 1973), it is assumed that knowledge does not always imply better performance in the profession, and that competence is a complex concept, in which many factors are involved (Mendiratta-Lala et al. 2011). For the definition and evaluation of the competence of a radiologist, the Spanish Society of Medical Radiology (Sociedad Española de Radiología Médica - SERAM) used a functional analysis, so that the radiologist's performance can be measured. It has been proposed that monitoring systems based on validated measures

and that focus on clinical delivery are ideal (Leape et al. 2006).

These concepts led us to develop a functional model, and SERAM began designing the vascular radiologist and interventionist competency manual, not only because it fitted the model optimally, but also because it was a request from the radiologists themselves.

The initial work was successful and a manual was developed that served as a reference for other subspecialties of radiology competencies (Valdés Solís et al. 2010).

However, subsequent development was faced with different obstacles, so the project was slowed down and even paralysed for more than two years. Currently, it is being revised to try, under different conditions, to implement it.

### Do we need this?

This project arose as a request from a group of radiologists (interventionists), due to the threat posed by the activity of a certain group of vascular surgeons. SERAM's defined competency model would suppose that there would be a national reference to establish quality barriers and defend the profession of the radiologist.

The rest of the subspecialties and sections of Spanish radiology received this project with different interest, but in some cases workgroups were created to establish the competencies of the specific section. However, this request was not based on any threat and not all radiologists interpreted the project in the same way.

“MOTIVATING A PROFESSIONAL IN A SYSTEM, IN WHICH SALARIES VARY LITTLE AND PROFESSIONAL DEVELOPMENT IS SLOW, IS A DIFFICULT TASK”

In this way, although three working groups were set up (paediatric radiology, emergency radiology and cardiac radiology), none of them completed their project. In one of them (cardiac imaging) it was even experienced as a threat by the working group.

This led to a slowing down of the work until, after several months of inactivity, it ended without results.

### Why we didn't succeed

It is difficult to analyse and understand the causes why a project is not a success, but it is essential to do this analysis in order to redirect and finalise it.

We believe that there are several influential factors:

- **Complexity of the model.** In our environment, the most common models of competency assessment are simple, and are based fundamentally on the evaluation of knowledge, experience (valued primarily by seniority) and

attendance at courses and congresses. Our model fundamentally evaluates the results, something that is relatively easy to measure in interventional radiology, but more complex in other sections of radiology.

- **Lack of culture.** The Spanish health model is based largely on public assistance, with a "civil servant" concept. Professionals develop, attend courses and conferences and improve throughout their career, but without a clear development model yet, and none based on national competencies. There is no culture that professional development is aimed at acquisition and, above all, the maintenance of certain skills.
- **Difficulty leading the project.** The professionals most involved in this project within SERAM also work in other lines of the Society, so that it was increasingly difficult to find time and energy to develop a project of this scope. There are few radiologists with enough experience and knowledge in this field. This led to the project being very dependent on certain people.
- **When the enemy is inside.** Some radiologists not only did not support the project, but, considering that the model was not adequate, they raised an important resistance to its implementation. Others saw it as a threat, since they considered that a competency evaluation model supposes unnecessary external control. Some professionals even consider that they do not need any type of control or evaluation. Finally, establishing a well-developed competency system can make it difficult to manage a radiology service when distributing posts and assigning functions.
- **Lack of motivation.** Many theories that seek to understand what motivates a professional have been described (Martín Martín 2005). Nowadays, we usually talk about three pure types of motivations: extrinsic, intrinsic and transcendent motivation. The extrinsic is based on external rewards, the intrinsic in the satisfaction for the professional of a job well done. Transcendent motivation, being more complex, encompasses a set of concepts linked to values (appreciation of work well done, prestige, altruism etc). Motivating a professional in a public system, in which salaries vary little and professional development is slow and not without problems, is a difficult task. If one more

variable is added: the certification of competencies, without the professionals seeing a motivation (especially an extrinsic motivation) means that adherence to this project is limited. And so it was in our case.

### And now?

The Spanish Medical Colleges Organisation has begun a Periodic Validation of Certification campaign. Although it is not mandatory, it is an incentive for doctors to certify a series of requirements in education and in the fulfilment of the profession. In this context, SERAM is responsible for defining the educational and technical requirements (results) of radiologists. This supposes a

With all this, SERAM is already working on this second phase, so it is expected that in less than a year it will be available.

### Conclusion

Establishing a competency model for the radiologist is complex, especially in a health system that depends on different regional governments. The experience of SERAM, in the context of the Spanish health system, is that strategies must be carefully designed so that the effort involved in the design of a competency system is not paralysed by different factors. We must adapt the model, simplify it as much as possible and look for synergies and collaborations so that the professional is motivated to follow it. Strong leadership and good communication are two essential elements to ensure success. ■

## “ ESTABLISHING A COMPETENCY MODEL IS COMPLEX, ESPECIALLY IN A HEALTH SYSTEM THAT DEPENDS ON DIFFERENT REGIONAL GOVERNMENTS ”

second opportunity to adapt the model of competencies and join forces with other scientific societies to get a culture of competence certification created. But to achieve this, it is necessary to redesign the model:

- Make it easier, so that all radiologists are involved and can be certified.
- Adapt it to the current situation, both work and training. Include activities that are already done as elements that facilitate certification.
- Spread the model, creating culture. This implies, in addition, that there must be a very powerful leadership.
- Facilitate certification, with a system that allows certification through a simple procedure. Web tools are fundamental.

### KEY POINTS

- ✓ Defining what is a competent radiologist is not easy and both scientific societies and health administrators have proposed different models
- ✓ The health system in Spain is fragmented, as it is dependent on regional governments. No national model of competence is defined and accepted
- ✓ The Spanish Society of Radiology (SERAM) is working on a model of competence and trying to implement it
- ✓ After a promising beginning, with a plan of competence in interventional radiology, the project began to slow down
- ✓ We present the analysis of the different causes that may have taken us to the actual situation, the possible mistakes made and how to face the future



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# If you can't beat them... join them

## Encouraging point-of-care ultrasound to diagnose patients and train new healthcare professionals

Medical schools are including an ultrasound application and formal teaching in their curriculum; emergency medicine and critical care physicians have embraced the use of hand held ultrasound probes that offer the advantage to 'see' immediate information regarding the patient.



**Johan G. (Hans) Blickman**

Professor and Vice Chairman,  
Dept. of Imaging Sciences URM,  
Director of Fellowships;  
Dept QA liaison  
Professor and Radiologist-in-Chief  
Golisano Childrens Hospital  
Rochester, New York, U.S.

Johan\_Blickman@  
urmc.rochester.edu

urmc.rochester.edu

At the beginning of each academic year, first-year medical students at U.S. medical schools participate in a medical school tradition that kicks off their medical career — the white coat ceremony. After listening to inspirational speeches, students don their new white coats and receive a stethoscope at a special ceremony attended by family, friends and faculty members.

This time-honoured tradition is changing with the current digital age:

*“First-year medical students at Mount Sinai School of Medicine will be the first in New York to be introduced to a digital-age ultrasound device that can visualise inside the body, and fit directly into the pockets of their brand new white coats (Imaging Technology News 2012).*

*This visualisation tool is a handheld ultrasound device and is roughly the size of a smartphone. The device houses innovative technology that provides an immediate, noninvasive method to make visual information from inside the body.*

*The objective of this step is to demonstrate that handheld imaging technology can contribute to medical education at all levels of instruction and learning. A secondary goal is to prepare these future doctors to use US in their diagnostic pathways.”*

During this day a few years ago now, students, parents and faculty were thus introduced to the handheld ultrasound device, instead of just a stethoscope, thought to be a real step forward. Or not?

Six years later, in 2018, this is happening all across the U.S. Probably a quarter to a third of medical schools are including an US application and formal

US exposure/teaching in their first year curriculum. Again, is this a good thing or not?

Well, as always, a little history may help: at the turn of the last century, x-radiation was still considered dangerous, likely cancer-causing and if at all possible to be avoided. Ultrasound (US) was touted as safe, easy to use, easy to transport to the bedside and the equipment was relatively cheap. Relative meant relevant to Computerised Tomography (CT) which used x-ray and computers and cost around \$300-500 thousand for a top of the line machine, and Magnetic Resonance Imaging (MRI), which used much safer magnetic fields and no ionizing radiation but cost 2 to 3 times that amount. Neither modality could be transported to the bedside either.

**“NOW, STUDENTS, PARENTS AND FACULTY ARE INTRODUCED TO THE HANDHELD ULTRASOUND DEVICE, INSTEAD OF A STETHOSCOPE”**

Also, to a much greater extent than in the USA, in the rest of the (western) world the availability of CT in the 70's and 80's and MR in the 80's and 90's was strongly regulated by variants of Certificates of Need (CON) issued, piecemeal and very slowly, by the government of most European countries. This is to this day reflected in the number of CT/MR scanners per 100,000 populations being much less in countries outside the USA.

This state of affairs allowed US use, but also expertise with, to flourish, with concomitant loss of

radiology's purview of same. The 'turf battles' with Obstetrics and Cardiology, to a lesser degree with Urology, were thus lost by radiology during those decades.

The next development, in the early 2000's, mostly the increasing imaging volumes, but also the shift from inpatient to outpatient imaging drove the next change. It led to, first of all, scheduling issues (wait lists) for CT and MR and then to a slowly increasing realisation that US could be a cheaper and effective first line modality as an adjunct to the classic physical exam. Thus was born the notion of point-of-care US (POCUS).

### What is "Point-of-Care Ultrasound" (POCUS)?

Point-of-care ultrasound refers to the practice of (trained medical) professionals using US to diagnose problems wherever a patient is physically present, is being treated, whether that's in a hospital emergency department (ED), an ambulance, any health care facility (Schepper, Blickman 2016) or even in a remote village.

Further, it can refer to the use of portable US at a patient's bedside for diagnostic (eg symptom or sign-based examination) and therapeutic (eg image-guidance) purposes.

More recently, emergency medicine and critical care physicians have embraced its use. It offers the advantage to 'see' immediate information regarding the patient through dynamic imaging and the ability to integrate that information into the clinical picture. This allows providers to make decisions about patient care in real time.

The advent of affordable handheld devices with quality images, lead to improving patient diagnosis, enhance patient satisfaction and safety, shorten length of stay, and thus lead to increasing provider satisfaction.

For example, in patients complaining of dyspnoea, for which there is not a clear imaging diagnosis otherwise of, for instance COPD, CHF, pulmonary embolism, or pneumonia, a focused cardiac US can rapidly differentiate between right and left ventricular dysfunction, presence or absence of a

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pericardial effusion, or possibly even an arrhythmia. Pulmonary US has been shown to somewhat reliably suggest Kerley B lines (indicating interstitial oedema), show a focal consolidation, and/or illustrate a pleural effusion.

POCUS also is a teaching tool that can enhance exam skills. Medical students can learn the anatomy: either on each other or on cadavers in the anatomy lab, while clinicians can confirm physical exam findings and also teach housestaff or medical students as they palpate the liver or percuss the chest.

Performing a procedure such as a paracentesis or placing a central line under US guidance is now considered standard of care, many centres even have organised ‘vascular access’ teams centred around POCUS experience. It is well established that ultrasound guidance leads to safer and more expedient line/tube placement even when compared to clinicians skilled in traditional landmark techniques.

It is, though, also important to know the limitations of POCUS.

It is not a replacement for taking a good history or doing first rate physical examination. It is most reliable when answering binary questions (eg in FAST: ascites or pleural effusion present or not; cardiac failure: pericardial effusion present or not) unless in the hands of imaging trained providers.

Indeed, it is a skill to be acquired and honed, and it requires specialised training. And therein lies the rub: who can perform, who can interpret, ie, who is credentialed to perform these examinations, and, in the U.S. very important: who can bill for these examinations?

At this point in time, each speciality board in the U.S. has specified that each practitioner is to be able to perform and interpret these limited examinations. In most ED’s that means these ED practitioners have completed a training module or (mini) fellowship. This training can be in-house or at dedicated training sites. This will then govern hospital credentialing of these providers. They will then render a report in the medical record, but cannot as a rule bill for these examinations.

There is also a great variety as to where these images are stored (centrally or in the radiology archive). This is important so that other services can review these images, because if not they may be unnecessarily repeated.

Similar variety exists as to who can/will bill for the study. Mostly ED, vascular teams cannot, at present OB can. Often the former are then referred for a formal study in the imaging department, who then can bill for this study.

As can be seen from this communication giving US capabilities in any form can be seen as threatening to imaging. But I contend the opposite: the more we actively encourage medical students and residents to see the utility of US, they may well use it themselves but also might become fascinated by imaging in general. Thus maybe seek a career in imaging!

Also, working with other specialists and actively work with them, teach them how the US can help and how it can be done correctly and effectively will have a two-fold outcome: these colleagues will appreciate the team work with imaging but also realise what parts of an US examination might be better left to imaging department trained US imagers.

Most important though, like with any ‘turf battle’ we might encounter as imagers, if we are not there in person, at the ‘table’ when imaging discussions take place, but also when the patient needs the US exam, we may miss out all together as a specialty: ‘if imaging is not at the table, imaging will end up as the main course (a commodity!)’

In conclusion then, we should encourage the giving of US probes, hand held screens to medical students. It may well be a win-win situation! ■

## KEY POINTS



- ✓ Medical schools are including an US application and formal US exposure/teaching in their first year curriculum
- ✓ Point-of-care ultrasound refers to the practice of trained professionals using ultrasound to diagnose problems wherever a patient is physically present and being treated
- ✓ The advent of affordable handheld devices with quality images, lead to improving patient diagnosis, enhance patient satisfaction and safety, shorten length of stay, and thus lead to increasing provider satisfaction.



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**Diogo Manuel B. Simão**

Professor  
Medical Imaging and  
Radiotherapy Department  
Health School  
University of Algarve  
Faro, Portugal

Radiographer  
Hospital Particular do Algarve  
Alvor, Portugal

dmsimao@ualg.pt



**Luís Ribeiro**

Professor & Director  
Medical Imaging and  
Radiotherapy Department  
Health School  
University of Algarve  
Faro, Portugal

Researcher  
Research Unit for Sport and  
Physical Activity (CIDAF)  
University of Coimbra, Portugal

**António Abrantes**

Professor  
Medical Imaging and  
Radiotherapy Department  
Health School  
University of Algarve  
Faro, Portugal

Researcher  
CICS.NOVA  
Nova University of  
Lisbon, Portugal

**Joao Pedro Pinheiro**

Radiographer  
Centro Hospitalar  
Universitário do Algarve  
Faro, Portugal

# Effects of smoking on carotid artery structures and haemodynamics

## Role of radiographer in ultrasound assessment

A study to assess and compare structural and haemodynamic parameters in carotid arteries in smokers and non-smokers using ultrasound.

The goal of this research was to assess the effect of tobacco on structural and haemodynamic parameters in carotid arteries. 103 subjects (51 smokers and 52 non-smokers) were evaluated by a trained radiographer using ultrasound equipment. The smokers group was divided into four different categories depending on the number of cigarettes smoked per day. Several parameters were evaluated by B-mode and pulsed Doppler images acquired in longitudinal and transverse sections of the common carotid arteries: intima-media thickness (IMT), peak systolic velocity (PSV) and end-diastolic velocity (EDV). Our results suggest that smoking has negative effects on carotid artery structure and haemodynamics, and female smokers are more likely to develop vascular changes. Smoking is a risk factor for alterations in carotid artery haemodynamics.

### Background

Smoking is associated with several pathologies, such as atherosclerosis or strokes, and is the cause of death of millions of individuals worldwide (World Health Organization 2008). For this reason, it's crucial that smokers are screened to prevent major complications.

Many studies demonstrate an association between strokes and abnormalities in the common carotid arteries. Harris assessed the common carotid arteries of 259 subjects with a history of previous stroke, and concluded that intima-media thickness was associated with the presence of neurovascular pathologies (Harris 2012). In another study, where the objective was to compare severity of carotid stenosis and the dimension of the brain ischaemic lesion, it was

observed that the percentage of the stenotic lumen may be a good predictor for the quantity of ischaemic brain tissue (Alagoz et al. 2016).

The Australian National Stroke Foundation (2010) recommends that individuals with suspected vascular lesion should have imaging studies performed. Other organisations, including the American College of Cardiology Foundation, American Heart Association, American Academy of Neurology and the Society of Cardiovascular Computed Tomography have developed guidelines for the control of groups with carotid and vertebral vascular pathologies. These organisations recommend ultrasound examinations in asymptomatic individuals with suspected carotid stenosis, screening for any haemodynamic changes. This procedure must be repeated every year to evaluate lesion progression or therapeutic response (Brott et al. 2011).

Hedna et al. (2013) tried to understand stroke mechanisms with the objective of assessing the frequency, severity, functional outcome and mortality when lesions occur in the right and left brain. A higher incidence was found in the left brain, and the highest mortality rate was in those patients who had lesions that occurred in the left cerebral territory. Selwaness et al. (2014), in their study of the prevalence of atherosclerosis plaques, severity and composition in the common carotid arteries, showed that 85% of the individuals studied had bilateral atherosclerosis plaques. Unilateral plaques were more likely to appear in the left carotid artery. The authors concluded that these lesions are not distributed symmetrically, being more prevalent and unstable in the left carotid artery.

Based on this, it is crucial to implement a methodology to control population risk. The goal of this study was to assess and compare structural and haemodynamic parameters in carotid arteries in smokers and non-smokers using ultrasound, as it is a fast and economic imaging technique, with no ionising radiation.

### Materials and methods

The target subjects were male and female individuals, smokers and non-smokers. The inclusion criteria were individuals aged between 20 and 40 years old with unknown diseases, so risk factors such as cholesterol, hypertension and dyslipidaemias could not influence the results. This age interval was suitable as vascular wall thickness increases with age.

The final sample included 103 volunteers: 51 smokers and 52 non-smokers.

The ultrasound equipment used a 7.5MHz probe and dependent variables were defined: (1) intima-media thickness (IMT), (2) peak systolic velocity (PSV) and (3) end-diastolic velocity (EDV), as well as independent variables: (1) the average number of cigarettes smoked per day and (2) gender.

For the exam protocol the volunteers assumed a supine position with a pillow under the cervical spine for an extension of the neck to facilitate the approach with the probe. B-mode images were acquired in longitudinal and transverse sections of the common carotid arteries. IMT measurements were performed about 1.5 cm below the carotid bulb. Also, in this location, using pulsed Doppler, the PSV and EDV measurements were acquired. All image acquisitions and measurements were made by a trained radiographer in sonography.

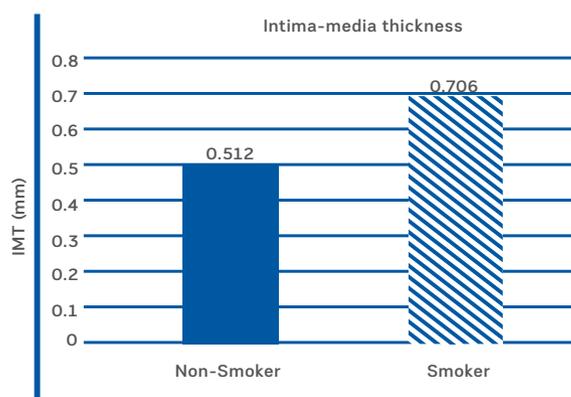
**Table 1.** Sample categories by cigarettes/day

		Gender		Total
		Male	Female	
Number of cigarettes smoked per day	Non-smokers (control group)	21	31	52
	1 to 4 cigarettes/day	3	4	7
	5 to 9 cigarettes/day	8	8	16
	10 to 14 cigarettes/day	4	9	13
	More than 15 cigarettes/day	10	5	15

The smokers were divided into four categories, according to the number of cigarettes smoked per day (**Table 1**), as described in Bjartveit and Tverdal (2005), whose study was to determine the risk of developing a tobacco-associated pathology in men and women smoking from one to four cigarettes per day. The arithmetic means of each dependent variable (IMT, PSV and EDV) were performed for each category and were compared to each other. Evaluations of these averages were also made for each gender (male and female).

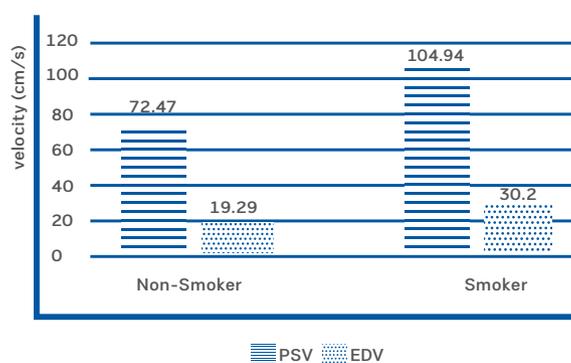
### Results

**Figure 1** shows the mean IMT in the control (non-smokers) group and in the smokers group. There is a significant difference in the mean, with smokers having a higher average.



**Figure 1.** IMT (mm) in control group vs smokers group

**Figure 2** shows the PSV and EDV of the control group compared to the smokers group. Both have a higher value in smokers.



**Figure 2.** PSV and EDV (cm/s) in control group vs smokers group

#### Rui Almeida

Professor  
Medical Imaging and  
Radiotherapy Department  
Health School  
University of Algarve  
Faro, Portugal

Radiographer  
Centro Hospitalar  
Universitário do Algarve  
Faro, Portugal

Researcher  
CICS.NOVA  
Nova University of  
Lisbon, Portugal

PhD student  
Faculty of Medicine  
University of Murcia, Spain

#### Sónia Rodrigues

Professor  
Medical Imaging and  
Radiotherapy Department  
Health School  
University of Algarve  
Faro, Portugal

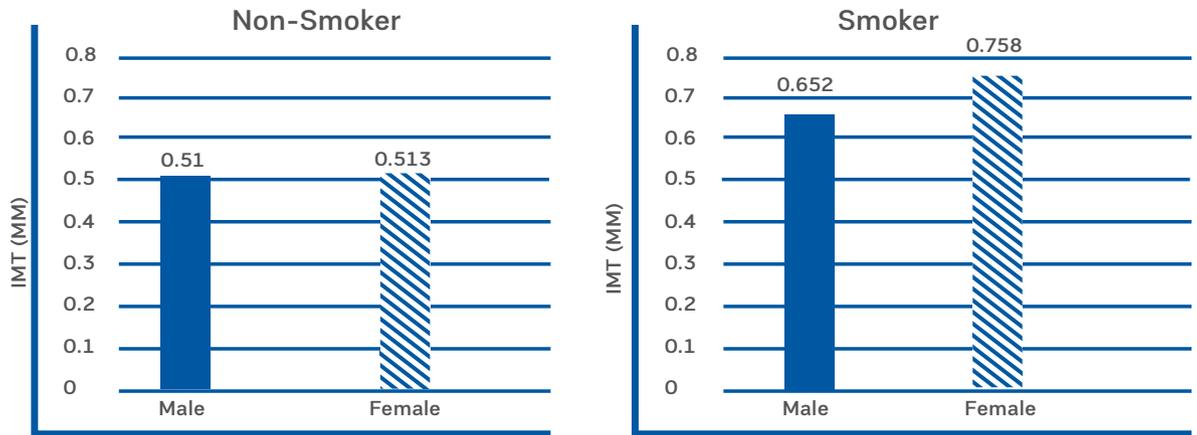
Radiographer  
Centro Hospitalar  
Universitário do Algarve  
Faro, Portugal

**Table 2** summarises the structural and haemodynamic changes by number of cigarettes smoked per day. The control group is included for comparative analysis. There is a direct proportion between the number of cigarettes smoked per day and the present changes, so the higher the number of cigarettes smoked per day, the higher values of IMT, PSV and EDV.

**Table 2.** Structural and haemodynamic changes by cigarettes/day

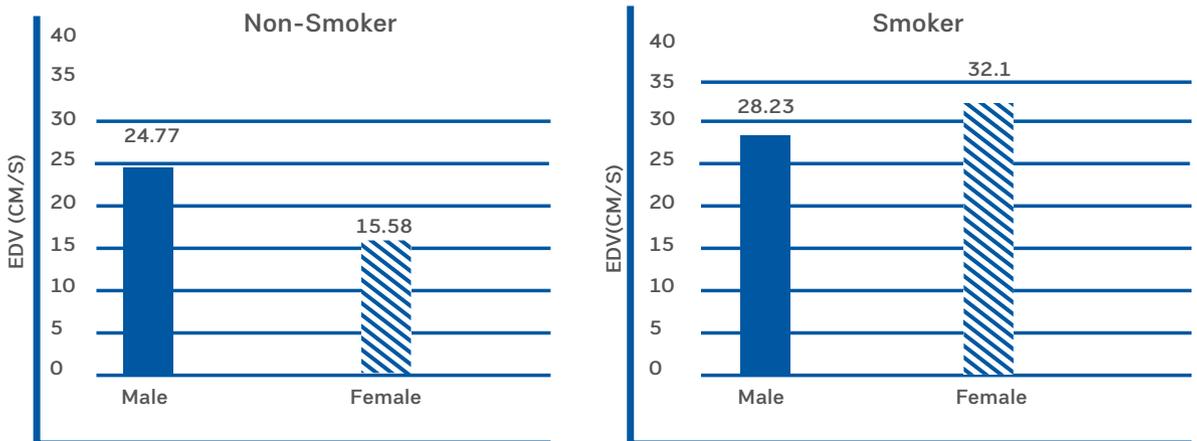
	IMT (mm)		PSV (cm/s)		EDV (cm/s)	
	Mean	Std. deviation	Mean	Std. deviation	Mean	Std. deviation
<b>Non-smokers</b>	0.512	0.171	72.47	38.55	19.29	8.96
<b>1 to 4 cigarettes/day</b>	0.514	0.069	91.79	16.19	28.03	8.28
<b>5 to 9 cigarettes/day</b>	0.725	0.355	103.83	46.34	29.52	11.70
<b>10 to 14 cigarettes/day</b>	0.731	0.317	105.19	48.81	30.40	14.18
<b>More than 15 cigarettes/day</b>	0.753	0.220	112.03	46.02	31.77	19.99

**Figure 3** shows the differences in IMT between male and females, non-smokers and smokers.



**Figure 3.** IMT (mm) by gender in control group vs smokers group

**Figure 4** shows the comparison between PSV by gender, in non-smokers and smokers. There is an overall increase of PSV in the smokers group.



**Figure 4.** PSV (cm/s) by gender in control (non-smokers) group vs smokers group

Figure 5 shows the EDV values by gender, in non-smokers and smokers.

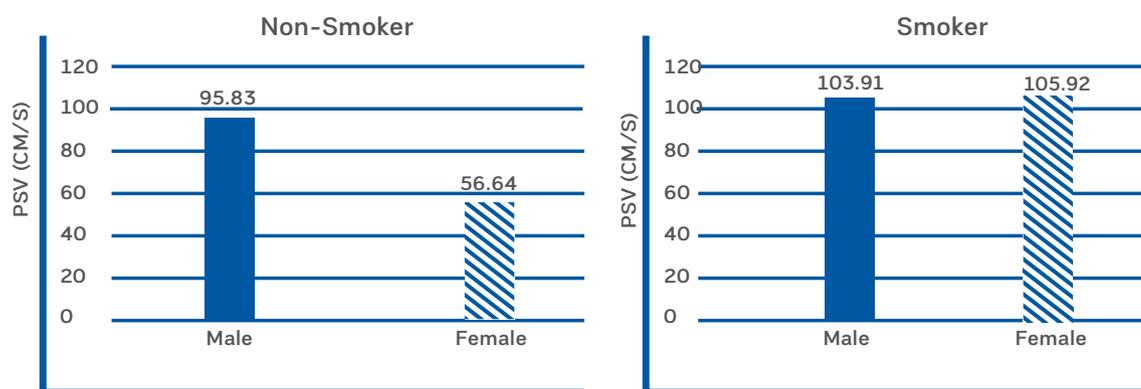


Figure 5. EDV (cm/s) by gender in control group vs smokers group

## Conclusion

The exponential increase of tobacco consumption in the world, especially in younger age groups, is already considered a serious problem. With these smoking habits growing among the young population, it is expected that in the near future this population will need an easy and accessible diagnostic tool for screening and controlling alterations caused by tobacco.

Similar results for IMT and PSV have been reported in previous studies, however these authors described EDV values inversely proportional to the number of cigarettes smoked per day (Mahmoud 2012; Alzimami et al. 2014; Recio-Rodriguez et al. 2013).

These results verified that tobacco consumption will increase the thickness of the intima and tunica media, as well as the value of the systolic peak and diastolic value. It should also be noted that the number of cigarettes smoked per day will be central to the severity of the changes presented since increasing the number of cigarettes smoked per day will intensify the associated changes. For this reason, the group of smokers who smoked more than 15 cigarettes per day was the

one that presented higher values in the study variables. Females also appear to be more likely to acquire structural and haemodynamic changes induced by tobacco compared to males.

The data from this study suggest that smoking has negative effects on carotid artery structure and haemodynamics. Radiographers qualified in sonography can play a key role in the detection of pathophysiological changes in a preventive perspective. ■

## KEY POINTS

- ✓ Smoking is associated with several cardiovascular pathologies such as atherosclerosis and stroke
- ✓ Diagnostic tools for the prevention and control of these risk factors induced by tobacco should be implemented in healthcare facilities worldwide
- ✓ Qualified radiographers in sonography should be able to detect premature vascular changes due to smoking in a preventive perspective
- ✓ This study showed that smokers presented the highest values of intima-media thickness (IMT), peak systolic velocity (PSV) and end-diastolic velocity (EDV)



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# EuroSafe Imaging: be a star for your patients

## A holistic approach to quality and safety in radiology

Presentation of an initiative to aid imaging departments to approach quality and safety in radiology as a whole, to bring visibility to radiation protection and create positive impact on clinical practice.



**Lorenzo Bonomo**  
Chair  
EuroSafe Imaging Stars network  
Vienna, Austria

lorenzo.bonomo.md@gmail.com

eurosafeimaging.org



**T**he EuroSafe Imaging Stars (EIS) is an initiative designed to identify and recognise imaging facilities that embody best practice in radiation protection and that are committed to putting the principles advocated and concepts developed by the European Society of Radiology into practice.

The initiative was launched under the umbrella of EuroSafe Imaging in early 2016 to support the EuroSafe Imaging Call for Action. It provides imaging departments with an incentive to embrace a holistic approach to quality and safety in radiology, and thus, the Stars network makes efforts to give radiation protection greater visibility while simultaneously having a positive impact on clinical practice. To participate in the EuroSafe Imaging Stars initiative imaging departments have to perform an online self-assessment on their level of radiation protection.

The Euratom Basic Safety Standards Directive (Council directive 2013) lays down Basic Safety Standards (BSS) to guard against the dangers arising from exposure to ionising radiation. The requirements of the BSS Directive affect healthcare professionals in radiology in all aspects related to the safety and quality of procedures using ionising radiation. Thus, the BSS Directive provides the legal framework for most criteria of the EuroSafe Imaging Stars self-assessment. However, many of the criteria used in the self-assessment go beyond the BSS Directive's explicit requirements, which have to be observed by all imaging departments in the European Union since February 2018.

The EuroSafe Imaging Stars concept was revised in mid-2017 to enhance the self-assessment and to better reflect the legal requirements and the clinical

environment. The self-assessment now consists of 21 criteria, which are structured according to the following core topics: Optimisation, Justification, Quality and Safety, Education, Research, and Regulatory Compliance.

The criteria include, for example: the use of local diagnostic reference levels (DRLs) for CT; specific paediatric CT and fluoroscopy protocols; the availability of imaging referral guidelines; the use of operational clinical decision support (CDS) in clinical practice; regular equipment quality control; operational clinical audit; and radiation protection research activities. Seven criteria require the submission of additional evidence.

“ THE STAR RANKING IS  
A TOOL FOR CONTINUOUS  
SELF-EVALUATION AND  
IMPROVEMENT IN THE SAFETY  
AND QUALITY OF RADIOLOGICAL  
IMAGING ”

After a thorough evaluation of the self-assessment and supporting evidence, the participating imaging department is awarded a number of stars, from one to five, and listed on the “Wall of Stars” according to the level attained. The ‘Star’ ranking is a tool for continuous self-evaluation and improvement in the safety and quality of radiological imaging. This is why there is a need to repeat the self-evaluation every three years in order to track institutional performance and to determine areas for further improvement. The EIS network is involved in various activities undertaken by EuroSafe Imaging and the European Society of Radiology.

The ESR Audit and Standards Subcommittee developed a pilot project to test the ESR audit templates in collaboration with EuroSafe Imaging in mid-2017. Nineteen EuroSafe Imaging Stars facilities participated, testing five “essential” and 12 “optional” topics proposed for piloting. An online survey was carried out to collect their feedback on the templates. The results of the pilot project were very positive and promising, as the participating EuroSafe Imaging Star facilities considered the ESR audit templates easy to use and the topics relevant and important (Paulo 2018).

Twenty centres from the EuroSafe Imaging Stars network are currently also contributing to the

European Commission funded project EUCLID ([euro-safeimaging.org/euclid](http://euro-safeimaging.org/euclid)), which is dedicated to the establishment of clinical diagnostic reference levels for Europe. These EuroSafe Imaging Stars centres are providing data on ten selected CT and four interventional radiology clinical indications, for which clinical DRLs will be developed during the course of the project. The results of this will be available by mid-2020.

As of 31 July 2018, there are 90 EuroSafe Imaging Stars centres in 20 countries: 68 five-star institutions, 21 four-star centres, and one department with a three-star award. A further 15 centres are currently in the process of becoming EuroSafe Imaging Stars.

EuroSafe Imaging was particularly pleased to recently welcome its first EuroSafe Imaging Star centre from Latin America: the Radiology Department of the Hospital Italiano de Buenos Aires joined the network in June 2018, gaining a 5-Star rating.

EuroSafe Imaging looks forward to expanding the network of Stars across other continents as well. In particular, a collaboration with the AfroSafe campaign has been envisaged to help develop a similar concept in Africa. ■

## KEY POINTS

- ✓ The Eurosafe Imaging Stars (EIS) initiative provides imaging departments with an incentive to embrace a holistic approach to quality and safety in radiology
- ✓ To participate in the EIS initiative imaging departments have to perform a self-assessment on their level of radiation protection
- ✓ The EIS is involved in various activities undertaken by Eurosafe Imaging and the European Society of Radiology
- ✓ As of 31 July 2018, there are 90 EuroSafe Imaging Stars centres in 20 countries: 68 five-star institutions, 21 four-star centres, and one department with a three-star award



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# 5G opens the future of telesurgery

A pilot project will use 5G cellular technology to enable remote assistance for surgical procedures in real time.



**Antonio de Lacy**

Professor of Surgery  
 Director of Gastrointestinal Surgery  
 Department of Surgery  
 Hospital Clínic  
 University of Barcelona

ALACY@clinic.cat

@Antoniodelacy

aischannel.com

Technology that enables telepresence has facilitated complex surgical procedures to be carried out in regions that lack expert surgeons, such as in small hospitals, developing countries, and also for militaries in combat. At the same time, robotics provide invaluable assistance, allowing procedures to be performed less invasively, thus reducing complications and delivery times. An aspect that will advance telesurgery even further is the attainment of a fast enough internet connection that will permit telepresence in real time. This is what our team in Barcelona is moving towards. Mobile World Capital Barcelona, Hospital Clínic de Barcelona and Advances in Surgery (AIS) Channel, a company I founded to improve training and performance, have implemented a pilot project that will use 5G technology to enable remote assistance for surgical procedures in real time.

The incorporation of 5G technology will make it possible to overcome barriers and reduce the current 0.27-second latency period to 0.01 seconds, a crucial time reduction in any surgical procedure. 5G will also make it possible to increase image quality and definition, a key factor for medical teams to take decisions with as much information as possible.

Our team presented the pilot project as part of the GSMA Mobile World Congress in Barcelona on 28 February, attracting many top surgeons who are keen to get involved with the technology.

## An operating theatre with an upper hand

The project is being conducted in Optimus, the most advanced operating theatre in the world, which is located in Hospital Clínic de Barcelona. Optimus is an integrated, robotic and digital operating theatre that incorporates big data and smart lighting. A team is already testing a solution there that audiovisually records all that happens in the operating theatre from every possible angle, and sends the information live to the outside of the operating theatre. Our proposal for real remote mentoring based on 5G technology

will take the concept of telesurgery a step further by enabling a specialised surgeon to guide the surgeon in the operating theatre without being physically present and in real time.

## Success in the first phase

The pilot will consist of three stages that test the technology's use in facilitating real time communication and assistance in surgical operations. The first phase of the pilot project has already been conducted and has produced positive results. It tested remote assistance between surgeons inside the Hospital Clínic de Barcelona, and after three tests with real patients the team verified that knowledge from senior surgeons can be transferred in real time without putting the patient at risk.

The first test was carried out in May between a cardiac haemodynamics surgeon's office and a cardiac haemodynamics operating room (OR) with a NUCLeUS system—a platform that provides centralised and coordinated access to all audio and video technology in the OR, and which offers various ergonomic enhancements such as control over surgical lamps, cameras, ventilation and more. The test demonstrated smooth communication and fast acclimatisation to the system, including telestration—a drawing tool with which the specialist surgeon can make freehand sketches on the video screen.

At the beginning of June, another couple of phase one tests were conducted at Hospital Clínic de Barcelona and presented on AIS Channel. Both were sleeve gastrectomies, each conducted by a surgeon whilst another specialist surgeon communicated via the 5G technology. The system enabled discussion in real time, with the expert able to share advice, eased significantly by the use of telestration to guide the procedure where needed.

## Transferring knowledge to serve patients

Phase two of the pilot will involve collaboration

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between various Barcelona hospitals. Surgery has advanced more in the last 15 years than in the past 150. For this reason, it is vital to create bridges of collaboration and transfer of knowledge in real time between hospitals. It is the future.

After this, phase three of the pilot project will involve communication between the hospital and a moving vehicle, ie an ambulance. If the previous phases have the consequence of offering a better service to patients, the obvious derivative is to be able to do it at the most critical moments—when the patient is transferred to the hospital.

### Implementation in daily practice

The next step will be to implement the system as part of daily practice. You just have to imagine having a source of knowledge in real time. This will accelerate learning curves and improve the quality of life and the safety of patients.

New technology is only one aspect of the project, as there is a deeper message to impart, which can be of use to all doctors, with or without state-of-the-art technology. I believe that cultural change—the ability to understand that knowledge can be received and applied in real time—is more relevant than the technology. 5G, or the technology that comes, should facilitate the transmission of knowledge, but the challenge is to make it a daily practice.

### Spreading knowledge across the globe

143 million surgical procedures are currently not performed across the globe due to a lack of knowledge of specific procedures, according to data given by *The Lancet* (Meara et al. 2015), making the new system all the more significant, since it presents a means for improving these figures. It is hard to say how soon 5G technology and ensuing research will lead to an improvement in these figures.

Developing countries will benefit the most from the new system, as they will be able to access the real-time knowledge of the world leaders from the first-world countries. These countries have an advantage; they need not replace old networks and transmission systems. They can directly access the newest ones, which in turn is easier.

### Lifting a barrier for top quality training

The 5G technology is lifting a barrier in the provision of high-quality, continuous training, which only a tiny proportion of the world's surgeons have access to. Only 3% of surgeons in the world have access

to high-quality continuous training. For this reason I founded AIS Channel and this project is a big step in that direction. I have been testing different systems for more than five years, but the barrier had always been the transmission of data and as a consequence the latency.

### Rapid replication across the globe

The 5G technology has opened a door, whilst another advantage of technology is the potential for rapid uptake. If everything works, replication of the system in other countries will be instantaneous. It is one of the advantages of technology, which is well structured. It can be replicable and scalable in a very short period of time. We just need to show that it covers a real need for surgeons and improves the quality of procedures.

Joining AIS are Hospital Clínic de Barcelona, 5G Barcelona, Barcelona City Council, Mobile World Capital Barcelona, the i2CAT Foundation, the Technological Centre for Telecommunications of Catalonia (CTTC), Atos, and the Catalonia Polytechnic University (UPC) to turn the city into a 5G digital hub that will be a reference in Europe. ■

## KEY POINTS



- ✓ The faster 5G internet connection will enable telepresence in real time
- ✓ Incorporation of the technology will reduce the latency period from 0.27 to 0.01 seconds
- ✓ The 5G connection will also make it possible to increase image quality and definition
- ✓ The three-part pilot project has produced positive results and is at its second stage
- ✓ Phase one tests were conducted in an advanced operating theatre, demonstrating remote assistance and use of telestration
- ✓ Phase two of the pilot will involve collaboration between various Barcelona hospitals
- ✓ Phase three of the pilot project will involve communication between the hospital and a moving vehicle



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# Digitisation 4.0: The transmission of patient data

## New methods of patient empowerment and communication with doctor

In the Mühldorf clinic, patients have been equipped with a 'smart visit' app in a pilot project to gain experience with a new instrument of data communication.



**Ulrich Hornstein**  
CEO  
Kreiskliniken Mühldorf am Inn  
Mühldorf am Inn, Germany

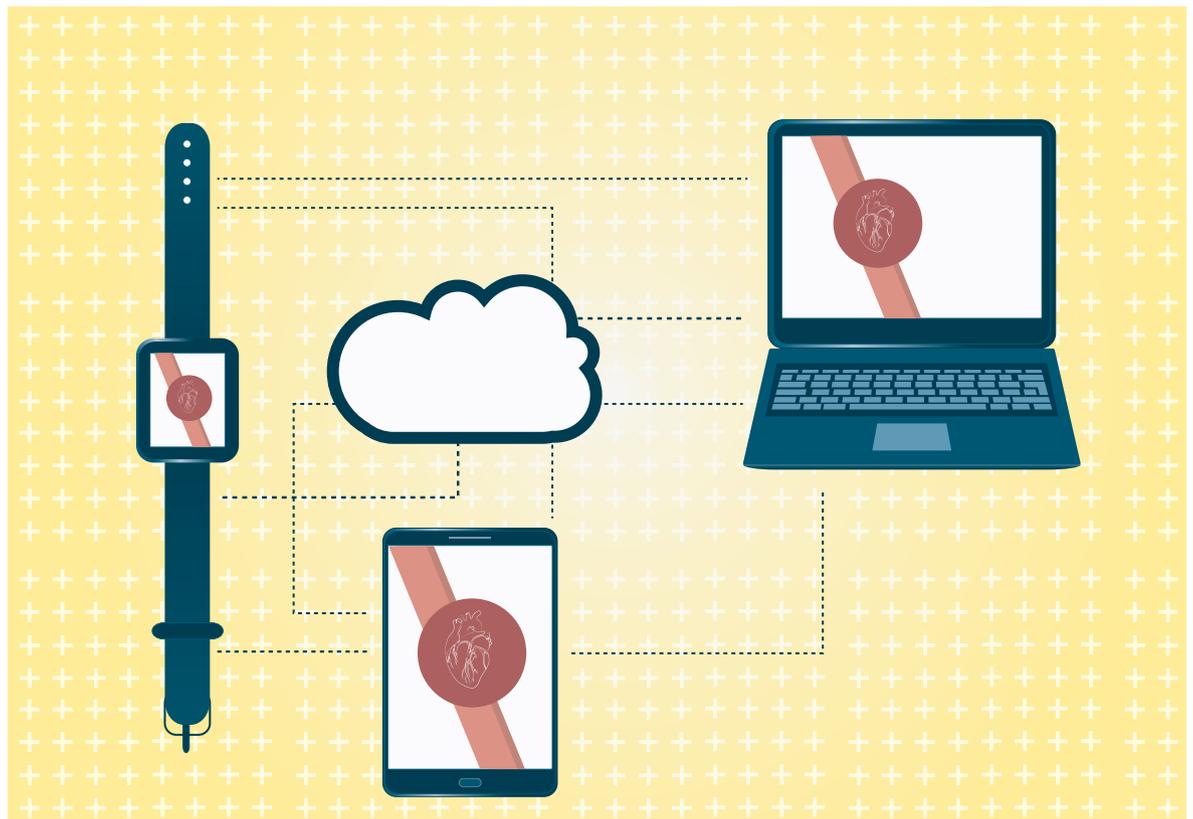
Ulrich.Hornstein@kliniken-muehldorf.de



**Gerhard Füchsl**  
Senior Physician,  
Internal Medicine  
Kreiskliniken Mühldorf am Inn  
Mühldorf am Inn, Germany

Gerhard.fuechsl@kliniken-muehldorf.de

kliniken-muehldorf.de



There are numerous apps to assist people with a broad range of issues relating to health and illness, whether in the form of guides, assistance in illness situations or fitness trackers measuring data. Many people use these apps to log their physical status and monitor it for themselves. By contrast, there is still a large number of people who document their blood pressure, or other similarly measurable values, on paper. Both these groups have something in common: they are recording this information for themselves. A human advisor, such as a doctor, is initially unable to make use of this information. The doctor can only access it when the

user shares the information "manually", providing the doctor with the information in the form of a paper record, a scanned pdf or an exported table. This is inconvenient, and has other disadvantages too. Transmitting health-related information via email, for example, could be problematic from a data protection perspective.

Smartphones can do all of these individual functions: recording, storing, evaluating, and visualising data. They can also send data in compliance with data protection guidelines. So why not try to bring all of these functions together within one app, and share the recorded information with a trusted

doctor? Patient empowerment under medical supervision. As an initial approximation, this would offer patients and healthcare workers a good few advantages, with some economic considerations.

### A common interest develops

This idea led to the project “Digitisation 4.0 - transferring patient information from Apple's Health Kit and Care Kit” (HealthOn 2017). Initially, the app was intended to be configured by a doctor to suit a patient's medical needs. The patient would then be able to work with these specifications—collect data, use reminders to take medication, for instance—and send this information back to the healthcare professional in question. This makes the app a communication interface between the doctor and the patient. The technical capabilities of the Apple Health Kit and Apple Care Kit frameworks enable health-related information to be stored centrally on an Apple smart phone, which can be read and processed further if the app's user consents to it. Upon approval by the user, this information can be sent to the doctor's office using end-to-end encryption, and without intermediate storage on an Internet server.

Doctors are subject to technical and organisational conditions. For example, a clinician has to rely on the on-site hospital IT system having the appropriate functionality to use patient information in this way. Thus, the doctor's interest in using and evaluating patient information is not the sole determining factor; the interest of the organisation itself (ie the clinic and its management) are also necessary to contribute to the success of the project. This means that multiple parties need to come together. As a result, the IT partners aycan CEO Stephan Popp and Mühldorf am Inn clinics jointly presented this project proposal to Entscheiderfabrik (Decision Makers Factory) in 2017.

### Embarking on the journey

At this project stage, it became apparent that this novel data exchange did actually impact on the clinic's landscape. The electronic exchange of medical information, which is common practice between institutions (clinic and health insurer) is likely to be desired, if not requested, more and more by patients. The project was selected from among five finalists in Entscheiderfabrik and other interested clinics (Ategris, Sozialstift, FACT) and IT partners, particularly KIS manufacturers and network partners (Cerner, März AG), were prepared to launch the connection.

While the development work for what became the SmartVisit app progressed, in June 2017 the Entscheiderfabrik summer camp saw the current status reported on, and additional conditions and specifications discussed. Specific, concrete communication issues were clarified, and finally, in October 2017, it was time: the app reached the final development stage, and the first connection to the hospital IT system (Cerner Medico) in the Mühldorf regional clinic was set up. The server for communication with the app was installed – all that was left to do was to launch it.

### Gaining experiences and insights

The on-site installation was made possible thanks to players on both sides agreeing and being prepared. It was possible to access the hospital IT system with just a few clicks, providing authentication for the clinicians.

“THE APP CAN BE USED AND DEVELOPED AS A PERSONAL MEDICAL FILE OVER WHICH THE PATIENT HOLDS DATA SOVEREIGNTY”

The user authentication is carried out with a photographed QR code. Subsequently, the app can be configured using simple drag and drop. From the point of the healthcare profession, it does not take long to configure the app. For the user, too, the app is easy to use after a brief introduction. This is supported by the included guide.

The app offers a medication plan, records fitness values, health-related information, questionnaires and exercises. Furthermore, it supports the secure, bi-directional exchange of documents. For the first concrete attempt, the fields of diabetology, gastroenterology (reflux) and pain management were selected. Neurology (here, Parkinson's disease) was added in the second attempt. Interested physicians were available from all the specialist departments in the Mühldorf am Inn clinic.

It took until December 2017 for patients with suitable smartphones to be available following the distribution of various manufacturers' smartphones across the market. This experience in particular triggered the development team to set to work on

Android systems to begin to also provide the functionalities on this platform, in line with the specification. This expansion work is currently underway. One key focus of this is secure information transfer.

### The app as a medical instrument

An app of this kind is not a sure-fire success, from a medical or organisational perspective. It must first be established in both the doctor's and patient's mind as a tool to support patient compliance and patient empowerment. It makes a difference whether a doctor should require a patient to meet various stipulations and thereby attain compliance and empowerment, or whether a patient should independently carry out a range of therapeutic interventions. The extent to which the usage of the app can improve patient compliance in the long-term remains to be seen. In future, strengthening of "media literacy" will certainly be required to enable it to be used on a sufficiently wide scale as a medical tool, and to ensure that patient selection is not too strongly weighted in terms of those who are interested.

In the first approach mentioned, the app is now filled with simple, validated medical content and questions for the patient, which are provided with medical supervision. It is expected that development will be required here in the future. The need for development will also impact data aggregation and the recognition of patterns. To date, the information recorded has been collected and transmitted. It seems very important that a doctor can evaluate these records in detail, independently, but this is only possible to a limited extent. The introduction of one IT tool—the app—therefore leads to a need for additional IT tools.

The project was presented at a medical training course in the Mühldorf clinic, and was met by significant interest on the part of the doctors. It even provoked a discussion regarding the exchange of medical information. Topics such as the secure exchange of information were hotly debated during this. However, it appears that the basic need, and the requirement on the part of medical professionals, is a given, as is their readiness for it.

### Intersectoral connection - individual patient file meets institutional patient file

An app of this kind can only make full use of its functionality if it makes patient information available to multiple healthcare professionals, or, from the

patient's perspective, if the patient can make information available for multiple healthcare professionals. As such, the app can be used and developed further as a personal, individual medical file over which the patient holds data sovereignty—with regard to the Apple platform, not least in conjunction with Apple's electronic health file dubbed "Health Records". The information can then be shared with other healthcare professionals with the user's permission.

Looking at additional ways to view the sharing of patient information, another sub-area of the project comes into play: how the patient information can be integrated into an IHE-based inter-operability platform still needs to be tested. This should make it possible for information from authorised users to be available both within an institution and across institutions. The prerequisites for this are currently being created. ■

## KEY POINTS



- ✓ Many people use apps to log their physical status and self monitor
- ✓ Smartphones record, store, evaluate, and visualise data and can also send data in compliance with data protection guidelines
- ✓ The project "Digitisation 4.0 - transferring patient information from Apple's Health Kit and Care Kit enables a communication interface between the doctor and the patient
- ✓ The app offers a medication plan, records fitness values, health-related information, questionnaires, exercises and document sharing
- ✓ Doctors' and organisations' interests in using and evaluating patient information are both equally important so cooperation is key
- ✓ The project was presented at a medical training course in the Mühldorf Clinic to an enthusiastic response
- ✓ The future involves looking at additional ways to view the sharing of patient information which leads to the question of how information can be integrated into an IHE-based inter-operability platform

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# Shaping the future of dementia care

Re-examining approaches for dementia management. The potential of applying integrated pharmacological and non-pharmacological treatments for the care of people living with dementia.



**Agnès Leotsakos**

Director  
Reijin Association  
Geneva, Switzerland

WHO Consultant, Health systems and services  
Geneva, Switzerland

leotsakosagnes@gmail.com



**Konstantinos Petsanis**

Director  
Reijin Association  
Geneva, Switzerland

Chief Neurologist  
University Hospital of Geneva  
Geneva, Switzerland

petsanis@gmail.com

Dementia is a mental state used to denote severe cognitive impairment which impacts daily activities and life. Alzheimer's disease is one of the most common forms of dementia, vascular dementia being the other. Contrary to common belief, the mental decline seen in Alzheimer's disease and other dementias is beyond memory failure but encompasses a range of cognitive functions including awareness, reasoning, perception, creativity, language and communication. Some diseases and conditions which can be of infectious, metabolic or neurological origin, or traumatic brain injury, can also lead to dementia.

Dementia is becoming a global emergency of epidemic proportions affecting millions of people worldwide. In 2016, 47 million people lived with dementia. By 2050 there will be over 131 million, worldwide, with projections of a 116% increase in dementia prevalence in developed countries, and double by comparison to 227% for transitional countries and 264% for developing countries (Alzheimer's Disease International 2015; 2016; The Lancet 2015). In research studies there is a tendency to focus on Alzheimer's disease data, which is expected as it's the most common form of dementia. As a consequence, data on other forms of dementia are not usually addressed or measured.

Among the ageing population, dementia is the leading chronic disorder and contributor to disability and need for care. An expanding ageing population means that even if the prevalence of dementia remains constant, the number of people with dementia will continue to grow. Any treatment approach that delays the onset and improves the symptoms of dementia will have significant societal and economic benefits.

Health systems worldwide struggle to provide adequate coverage of diagnostic and treatment services for patients with dementia. Care is often fragmented, uncoordinated, and unresponsive to the needs of these people. The demographics of the escalating problem has led researchers to estimate care

costs over the coming decades. In EU countries that had 7.22 million people living with dementia in 2008, estimated to increase to 14.3 million by 2050, costs are projected to increase to €250 billion by 2030 for the whole of Europe (Wimo et al. 2009). In the USA, dementia is one of the most challenging and costly to treat diseases with \$277 billion projected to be spent on dementia care by the end of 2018 (Alzheimer's Association 2018). In the UK, the total cost of dementia to society was £26.3 billion (2017) projected to reach £55 billion by 2040 (Prince et al. 2014).

In most countries around the world, the management and economic support for dementia care is mainly provided by the extended kin. Given the many years of dementia progression, informal costs of care can cause distress to families and lead them into financial hardship. UK estimates show that out of the total £26.3 billion spent for dementia care in 2017, £11.6 billion were contributed by the work of unpaid carers and family members, while only £4.3 billion were spent by healthcare sector and £10.3 billion by social care (publicly and privately funded) sector. In the USA 16 million people provided unpaid care in the form of physical, emotional and financial support – a contribution to the nation valued at \$232 billion (2017) (Alzheimer's Association 2018). **Figure 1** shows the costs for dementia care globally (available online only).

These sobering estimates should drive intensified national and global action to help improve medical and public health interventions for dementia, as well as social and wider public policies. National authorities and societies not adequately preparing to address dementia will be severely disadvantaged both in societal and financial burden.

## Why is dementia rising?

Dementia has no cure. A potentially preventable condition continues to affect millions of people. Major reasons that contribute to the rising numbers of people living with dementia are included in **Table 1**.

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## Limitations of pharmacological treatments

Despite a plethora of medical and neuroscientific research, there remains much uncertainty as to the effectiveness of existing pharmacological treatments for dementia, which have limited efficacy and adverse effects. For example, antipsychotic drugs, one of the main treatments for managing behavioural and psychological symptoms in patients with dementia, are associated with an increased risk of falls, stroke, heart problems or even death. Inappropriate high dosage and long-term use of antipsychotic medication is contra-indicated but common in specialised care facilities, in some countries (Gustafsson et al. 2013). Antidepressants, another type of medication given in dementia, have an unsatisfactory performance. Medication prescribing and administration to these patients is complex and can result in unsafe use of medications and medication errors.

Although extensive and expensive efforts to develop new medication for Alzheimer's and other dementias have continued in the past decades, disappointing results from drug trials with candidate compounds have led to doubt that pharmacological treatments have a positive influence. For example, one study showed that between 2000 and 2012, 244 compounds were tested for Alzheimer's disease in 413 clinical trials with a failure rate of 99.6% (Shurkin 2015).

The limited efficiency of existing medications and associated adverse effects, as well as unsatisfactory outcomes from new drug trials, have led to scientific and clinical interest in non-pharmacological treatments. These are increasingly being recognised as important complementary approaches for the care of patients with dementia. To promote a balanced use of antipsychotics and anxiolytics, health professionals must become more aware and build skills on the application of non-pharmacological treatment approaches.

The suggested preference by some clinicians now working in these areas is to initiate non-pharmacological approaches first and avoid or delay use of medication which has the potential of adverse effects and is expensive (Shurkin 2015). With symptom progression, the benefits of integrating non-pharmacological approaches with a balanced use of appropriate medication become apparent.

## Non-pharmacological treatments contribute to dementia management

Despite increasing interest in non-pharmacological treatments, they remain inadequately implemented and studied.

Table 1.

<b>1. Rising numbers of ageing people</b>	With rising ageing populations, the numbers of people living with dementia will also proportionally grow if preventative measures are not implemented.
<b>2. Challenging and unhealthy lifestyles</b>	Stress and anxiety from the pressures of contemporary living and hectic professional requirements, unhealthy diets, heavy metal toxicity (eg lead exposure, polluted air and water, consumption of foodstuffs produced with extensive use of pesticides and fertilisers) can all have a lifelong detrimental effect and play a role in dementia development.
<b>3. Overwhelmed health services to address the increasing numbers of people living with dementia</b>	The capacities of health and welfare services to provide care for the mounting numbers of patients with dementia are being stretched. For example, in the UK, more than 70 % of ageing people in residential homes live with dementia. The comorbidities of patients with dementia are inundating hospital services; 25% of hospital beds are being occupied by patients with dementia (Alzheimer's Research UK 2018b).
<b>4. Limited/problematic diagnosis of dementia leading to growing numbers of undiagnosed, poorly diagnosed or misdiagnosed people</b>	Dementia is under-detected, underdiagnosed, under-disclosed, under-treated in primary care (The Lancet 2015). Studies show that most people currently living with dementia have not received a formal diagnosis. Only 20-50% of dementia cases are recognised and documented in primary care (ADI 2015). Stigma associated with dementia also prevents people from receiving an early diagnosis and appropriate treatment. Other challenges include: <ol style="list-style-type: none"> <li>Existing diagnostic tools are dated to successfully diagnose the full breadth of a multitude of symptoms representing about 10 different diseases and conditions that can lead to dementia.</li> <li>The problem of wrong or missed diagnosis is significant. The ageing population is particularly affected as non-specialist health providers are not familiar with diagnosing dementia of various types. Diagnostic errors are frequently made.</li> </ol>
<b>5. Long-term use of medication and medical errors</b>	Some medications can have adverse effects on cognition and their long-term use can have detrimental outcomes (Campbell and Boustani 2015). Lowering blood pressure during lengthy surgery without respecting guidelines can have an impact on cognition later on in life. Adverse effects on cognition by some medication should not be ignored when prescribing for various pharmacological treatments.
<b>6. Limited impact of medication on patients with dementia</b>	Health professionals in specialised care facilities traditionally prescribe medications to address psychological and behavioural problems, and improve cognitive functions. Inappropriate dosage, off-label and long-term use of pharmacological treatments is contra-indicated but common in facilities. They can have adverse effects. Clinical trials for new compounds over the past two decades have failed to produce new drugs to manage dementia.
<b>7. Poor understanding and use of non-pharmacological treatments (NPT)</b>	NPTs can have a beneficial impact on people living with dementia, often delaying the onset of the disease or progress to its severe stages. NPTs reinforce positive emotional states and reduce difficult behaviours. As emotional states are the strongest 'route' through which to penetrate and treat these patients, the aim of NPTs is to engage the emotional capabilities they have to produce a state of wellness and a better quality of life.

In some recent studies, non-pharmacological interventions have been reported to be effective in managing behavioural and psychological symptoms in dementia patients both in specialised care facilities and communities (Brodaty and Arasaratnam 2012; O'Connor et al. 20091; 2009b). These approaches minimise patient adverse effects and events (Ayalon et al. 2006). Behaviours more likely to respond to such interventions appear to be agitation, aggression, disruption, apathy,



distress and repetitive behaviours (Graessel et al. 2011). Other studies have shown that standardised, non-pharmacological interventions conducted in care facilities or nursing-homes were able to postpone a decline in cognitive function, or even improve these functions in patients with dementia (Olazarán et al. 2010; Graessel et al. 2011; Gardette et al. 2010; Agency for Healthcare Research and Quality 2014).

A systematic review of non-pharmacological treatments (Olazarán et al. 2010) proposed that these can make both a realistic and affordable contribution to the improvement and provision of care for people living with dementia. The review indicated that, 'in contrast to drugs, non-pharmacological interventions are often of low cost, and the cost relates to human endeavour rather than expensive technology or medication'. This means that non-pharmacological treatments of demonstrated effectiveness might be financially viable solutions to address the escalating human and financial burden of dementia care in all countries.

The UK's Policy Innovation Research Unit (PIRU), in its 2012 systematic review of non-pharmacological treatments, showed that there was promising evidence for several non-pharmacological interventions (Dickson et al. 2012). More countries which encourage the use of non-pharmacological treatments include Australia (Dementia Australia 2018), Canada, Scandinavian countries and the USA (Agency for Healthcare Research and Quality 2015).

### Why are non-pharmacological treatments important in dementia care?

What people living with dementia continue to have as their condition progresses is the ability to experience emotions. While they may not properly interpret a situation or circumstance which triggers their emotions, they are able to experience them fully. Environments, people and circumstances which have a calming and reassuring influence on patients with dementia bring up positive emotional and psychological states in them. Non-pharmacological treatments appear to reinforce positive emotional states and reduce difficult and negative ones. As emotional states are the strongest 'route' through which to penetrate and positively influence these patients, the aim of non-pharmacological treatments is to employ the emotional capabilities and functioning these patients have, to produce a better quality of life for them.

It is perceivable that emotional and psychological wellness may also positively contribute to stimulating residual cognitive abilities. The positive emotional

states that these treatments provide can be a strong foundation for supporting and triggering non-specific stimulation of cognitive reserves, leading to retention of new information with time and practice. Indirect evidence arises from studies using cognitive training or cognitive rehabilitation, which have demonstrated improved rates of learning and memory among patients with mild dementia (Shurkin 2015).

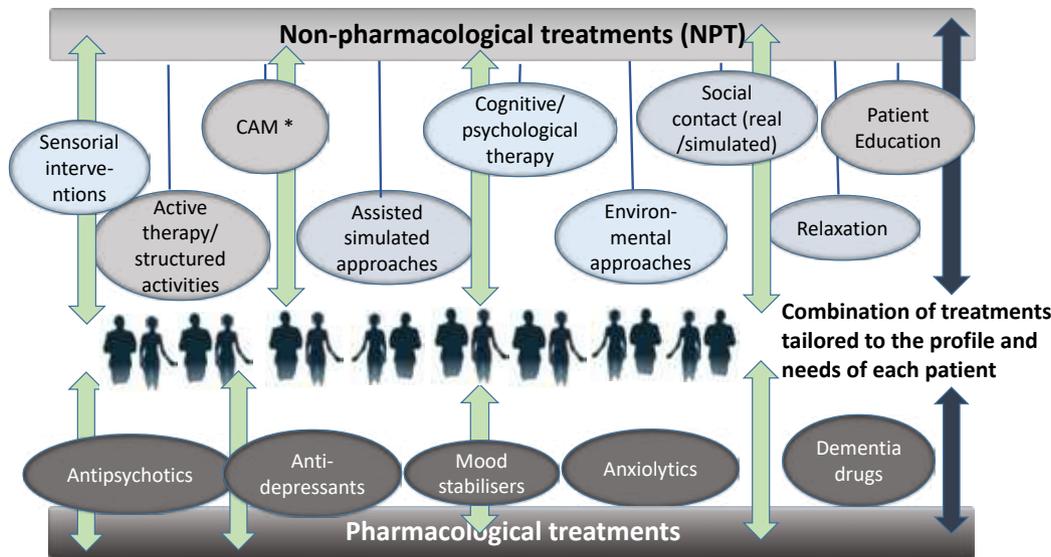
### What are non-pharmacological treatments?

Non-pharmacological treatments are an array of interventions developed over the past two decades, ranging from cognitive training and biographical approaches to sensorial stimulation and environmental enhancement. Studies show that multicomponent interventions (eg with cognitive, motor, sensory and daily living activities stimulation components) for patients with dementia can have a significant positive effect on their behavioural and psychological problems, as well as cognition (Graessel et al. 2011).

Recently, virtual reality (VR) applications such as headsets or projections showing travel, landscapes, animal and aquatic life, adventures, footage of important past events, and the Google Earth Virtual Reality program as a visual reminder of familiar places, have been used to help improve the emotional states (eg anxiety, depression, boredom) of people living with dementia (Tsukayama 2016; Chadwick 2016; Kennedy 2017; Lucci 2017). VR applications have been used in some specialised care facilities in Australia, USA, and the UK, among some countries, with positive impact on both the people living with dementia and health-care professionals and caregivers. **Table 2** (available online only) lists non-pharmacological treatments. (Information from: UK's Policy Research Unit in Policy Innovation Research 2012 systematic review report and USA's Agency for Healthcare Research and Quality (AHRQ) listing of non-pharmacological interventions and authors' experience).

In addition, **comprehensive training of health professionals and family caregivers** includes building of skills to care for patients with dementia. This comprises of support groups, training and education of health professionals, as well as caregivers to care for specific behaviours.

**Patient-centred care** should be a commitment and a guiding principle to supporting people living with dementia in communities and specialised health facilities. This includes the application of principles and best practices of patient safety, quality improvement



\* Complementary and Alternative Medicine

**Figure 2.** The aim of being able to deliver high quality and safe care targeted to the needs of each patient

of services provided, engagement of family members in the careplan and, above all, a focus on the psychographic profile of people living with dementia through interpersonal relationships with health providers.

### A model for the management of dementia

A balanced management of dementia includes options for combination of pharmacological and non-pharmacological treatments. These are tailored to the profiles as well as the clinical and care needs of patients, aiming to optimally and sustainably improve their mental status, and overall health and wellbeing, without excessive or long term use of medication. **Figure 2** represents the aim of being able to deliver high quality and safe care targeted to the needs of each patient.

### Conclusion

As there is no cure for dementia, people living with this condition experience deteriorating behavioural and psychological symptoms, which cause considerable patient distress and are associated with accelerated functional and cognitive decline. They can also cause distress to family caregivers and healthcare professionals in specialised care facilities. The main goal of dementia care is for an early diagnosis, and delay of the onset of dementia to ensure quality of life. The management of dementia should address behavioural and psychological symptoms, maintain quality of life, maximise function in daily activities, improve recognition skills, mood, foster a safe living environment, and promote social engagement.

The aim of integrating pharmacological and non-pharmacological treatments is to improve emotional and behavioural states with an anticipated longer-term

goal of protecting cognitive reserve or even building areas of residual cognitive ability. Non-pharmacological interventions are important as they allow people living with dementia to enhance their sense of wellbeing and improve on the burden of family members, caregivers and health professionals caring for these patients.

If non-pharmacological treatments could be routinely applied, then patients with dementia would continue to experience day- and night-long positive emotional and psychological states together with a balanced use of medications for dementia.

These emerging interventions of scientific and clinical interest are useful and versatile approaches for the management of dementia. Future research would benefit from examining their effectiveness, favourable patient outcomes, cost benefits and the training of healthcare professionals. ■

### KEY POINTS

- ✓ Dementia is becoming a global emergency of epidemic proportions affecting millions of people worldwide and costing trillions of dollars
- ✓ Dementia prevalence is rising because of the increasing numbers of ageing populations, unhealthy lifestyles, overwhelmed health services, poor diagnosis of dementia cases and ineffective treatments
- ✓ Integrated pharmacological and non-pharmacological treatments are realistic and cost-effective solutions for the management of dementia, alas underused
- ✓ Their application enhances the wellbeing of people living with dementia and improves on the burden of family members, caregivers and health professionals caring for these patients



### REFERENCES

For full references, please email [edito@healthmanagement.org](mailto:edito@healthmanagement.org) or visit <https://iii.hm/mii>

Supplementary material online:

**Figure 1:** The costs for dementia care globally.

**Table 2:** Non-pharmacological treatments and interventions.



## PAUL CHANG

PROFESSOR OF RADIOLOGY VICE CHAIR, RADIOLOGY INFORMATICS  
MEDICAL DIRECTOR, ENTERPRISE IMAGING UNIVERSITY OF CHICAGO,  
USA

### TOP QUOTE FROM BLOG:

#### Can we put true value back into radiology?

“The reason we need technological help, whether it’s AI or something else, is because now simple image interpretation is not enough. We have a significant increase in dataset complexity, and we have to be truly impactful in managing patients, not just interpreting images.”

See more at:

<https://iii.hm/ljf>



## KAI ZACHAROWSKI

DIRECTOR - UNIVERSITY HOSPITAL  
FRANKFURT, DEPARTMENT OF  
ANAESTHESIOLOGY, INTENSIVE CARE  
MEDICINE AND PAIN THERAPY (KAIS),  
GERMANY

### TOP QUOTE FROM BLOG:

#### Patient blood management before surgery

“All too frequently, patients

already have insufficient blood volume when presenting for surgery. Patient Blood Management and anaemia management have the potential to save thousands of lives each year.”

See more at: <https://iii.hm/lje>



## EUGENIO MANTOVANI

RESEARCHER - RESEARCH  
GROUP ON LAW, SCIENCE,  
TECHNOLOGY & SOCIETY  
(LSTS), VRIJE UNIVERSITEIT  
BRUSSEL, BELGIUM

### TOP QUOTE FROM BLOG:

#### GDPR: Conducting “big data” research with European health data

“Big data analysis upsets the paradigm “consent or anonymity”, according to which the processing of medical data for research purposes requires either individual informed consent or the previous anonymisation of personal data.”

See more at: <https://iii.hm/ljd>



## MARJA JESÚS DÍAZ CANDAMIO

RADIOLOGIST - SERVICIO  
DE RADIOLOGÍA, COMPLEJO  
HOSPITALARIO DE A CORUÑA, A  
CORUÑA, SPAIN

### TOP QUOTE FROM BLOG:

#### What does it mean to scan medicine and life with a radiologist gaze?

“It will take a long time before robots replace the radiologists. Thanks to artificial intelligence (AI), radiologists will be more efficient and accurate, and we are looking forward to these changes.”

See more at: <https://iii.hm/ljg>

### Brussels Office

Rue Villain XIV 53-55, B-1000 Brussels, Belgium  
Tel: +32 2 2868500, Fax: +32 2 2868508  
brussels@mindbyte.eu

### Limassol Office

166 Agias Filaxeos, CY-3083 Limassol, Cyprus  
Tel: +357 25 822 133, Fax: +32 2 2868508  
office@mindbyte.eu

### Headquarters

9, Vassili Michaelides, CY-3026, Limassol, Cyprus  
hq@mindbyte.eu

### Executive Team

**Christian Marolt, Executive Director**  
cm@healthmanagement.org

**Iphigenia Papaioanou, Project Director**  
ip@healthmanagement.org

**Carine Khoury, Director CEP Programmes**  
ck@healthmanagement.org

**Marilena Patatini, Creative Director**  
mp@healthmanagement.org

### Editorial Team

**Claire Pillar, Editorial Director**  
cp@healthmanagement.org

**Lucie Robson, Senior Editor**  
lr@healthmanagement.org

**Venetia Kyritsi, Staff Editor**  
vk@healthmanagement.org

**Samna Ghani, Staff Editor**  
sg@healthmanagement.org

**Marianna Keen, Staff Editor**  
mk@healthmanagement.org

**Dran Coronado, Staff Editor**  
dc@healthmanagement.org

**Martina Feyzrahmanova, Contributing Editor**  
edito@healthmanagement.org

### Communications Team

**Katya Mitreva, Communications Director**  
km@healthmanagement.org

**Maria Christodoulidou, Communications Manager**  
mc@healthmanagement.org

**Mahjabeen Farooq, Communications Assistant**  
mf@healthmanagement.org

**Uttam Sah Gond, Communications Assistant**  
ug@healthmanagement.org

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