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Staff matters

People are the backbone of healthcare systems. With staff costs up to three-quarters of the total budget one wonders why healthcare leaders are not looking for different, unorthodox, innovative approaches. When did we notice the last time anything groundbreaking in human resources? Perhaps the potential of robotisation in healthcare to automate repetitive tasks may come to your mind? Point taken as it reduces variation and improves patient safety. Surely you may think about artificial intelligence playing a role in various areas of human resources, including recruitment. And then?

Both burnout and boreout is a concern, with a worrying percentage of healthcare workers in recent surveys reporting experiencing this. Remedies for burnout cannot only lie with the individual but the healthcare system must take responsibility. And does it?

Our Staff Matters issue will give you surely answers as it explores human resources in healthcare with insights into how the sector can meet challenges head on. Some of the most forward-looking HR professionals will share their ideas.

Cheryl M. Patton looks at how to manage workplace conflict—before it becomes uncivil. Lou Adler explains how a change in strategy rather than technology will lead to hiring stronger people. Leaders are not born, but made, and simulation is being used now to train future healthcare leaders. Michael Rosen and colleagues describe the Simu-Leader programme at Johns Hopkins Medicine.

Tim Cunningham introduces the Compassionate Care Initiative of the University of Virginia, which offers programmes that support resilience for critical care providers and hospital leadership. Indeed, a badly needed programme which should be rolled out on a much bigger scale. Then, Brigette Hyacinth asks if we should be worried about robots taking our jobs in healthcare. The thorny issue of EMR burnout that so many medics report is under the microscope as Rachel Dunscombe updates us on human factor approaches for implementing and supporting the technology. Is there potential of a game-changing positive impact for clinicians and patients alike? William Ramsden and Caroline Rubin outline the UK Royal College of Radiologists' initiatives to promote maintenance of competence through continuing professional development. Alison Brindle describes how a staff-led initiative to enhance patient communication took off worldwide via social media. Staff editor Marianna Keen outlines why animation in videos is a winner for staff training.

Winning Practices look to the future 'boundaryless' hospital from Maximilian C. and Wilfried von Eiff. Next is the silo-smashing CVD innovation at the Jacobs Institute's Idea to Reality Centre. Peter Kapitein makes the case for cooperation not competition in research. What has space got to do with healthcare? The UK Space Agency has an exciting collaboration with healthcare for better patient care. Then we cover the EUCLID project on diagnostic reference levels for radiology, a study on variation in follow-up imaging for women who have had breast cancer and what a successful quality management system in a radiology department should look like. Last, don't miss Krista Kim's healing digital art.

Koen Kas, who wants to make healthcare delightful, and Paul Chang, radiology thought leader are covered in our Spotlight. The regular Management Matters column provides tips for better communication.

We hope this issue will encourage and inspire you in your own practice. Thank you for your feedback. Feel free to share your thoughts at **cm@healthmanagement.org**. ■

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What Do You Think?

What are your views on Staff Matters? As a leading healthcare management print and digital publication, there are many ways to share your expertise with our wide readership and to join our faculty of esteemed writers. With advances in technology, the increasingly central role of the patient and the question of employee burnout, the architecture of the healthcare human resources landscape is changing rapidly. While some questions, such as acquiring and retaining the right personnel are perennial, unprecedented changes in patient expectations and developments in HIT have put new pressures on sector management and staff alike. In order to keep up with restructured employee profiles and to ensure patient satisfaction, how can we go forward successfully and effectively? We welcome your ideas. Contact us on **edito@healthmanagement.org**

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Is your lab demonstrating its true value?

Today's clinical laboratory faces increased patient volumes, a rise in chronic illnesses and more educated patients demanding real-time information — all leading to rising costs. As a result, laboratories are often an easy target for budget cuts because decision makers are focused more on cost instead of total value. Solutions, such as headcount or reagent cost reductions and consolidation, often fail to have the desired impact on budgets. To remain viable, laboratories must deliver value above and beyond their ability to contribute to positive patient outcomes at the lowest possible cost.

Emilie Neukom
Director of Marketing for EMEA, Abbott Diagnostics

The rising cost of healthcare means that labs are being pushed to save money by reducing reagent costs and headcounts in an effort to avoid consolidation of services. In this article, we showcase how a total value of ownership (TVO) approach may offer a better way of improving operational efficiency and the overall performance of an organization, looking at three labs that have worked in partnership with Abbott to adopt a TVO approach.

Understanding the total value of ownership

The TVO approach seeks to widen the scope of value beyond direct and indirect instrument costs, taking into account further benefits such as time and space savings. The process can be broken down into five steps:

1. **Establish** goals and baseline metrics to steer the overall process
2. **Measure** direct and indirect instrument-related costs (reagents, consumables, labor, maintenance, utilities, etc.) and audit lab workflows
3. **Calculate** and validate the benefits of a particular operational change
4. **Implement** measures which will improve efficiency and productivity
5. **Monitor** ongoing performance to support continuous process development

Time savings to support growth

The core lab at Christus Health Santa Rosa (CSR) in San Antonio, Texas, offers a broad range of cardiac, infectious disease, transplant and pediatric services. To meet the scope and demand of its testing portfolio, the lab was operating 14 diagnostic platforms from four vendors, creating an unnecessarily complex situation, and needed to find a way to maintain its high quality service, while improving efficiency and creating capacity for growth. Important goals included improving turnaround times (TATs) to meet key performance indicators, consolidating and standardizing platforms across campuses, and implementing better quality control processes. The TVO analysis and resulting improvements far exceeded CSR's expectations, including reducing its immunoassay TATs from 59.5 to 46.2 minutes – a 22 percent time saving.

Digging deeper than surface costs

Citilab is the second largest medical diagnostics lab in Moscow, and was under pressure to improve efficiency, reduce cost and demonstrate its true value. Using the TVO approach, Citilab compared the performance of Abbott and Roche instruments and assays for its top 20 immunoassays and top 20 clinical chemistry assays. At first glance, the results indicated that the Roche solution was the winner, as combined reagent and instrument costs were 17 percent lower. However, taking into account indirect costs – such as utilities and waste – revealed that the Abbott platforms offered 33 and 26 percent savings for immunoassays and clinical chemistry assays respectively, providing greater overall value to the organization.

"OVERALL, INCORPORATING TVO INTO DAILY WORK CAN BE HUGELY BENEFICIAL FOR HEALTHCARE ORGANISATIONS AND LABORATORIES. AFTER ALL, IT IS MUCH MORE THAN A METHODOLOGY"

Reducing risk, improving earnings

Korea Clinical Lab (KCL), a research-oriented medical foundation in South Korea, focuses on innovation and high-end instruments as key market differentiators, but this is not always enough to stay ahead of its small and medium-sized Clinical Research Organization (CRO) competitors. TVO analysis helped KCL determine optimum staffing levels and improve the quality of testing.

HOSPITAL DECISION MAKERS

- Not connected to day-to-day laboratory operations

Their Focus

- High upfront instrument investments
- Per-test costs

Their Perception

- Labs are cost centers
- Labs can easily be eliminated or outsourced

Laboratories are often an easy target for these budget cuts because decision makers are focused more on cost than total value.

Implementation of the recommended Abbott instrumentation led to a 12 percent increase in EBITDA (earnings before interest, tax, depreciation and amortization), with a further 10 percent increase expected after putting into practice additional TVO workshop recommendations.

A change in mindset

Incorporating the idea of TVO into daily work can be a significant change for many healthcare organizations and laboratories, as it is much more than a methodology – it's a complete change of mindset. However, its adoption is hard to argue against; the benefits far outweigh any challenges associated with organizational change and the risk of consolidation. A TVO approach is a win for everyone – from management to staff to patients – as improved operational efficiency and a realistic understanding of costs support better decision-making and, ultimately, achieve better healthcare performance. ■

1. ESTABLISH

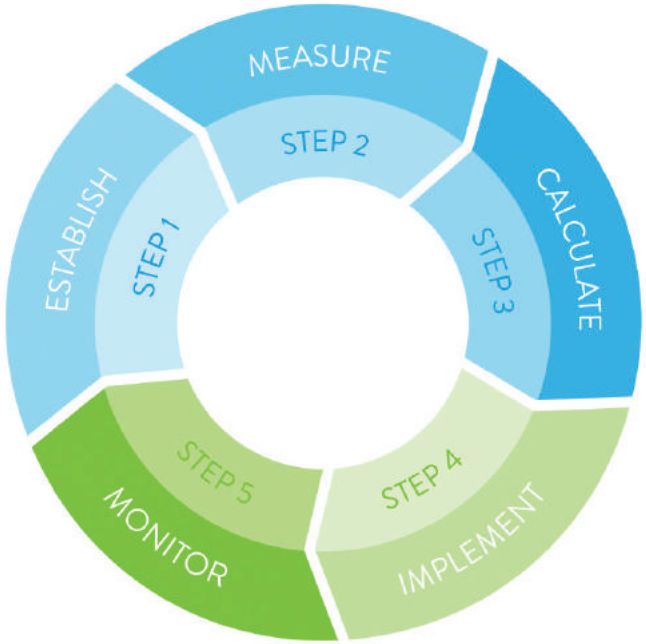
Establish customer goals and baseline metrics to be documented (improve total quality transformation, minimize human intervention, reduce waste generation, etc.).

2. MEASURE

Measure direct and indirect instrument-related costs and audit laboratory process (instruments, reagents, consumables, quality control, labor, required maintenance, utilities, footprint, etc.).

3. CALCULATE

Calculate and validate the impact of potential operational efficiency benefits.



4. IMPLEMENT

Design and implement operational productivity changes.

5. MONITOR

Monitor performance and update baseline metrics for continuous process improvement.

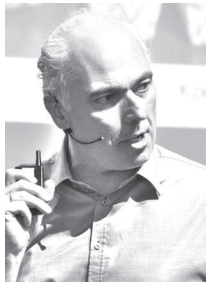
TVO process: Through the power of TVO, laboratory management can tell a story to hospital decision makers that changes the lab's identity from a cost center to a value center.

How the simple ingredient of delight can transform healthcare

A small dose of 'magic' in the healthcare setting can lead to a more efficient experience

With an emphasis on health rather than sickness, healthcare can make simple but profound adjustments to align for a healthcare experience patients can actually look forward to.

Healthcare futurist, entrepreneur, professor of molecular oncology, author and international keynote speaker, Koen Kas is driven by the aim to make healthcare personalised, preventive and, above all, delightful. He has published his vision in the books ***Sick no More****, which describes how we will transition from reactive 'sickcare' to pro-active healthcare and '****Your guide to Delight****', a roadmap towards creating health, dealing with change, and introducing our personal 'Digital Twin' as the ultimate personal assistant guiding us through life. HealthManagement caught up with him for deeper insights into his concept of 'Delight' in healthcare management and practice.*



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As a professor of molecular oncology and biotech entrepreneur, with experience ranging from elucidating the molecular basis of diseases to developing medication for children with brain cancer, one might think that my job was completely fulfilling. It was not. Dealing with the end of a patient's life is always a challenging confrontation. This experience shaped me however and initiated lateral thinking 15 years ago when I wondered whether there was a possibility it could be different. Could we think of game-changing tools to predict disease, or even prevent it?

My interest was especially piqued when I learned that more than 2000 years ago, in some parts of China doctors got paid as long as people in their village remained healthy. Once you got ill, you no longer had to pay. That is, 'the system' paid for consistent health. Would it be possible to go back to this, but in a contemporary way, from reactive sickcare to proactive healthcare? Would it be possible to create and monetise health instead of carrying on along the lines of the current standard with my doctor, hospital, pharma companies and medical device makers making money from me being sick?

I tried to answer these questions with *Sick No More*, my book published in 2014, which explored how we could go back to this ideal world. Some called it visionary, but I never liked that. I felt more that the idea was common sense and feasible to start applying tomorrow. That tomorrow is today.

For example, we are seeing models appearing where I can store my personal data in a secure way and get rewarded by my insurer for living healthily and by a pharma company for being included in a clinical trial. Apple is soon opening its first two clinics, AC Wellness, to promote employee health and is currently hiring. Overall, the majority of new recruits aren't physicians. Instead, Apple is bringing in nutritionists, nurse practitioners and exercise specialists. It has also hired about six care navigators, who guide patients to the best care, whether this means a lifestyle change or a conversation with a specialist. In St. Louis, Missouri, the first remote hospital (Mercy) is a reality—there isn't a single patient in the hospital. They manage remotely, which means they no longer get rewarded for filling beds. The emphasis is on and reward is in the outcome.

The publication of *Sick No More* was, apparently, just the beginning. It launched a keynote speaker tour across the globe, from Antwerp to Tokyo and Silicon Valley, (48 months and counting), to explain and document my 'vision'.

Every time I spoke people got inspired by the possibilities of what they learned could come next. Even more so, to my pleasant surprise, over and over

again, my audience endorsed my vision. This even included the parties who currently thrive from sickcare and are making money from illness and disease. The reason for this reaction? Maybe simply an inspiring, convincing talk. For sure, many audiences were hearing these ideas for the first time—their unknown unknowns (Rumsfeld 2002). But there was also an unspoken fear that my model of extreme healthcare could turn out as disruptive as had been the transition from analogue to digital photography. That transition was initially embraced by Kodak, an early market leader in photography. But after one year, they didn't want to support digital photography any longer because the uptake was too slow. Everybody knows what happened a few years later. Kodak became obsolete and filed for bankruptcy. Not a single healthcare player wants to experience this kind of Kodak moment.

"MORE THAN 2000 YEARS AGO IN SOME PARTS OF CHINA, DOCTORS GOT PAID AS LONG AS PEOPLE IN THE VILLAGE REMAINED HEALTHY"

But imagine this for a second: the market leaders in development of medication, medical devices, hospital care or health insurance suddenly become obsolete. But in the meantime, as well, these parties struggle to embrace let alone act upon this possibility, this drastic emerging change.

In light of this I then felt I could do more. I felt I could offer more than expected from a keynote or a workshop, even if it provided some inspiration, mind-stretching and was thought-provoking. It felt like I was offering a gift I was not even aware existed. This was my first encounter with the concept of Delight.

Can 'Delight' exist in the anxiety-ridden world of healthcare?

When I started to communicate the concept of Delight in healthcare, people usually responded by asking if it was really possible to experience anything delightful in a stressful healthcare setting. But as they kept listening, they started to realise that in any healthcare transaction (patient going to hospital, patient looking for information, doctor storing patient data on file, patient reminded about his/her medication scheme), you can do the following:

- remove an element of friction (in time, in location, in interface)
- put the transaction into a new perspective giving it an experience format to look forward to (ie, hospital picks up the patient at home)
- add a design feature for fun, reward, authenticity.

These approaches are the foundation of Delight Thinking that I describe in my books. I see a time when we will use the concept of Delight to help introduce our digital twin, our personal alter ego.

Indeed, Delight is the concrete, tangible exponent of an experience which comes close to magic and for which you can't be prepared. Incidentally, a company called Magic offers you a 24/7 personal assistant. And that is exactly how I see the future. Our human digital twin, a 24/7 guardian angel as personal assistant which practises and learns from something unknown before, to coach and delight us how to live life to the fullest, and help us to be the best version of ourselves. Remember the old Chinese doctor who kept us healthy? Our digital counterpart will take on exactly that role.

Revising the customer experience for more Delight

For a more delightful experience, customer interactions need revision. Below are a few examples that need work:

1. **Hours/appointments:** When is your provider open? Are they available when its most convenient for you? Do they expect you to miss work or school to come see them? How far in advance do you have to book an appointment with your specialist (gynaecologists are noteworthy according to my wife)? Can you simply "walk in" for appointments?
2. **Interactive booking:** Can you book appointments online? Can you cancel or reschedule online?
3. **Information collection:** Does your doctor make it easy to provide information about your visit? Can you do this online before your visit, or are you handed a clipboard full of forms where you enter information you have already provided on previous visits?
4. **Electronic communication:** Can you send your healthcare provider email? Do they respond? Do they even make an email address available? Can you even leave a voicemail?
5. **Response time:** How quickly do they follow up to a request? Do they have a consistent guarantee on time to appointment? What about in response to a question via email or phone?

6. **Pricing transparency:** Have you ever seen a menu of pricing for any healthcare services? Why not? Price lists of common procedures are rarely publicly available in every clinic and office

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

7. **Information sharing:** Does your doctor send you a detailed "receipt" of the procedures they performed, their discoveries, their analysis, and their conclusions so that you have an archive? Do you even get a list of the charges they are submitting to your insurance company? Are the charges ever discussed or explained?
8. **Empathy:** Do you find that your healthcare provider makes a concerted effort to treat you as a customer with enthusiasm and empathy?
9. **Service level:** Do your doctors ask you for feedback? Do they conduct surveys? Do they measure waiting time? Do they measure Net Promoter Score (NPS)?

It's also worth noting that the healthcare space is only now slowly learning how to embrace start-ups and the learnings from their daily routines. The introduction of new healthcare technology can generate unintended consequences for physicians and patients. Consider the electronic health record (EHR). The American Medical Association (AMA) recently launched a push to consolidate the fragmented data generated by these systems to make it more useful in practice. The online community is a space for physicians to connect with technology companies and entrepreneurs in order to collaborate on the development of new digital health tools. Belgian-based In4care, uniting close to 400 hospitals and care organisations, launched in4care Inside, an online community to connect all its members and a growing amount of start-ups in a 24/7 knowledge exchange environment. Start-ups find a fertile application ground in the care organisation, which can signal novel needs showing the way forward – to a more delightful future in healthcare. ■

KEY POINTS

- ✓ The healthcare sector needs to change emphasis to reward personnel and patients for health rather than on the current orientation towards 'sickcare'
- ✓ We can achieve 'Delight' in healthcare through data-driven anticipation of events (in the future via our personal digital twin), but also throughfacets such as empathy, pricing transparency and removing friction in the patient journey
- ✓ We are already seeing a shift towards 'Delight' and reward for health in some healthcare quarters
- ✓ Start-ups can be ideal contributors/creators of 'Delight'

Both *Sick No More* and *Your Guide to Delight* by Koen Kas are available at: **koenkas.com/books**

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SECTRA

Knowledge and passion

How can radiologists adapt to the knowledge age?

Artificial intelligence (AI) is the talk of the radiology world. While AI is unlikely to replace the radiologist, better adaptation in healthcare to new technology is needed. In this interview with *HealthManagement*, Paul Chang, Professor of Radiology at the University of Chicago, explains the importance of human-machine cybernetic harmony.

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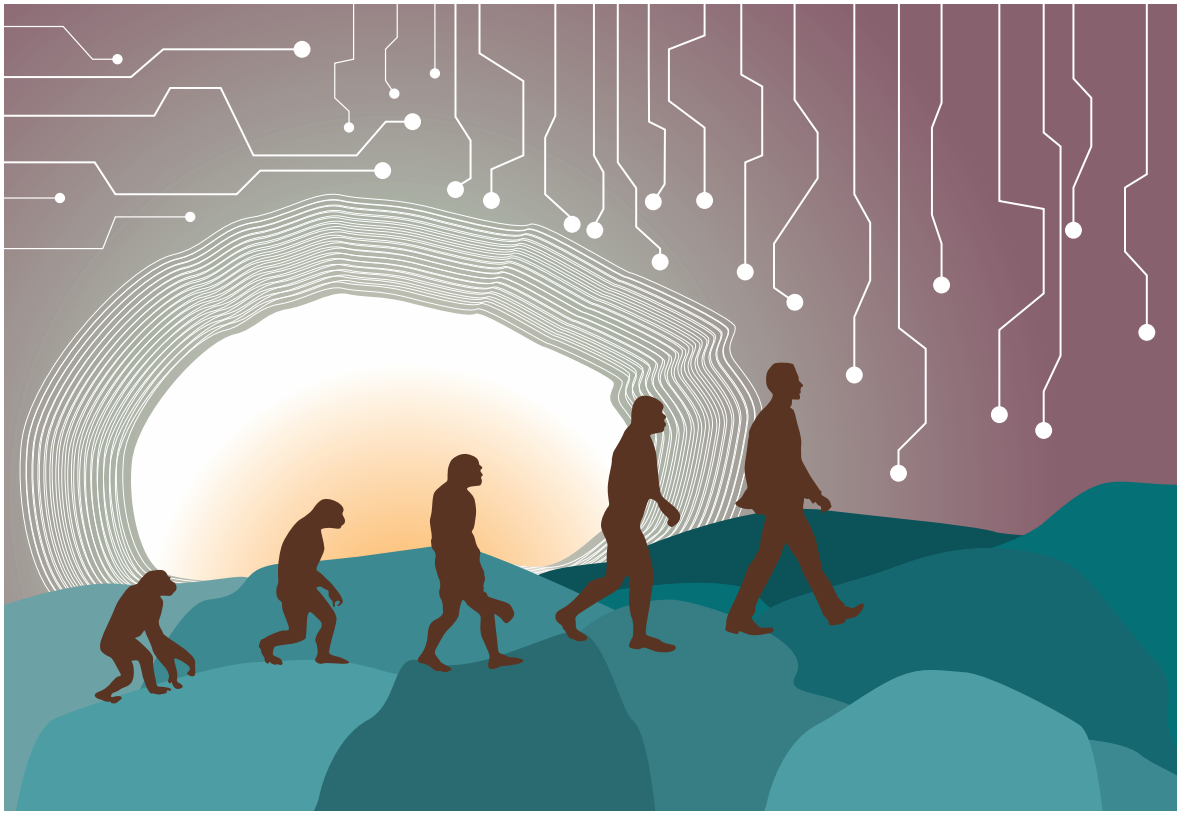

Many years ago, an anthropologist and an evolutionary biologist told me that we haven't been on this planet long enough to evolve to handle the pressures, expectations and demands of the modern world. Radiologists are knowledge workers. We consume, interpret and deliver data and information, and hopefully produce knowledge and insight. But the concept of the knowledge worker is relatively new. We haven't had enough time to evolve to fully embrace the information knowledge worker age. That's one of the reasons why technology sometimes is a mismatch to human behaviour—our human brains are still stuck on the savannah: manipulating real world objects to kill or avoid being killed. We haven't been on this planet long enough to understand what the demands are of being a true knowledge worker, so changing human behaviour with respect to how humans collaborate with technology is critical.

When you look at other industry verticals, they have the same type of computers, software and databases as we in healthcare do. Yet they have done a much better job at achieving human-machine cybernetic balance or workflow collaboration. This is when so-called "left-brain" tasks are left to the machines that do them better, and

"right-brain" tasks are left to humans, such as those tasks where humans can look at the bigger picture and gain true insight as a knowledge worker.

On the other hand, in healthcare, and in radiology in particular, we are used to our traditional paradigms and analogue models. When you go into a picture archiving and communications system (PACS), you'll hear people say things like, "Oh, I need a better hanging protocol", and we still use the word "film." We haven't used film in decades. This is a throwback to a more primitive time where we hung films and had a predominantly manual workflow. Other industries bend over backwards to make sure that the human knowledge worker is not placed in a position to fail. We do the opposite. We use the same IT, but because of suboptimal human-machine cybernetic harmony, or disharmony, we put humans in positions to fail all the time. I have to remember to follow up that nodule, I have to look up the values to correlate with the radiology findings, and so on. In radiology IT, it is too easy to make humans fail.

"SOMETIMES I THINK KAIZEN IS LIKE REARRANGING THE SEATS ON THE TITANIC. SOMETIMES WE NEED A BETTER BOAT"

Hospitals generally will not pay a dime to *truly* improve our IT systems, but will pay millions of dollars to consultants to implement Kaizen: to me, that's like rearranging seats on the Titanic. Sometimes you need a better boat. We try to change human behaviour to improve quality and efficiency, but sometimes, the existing IT offerings are the real issue: the "sinking boat." Advanced IT and optimised human-machine collaboration can be the "new boat" that saves the day. We tend to throw people at problems because of our primitive savannah brains. In reality we need to have better human-machine cybernetic balance as other industries have achieved.

Here's another analogy. During the mid-19th century, they found gold in California and there was a gold rush. Everyone went west to dig for gold. Most people failed and many died. Who succeeded? The people who sold the shovels and jeans. That's a good hedge strategy, what we call the shovel strategy. What I propose to administrators is that it is too early to pick a "winner" in advanced IT, such as AI or deep learning. Healthcare tends to buy early into the hype, but it takes us *much* longer to appropriately consume these technologies. Instead, we should adopt a "hedge strategy": improve our existing IT infrastructure to support advanced IT, such as AI and big data analytics. Do it NOW. It is going to take us a lot of time to validate and feed these new technologies. Advanced IT, such as AI and Big Data is like having a Lamborghini sports car. Even though it might be the greatest, fastest vehicle available, it still needs gas and roads to function. A good IT hedge strategy is to "drill for oil" and "build the roads": in this metaphor, the "gas" is true data interoperability, and the "roads" are appropriate workflow orchestration and optimised human-machine collaboration.

When I first came to the University of Chicago and was setting up imaging informatics, we didn't go to hospitals to look at their setups. We went to other companies—insurance companies, manufacturers and so on, to ask how they handled data interoperability. I explained to them how we do it in healthcare (EMR, PACS, HL7, DICOM, etc.) and they looked at us as if to say, "You can't be this stupid!" They said, "That explains why every time we go to the hospital it's like going back to the stone age". They explained to me how the rest of the world works—including restaurants, insurance firms, banks, Amazon, and Microsoft. Service-oriented architecture (and now micro transactions/API)—this is how the rest of the world works. We should learn from these other business verticals and improve our IT infrastructure to support AI, big data analytics, and other advanced IT.

It's a misconception that AI will replace people, and I highly recommend an article in the *Wall Street Journal*, "Without humans AI is still pretty stupid " (Mims 2017) that shows that in other industries the best AI-powered systems require humans to play an active part in creating an efficient operation. AI is not replacing humans; it's just using humans with machines in a more cybernetically harmonious way. As humans we frequently don't understand that machines can help us, so instead we throw people at our workflow problems or use Kaizen or Six Sigma. We have scrum sessions and we rearrange people. Sometimes you need a better boat. ■

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Putting the patient at ease

10 steps to better communication

When it comes to physician-patient communication, tone is key, from the tenor of the doctor's voice to the mannerisms that influence whether a patient comprehends or is satisfied. Matt Eventoff explains how to effectively share information.

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Physicians have one of the most difficult jobs on the planet. Saving lives and healing the sick are sacred arts and skills that are fraught with stress and pressure. Every decision is second guessed and analysed after the fact, often unfairly. Time is precious, and time is something which physicians and staff can never have enough of. Making the most of this time and communicating well is key.

I have worked with many physicians, and many more patients. What I've come to realise is that some basic parameters at the beginning of a visit can make the difference between a great experience and a poor one for both parties. The visit begins the second a patient walks into the office, and every person the patient interacts with has an effect on that patient's view of the visit.

A common complaint is that a physician often rushes into an examination room, looks at the patient's chart, makes less than two seconds of eye contact with the patient, then looks back at the chart before beginning the examination, all while talking. It's the hurried pace, the lack of a smile, the look that says you're taking my time and there's something else I have to get to. That is not the message being intentionally sent, but that's what's coming through.

As laymen, many of us (me included!) over-analyse what is going on in our own bodies, and "Dr. Google" has made this even easier and more dangerous. Many of us walk into the office very nervous and very anxious. There are steps every physician, from a general practitioner to a neurosurgeon, can take to become a more effective communicator. These steps are also relevant for all office staff. Let's face it, a physician's office is a busy place, with more demands on time than hours in a day. And a visit isn't just the examination—again, it starts the minute a patient enters the office area. Here are the ten steps I recommend:

> "I AM FORTUNATE TO HAVE HAD PHYSICIANS WHO HAVE TAKEN THE TIME TO EXPLAIN THINGS IN A CALM, CLEAR TONE"

1. Refer to the patient by name. This sounds so obvious, but on occasion a physician refers to a patient as 'the patient', especially when a loved one is helping to fill out paperwork or attending the visit. This can unintentionally sound cold and clinical. Refer to the patient by name, either first or last, from the first interaction in the office to the final interaction as the patient leaves the office. It seems like a very small matter, but it means a lot to the person to whom you are speaking. Think about how it feels when you visit a restaurant, or a store, or your building and someone refers to you by name.

2. Make eye contact. The patient's chart might be crucial, but the person whose chart you are looking at is more crucial. Every physician is extremely busy, and has to see many, many patients on a daily basis. That is understood. When you enter the exam room, the person on the exam table has often been waiting days, or weeks, and may be very anxious. Eye contact from everyone, from the front desk to the attending nurse to the physician makes a huge difference. And along with eye contact...

3. Smile and say hello. Greet each patient with a smile. Something that may seem common and routine to every person who works in the clinic or hospital—such as a common fever or routine surgery—is probably anything but common and routine to the patient and his or her loved ones. If putting the patient at ease is a priority, smiling and saying hello goes a long way.

4. Sit down. Towering over a patient can be physically intimidating. Sitting down makes what can be a distressing experience (again, not knowing what is wrong with you is scary for many patients) a bit less harrowing. It can create warmth and eliminate a barrier.

5. Breathe and listen. Ensure you listen to all the patient has to say before you begin to speak. When it comes to your turn to contribute, take a moment to breathe and listen again at intervals, as this will help

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you to recognise whether the patient understood you or not. In medical discussions especially, every word matters. As with any profession, but even more pronounced in medicine, an extra minute or two explaining, or being "patient" with a patient (no pun intended!) will save a physician and the office considerably more time on the back end. Confused patients and those who feel the visit wasn't satisfactory will of course impact negatively.

6. Reflect and clarify. It is also key that you fully understand the patient. Restate the information that was shared to be sure that you got it right and understood correctly. This not only shows interest and respect, it ensures both patient and clinician are on the same page.

7. Ask yourself if the patient appears comfortable. Pay attention to the patient's demeanour, body language as well as their tone of voice and rate of speech. If they appear stressed or fearful then try to calm them. Getting a patient comfortable, through meeting him or her at eye level, smiling and keeping a calm, even pace will help that patient open up and share more information, making it easier to get a feel for what might be going on. In some cases, it may take a little longer to achieve this and gain the patient's trust. A physician is the expert when it comes to medicine, but no one has a better handle on what the patient is feeling than that patient; so, the more the patient speaks the more information you will have to work with.

Remember: You might do this every day, but for a patient, the visit can be nerve-wracking. Put yourself in your patient's shoes. It makes sense to take a moment as you enter an examination room to ask yourself, "If I, or a loved one, were sitting on the other end of this table and knew nothing, how would this look or sound to me? How would this make me feel?"

"SITTING DOWN CAN CREATE WARMTH AND ELIMINATE A BARRIER"

8. Consider your tone and rate of speech. As physicians you are dealing with the most sensitive of subjects and information. A slower pace, with a calm, warm tone, and an easy-to-follow pace can go a long way. Every word matters, and as patients we often think back to the exact phrases used and the tone in which they were used. I am a 'questioner' and ask many questions. I am fortunate to have had physicians who have taken the time to explain things in a calm, clear tone. This is very helpful once a patient has left the office and is thinking back on the conversation.

9. Be clear. Think carefully about the language you use, remembering that your patient may not possess the same knowledge as you about the topic you are discussing. Clarity is crucial. This also pertains to the time during an exam or procedure. When informing the patient, make sure they understand, bearing in mind that many medical terms sound similar and mean dramatically different things. Meanwhile, acronyms and polysyllabic medical terms can often be confusing and many can sound frightening. Using a term because it is medically correct is the right thing to do, but make sure to explain what that word means in a way that an average person can process and understand. Many times the patient will want to/need to explain what has just happened to loved ones after the fact. Repeating some key points can help them to recall it and relay the information accurately. Remember: while it's helpful to gain your patient's trust by explaining clearly, it's important to do so without patronising. You will likely get a feel for each individual's level of knowledge and understanding as you communicate and listen, enabling you to respond appropriately.

10. Close communication with interest. Although it may be very difficult to avoid when you're incredibly busy, turning away from your patient to signal it's time to move on to your next patient can put a sour taste on any communicational exchange. As with most communication, people often have a vivid recollection of your 'ending'. After a great visit, it is always nice when a physician smiles, lets you know that you are on the same 'team' and that the patient was not just a number. ■

HERA W10

Introducing Samsung's new ultrasound platform

At this year's ISUOG, Samsung is launching new premium-grade ultrasound system for obstetrics and gynecology, HERA W10. HERA stands for Hyper-aperture Enhanced Reconstruction Architecture, which include CrystalBeam™, a massive parallel beamforming technology that combines multi-beam and synthetic aperture. Built on the powerful beamforming platform, HERA W10 is specifically designed to increase diagnostic confidence and simplify workflow for clinicians by reducing unnecessary procedures to repeat scans.

The new platform offers high resolution images with uniformity. The HERA W10 provides image quality, advanced features, and enhanced workflow that enable users to scan and treat patients better.

The system is powered by CrystalLive™, which is an image processing engine that creates photorealistic fetal images, allowing deeper connection between fetus and expecting mother.

Among its features, ShadowHDR™ provides a shadow suppressed image especially applicable to highly attenuated regions such as fetal head and spine. It also has LumiFlow™, which provides three-dimensional visualization of continuous and detailed blood flow images.

HERA W10 has efficient workflow and intuitive ergonomics that meet every need. It has a wide control panel moving range from forward to back and left to right, with swivel mechanism. To improve efficiency of usage, Samsung developed QuickPrep™, which allows users to save probe setting time with a simple grab of the probe. When the user holds the probe, the preset is automatically executed.

A new ultrasound solution SonoSync™ will be introduced, software which provides network service that transmits real-time ultrasound examinations[1]. With SonoSync™, clinicians on both sides can simultaneously view the image scanned by sonographers and share markings during discussion. It can be easily connected to various appliances, increasing utility for clinicians' teaching and training.

Samsung will showcase innovative form factor ultrasound system called HERA I10, which improved usability by applying ergonomics design that goes beyond current form factor. HERA I10's Probe Supporter prevents users from heavy scan stress. ■

[1] SonoSync™ is not for diagnostic use. Its availability may vary in different countries, according to regulatory approvals.

*Devices and Features mentioned in this article may not be commercially available in all countries. Their availability may vary in different countries, according to regulatory approvals.

Workplace conflict

It matters how staff deal with it

This study sought to answer the question of how to effectively manage workplace conflict before it reaches levels of incivility.

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Anyone tasked with the role of managing human resources within organisations most likely appreciates the difficulty of dealing with employee conflict. After all, workplace conflict remains a ubiquitous concern. Leaders must find effective strategies to deal with conflict situations before they lead to deleterious consequences that jeopardise the employee, the organisation or both. The need for such strategies is particularly relevant today since multiple studies cite an upward trend in workplace conflict.

In the United States, conflict is growing increasingly dangerous in the workplace, including the healthcare workplace (U.S. Institute of Finance and Management 2013). Seventy-one percent of Americans feel that instances of incivility have been on the rise, with nearly 70% thinking that it has reached crisis levels (Weber Shandwick 2013). A 2013 survey revealed that one-half of the study's respondents were treated rudely at work at least once per week, up from only one-fourth in a similar 1998 study (Porath and Pearson 2013).

This study sought to answer the question of how to effectively manage workplace conflict before it reaches levels of incivility. The purpose of the research was to describe and interpret the staff-related, workplace conflict lived experiences of medical imaging technologists working in U.S. tertiary care centres, focusing on the management of such conflict. Both medical imaging technologist leaders and staff members were represented in the study.

Methods

Since describing and interpreting lived experiences was the focus of the study, the interpretive (hermeneutic) phenomenological qualitative approach was chosen (Smith et al. 2013; Van Manen 2016). Smith et al. (2013) posited that interpretive phenomenological analysis can investigate in detail the differences and similarities of the participants' experiences. The research approach is beneficial in gathering information from an individual as the researcher gains an intimate account of the participant's distinctive lived experience (Rivituso 2014).

Of the 13 participants, 11 were obtained through an online professional network; 2 were garnered through snowball sampling. All geographic regions of the United States were represented in the study. Semi-structured interviews were conducted via telephone, video, or email dependent on participant preference. Coding led to the reduction of data and emergence of themes, as searching for patterns among the cases concluded the analysis process. Using verbatim transcripts enhanced accuracy and credibility in this interpretive phenomenological analysis involved suspending my presuppositions and focusing solely on the interviewee's experience. Credibility was also strengthened by analysis of verbatim transcription, memoing, and periodic self-reflection (Edmonds and Kennedy 2017).

"INSTANCES OF INCIVILITY HAVE BEEN ON THE RISE, WITH NEARLY 70% THINKING THAT IT HAS REACHED CRISIS LEVELS"

Results

The 13 participants consisted of four medical imaging leaders and nine staff-level medical imaging technologists working in U.S. tertiary care centres. The medical imaging leaders described and interpreted conflict among followers. Staff-level technologists explained their personal experiences of workplace conflict. Both groups elucidated how the conflicts were managed.

Avoidance was the primary conflict management style used by staff-level participants. Instead of attempting to reach a viable solution, they opted to ignore the situation altogether. Reasons varied as to why this approach was taken. Some merely disliked conflict and any confrontation that it involved. Others avoided confronting their conflicts for other reasons. Yvonne feared retribution. She felt that if she managed her conflict more assertively, her two coworkers who already shunned her would not respond to any work-related questions that might arise. Another participant feared physical harm since a female coworker who threatened to use her "as target practice" catalysed her conflict. After the threat, she displayed avoidance when she hid in a closet after the conflict.

Of these avoiders, only one eventually resolved the conflict. Desiree revealed that she finally reached a point where she felt confident enough to act assertively and confront the technologist who treated her poorly. This happened years after her first encounter with the technologist. Desiree grew tired of being treated disrespectfully. She disclosed, "I just put my foot down and I said, 'Listen buddy, let's go talk.' And we went and we talked, and we ended up hashing it out. We've been good since, actually."

Leaders who avoided conflict also found less success when avoiding their subordinates' conflicts. Joanne described an incident that illustrated how leader avoidance can lead to escalation of a workplace interpersonal conflict. Soon after assuming the role as operations manager of a large medical imaging department, Joanne was approached by a male technologist. He complained that a female peer teased him regarding his sexual preference on numerous occasions. The male technologist had asked her to stop; yet it continued. Joanne recalled her response to the complaint. She advised them to work it out among themselves; she avoided getting involved upon first hearing complaints.

This advice failed to correct the situation. The conflict escalated as department members took sides with one or the other conflicting party. Finally, a physical altercation ensued between two female technologists, one of whom was the initial perpetrator. The second female witnessed the bullying and took the side of the male technologist.

The uncivil behaviour took place in front of patients and other healthcare workers. According to Joanne, it was directly related to the initial conflict between the male and female technologists caused by bullying behaviours occurring under the guise of harmless teasing and banter. Yet, the male technologist made it clear that he did not appreciate the comments, informing the technologist and his manager.

This particular conflict led to legal action, as the three technologists involved each filed lawsuits. Joanne revealed that at least half a day and sometimes her whole day was spent on this conflict for over a year. Joanne had no recollection of how much the hospital paid in legal fees but revealed that two lawyers were flown in on various occasions for "five to six months" in preparation for the "two hearings" that resulted. Joanne disclosed that the entire department

underwent conflict management training immediately after this incident. An external consultant conducted the training, which cost the department $150,000, taking a large chunk out of the department's budget that could have been put to better use elsewhere.

Proactive and immediate conflict management on the part of the leaders was much more effective. One medical imaging leader anticipated the conflicts that a change in schedule would cause. He proactively managed the conflicts by transparently sharing the reasons for the changes and repeatedly rounding the department, keeping communication open during the transition. The other two leader participants shared conflict management experiences that revealed that expedient management worked more effectively than allowing it to linger. In fact, one participant, Don, noted that his lesson learned since becoming a leader in medical imaging was to manage conflicts immediately and not avoid them.

Conclusions

The avoiding style is found to be a common handling style in healthcare professionals, which is a finding supported by this study's participants. For example, one study comprised of 286 physicians and nurses concluded that avoidance was the most frequent handling style (Kaitelidou et al. 2012). In this current study, not only did conflict avoidance delay resolution of conflict, it also led to lack of collaboration, as avoidance of the coworker typically accompanied the attempt to avoid the conflict. Furthermore, patient care was put at risk since avoiding the other led to lack of important information transfer. Leader avoidance of conflict resulted in costly consequences to the entire organisation.

Proactivity is advised at all levels. When conflict is seen as a possibility, communicating transparently can mitigate such conflict. Once a conflict becomes recognised as creating problems in the workplace by resulting in lack of collaboration, fragmenting the department, or otherwise harming the organisation or patients, it must be addressed. At the staff level, this entails approaching the other party and attempting resolution. If this fails to improve the situation, then the staff member should alert a supervisor. The supervisor should meet with both parties separately and as a group to mitigate the conflict so it does not escalate or adversely impact the team or patient quality of care. If the conflict ensues despite leader intervention, a mediator should be contacted.

Organisational administrators and department leaders need to routinely assess culture. If negativity, unprofessionalism, and backbiting are cultural norms at the departmental or organisational levels, a shift in culture is necessary. Training staff members in collaborative, professional practices is beneficial. A zero tolerance policy of uncivil behaviours should be clearly communicated to all employees. Then, the policy must be upheld. Incivility should not be tolerated. Professional, civil behaviours need to be modelled by everyone in a leadership position. A collective effort of organisational members at all levels of the organisation is needed in order to mitigate or completely resolve conflicts that have the potential of negatively impacting patient care quality. ■

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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, Landspitali University Hospital Iceland*

12:00 Nudging, a useful tool for clinical risk management
Prof. Dr. Carl David Mildenberger, 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

On hiring

A change in strategy rather than more efficient technology will lead to hiring stronger people.

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Whenever asked about the latest hiring buzz I always respond by saying that while the buzz is louder than ever, when it comes to hiring stronger people very little has changed. That's why everyone still considers hiring strong talent an ongoing challenge.

The reason for lack of progress is that there's too much focus on being more efficient rather than improving quality of hire. Being more efficient using job boards to find stronger talent is unlikely when the strongest people either aren't looking or not applying.

The solution requires a change in strategy not more efficient technology. Simply stated:

No matter how efficient, a surplus of talent strategy won't work when a surplus of talent doesn't exist.

This concept is demonstrated in the graphic. The surplus strategy at the top moves left to right and is designed to weed out the weak. The scarcity strategy moves at the bottom, moves right to left and is designed to attract the best.

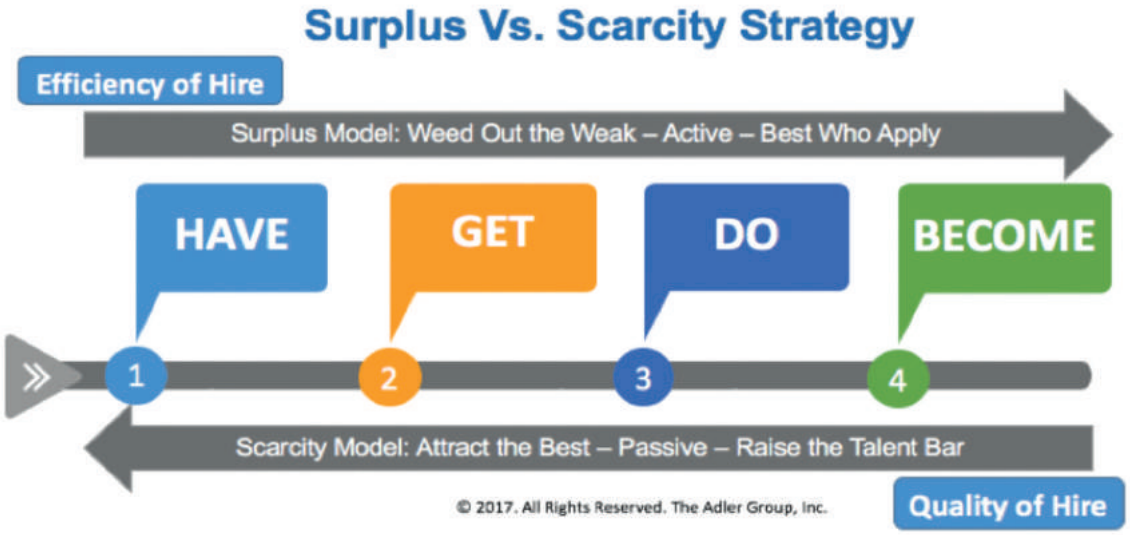
The surplus model is based on the idea that there are enough few talented people who will respond to boring job descriptions that are at best are ill-defined lateral transfers (the HAVE criteria) as long as you surround them with generic boilerplate and hyperbole. To determine if it's worth interviewing these few "qualified" people they're then screened on what they GET on the start date—a salary, company, title and location.

Companies somehow fail to recognise that neither the HAVE nor GET criteria predict a person's on-the-job performance. Worse, it excludes the best people who have the skillset but won't apply to what appears to be an ill-defined lateral transfer. The process also excludes all diverse and high potential candidates who could do the work but who have a different mix of skills and experience than listed on the traditional job description.

Reversing the process starts by defining the job as a series of 5-6 KPOs (key performance objectives) to replace the laundry list of "Must Haves." Assessing competency involves having candidates describe their most comparable accomplishments for each of the KPOs. If proven to be competent it's obvious the person has all the skills, experiences and credentials needed but likely a different mix than what was on the original job description. Attracting these people is possible as long as what the person could BECOME if successful represents a true career move.

Technology can certainly be built to handle this scarcity model, but progress has been slow for a variety of reasons. Lack of understanding for one. Stiff resistance to shift to a performance-qualified approach for defining work is another. Compliance and legal reasons add to the list of excuses. But perhaps most important of all is that tech vendors have no need to invest in these changes when there's less risk and more growth opportunity selling an old-fashioned job posting process that's more efficient.

Despite a full technical solution, the scarcity model is the default choice when companies want to fill critical roles. In these cases success always requires a great job that represents a clear career move, a committed hiring manager and a strong recruiter. ■



Building a patient-centric culture in a multinational healthcare provider

The Affidea Experience

Justyna Tyborowska
Senior VP, Chief HR Officer Affidea

Today, healthcare providers are facing numerous pressures and a hypercompetitive environment in which they should respond to patient needs in a personalised way. The focus on clinical excellence and outstanding medical outcomes can sometimes make healthcare providers lose sight of an important aspect of providing effective care: the patient experience and the attitude and behaviour of the caregivers (including empathy), that are impacting not only patients' well-being but also clinical outcomes.

Many studies have shown that a good rapport between patients and all caregivers who interact with them – a better customer experience, results in better clinical outcomes, greater patient satisfaction, lower rates of physician burnout[1] and, last but not least, it can be a key differentiator in terms of creating company's competitive advantage and impacting its financial performance (both the top and bottom line)[2].

We understand patients visiting our centres are often anxious and afraid of their medical outcome. They need to feel listened to, cared for and reassured.

At Affidea, our shared goal has always been to provide outstanding and compassionate care, every step along the patient journey and in the same time creating a great working environment for our staff.

Having patient experience at the heart of everything we do, we realised that we require more than world-class medical care. We realised that we are also required to pay special attention to our patient's comfort, to their emotional and educational needs and in order to achieve this we needed highly engaged staff, which basically translates to satisfied employees who are aligned with the values and mission of the company.

Taking these into consideration, we have designed an internal programme targeting all above. Knowing that consumers want the same qualities in healthcare companies that they value in non-healthcare settings[3], we partnered with a Swiss hospitality consultancy to inspire ourselves with know-how of a leading from the customer experience perspective industry in the Programme design. And in 2016 we started to launch the Affinity Programme across the Group, recognising in this way the patient experience as a strategic objective and a key imperative of our staff.

We have launched this Programme as part of company rebranding aiming at embedding the company values in daily behaviour of our staff and patient experience standards, strengthening in this way our organisational culture. We believed that it will make a difference, primarily to our patients, as well as will benefit other stakeholders, including our centres' staff, who have to deal with emotionally and professionally tough situations day-in, day-out.

The Affinity Programme represents, in fact, a holistic approach to establishing a patient centric culture that was turned into Standard Operating Procedures and other deliverables defining company patient experience bluebook, targeting:

- building common standards and improving patient experience;
- reinvigorating our staff's passion for their work;
- elevating our organisation.

Operationalising the patient experience and making it a part of the daily routines was therefore, our main challenge, which we have addressed in the following deliverables:

- Affidea Culture Programme – a training explaining Affidea culture and core values and raising the awareness about the importance of outstanding customer service to all staff;
- Designing and launching new standards of patient care delivery and embedding them in existing operational processes;
- Aligning Human Resources processes to hire, retain and reward the right people exemplifying in their behaviour the Affidea values and patient centric approach.

Celebrating successes and rewarding the patient centric behaviours were key components of the programme supporting it from the change management perspective.

MILESTONES IN RESHAPING THE PATIENT'S EXPERIENCE

The Programme is essentially aimed at improving patient experience within centres and increasing the level of empathy we demonstrate to our patients as individuals and as an organisation.

Therefore, upgrade and unification of the physical environment of the medical centres and the attitude of our staff members to each other and toward patients were seen as priorities in the milestones of our Affinity Programme.

• Consistency in behaviour and communication

Through the Affinity Programme, we make sure that training is being delivered to our staff members, at all levels, not only about the Affidea culture, values but also about the importance of empathy and communication and handling difficult situations, as we recognise the impact of communication of the caregivers with their patients for the satisfaction of the latter and the medical outcomes.

• Standardising patient experience procedures & sustaining the programme impact

We have 'coded' patient experience standards by creating our own "Book of Affinity" which contains all procedures related to delivering outstanding customer service in our centres. It provides directions to all Affidea departments, medical centres and staff that enables Affidea to provide uniform, empathetic and high-quality customer service.

In order to sustain the new patient care standards and the behavioural change, but also to make Affinity a living programme and part of organisational culture, we have decided to introduce the 'Affinity Champions'. They are the Affidea staff members who work in patient-facing roles and exhibit excellent customer service behaviour and commitment to upholding Affidea values. They are the role models in patient care who possess and demonstrate predefined competencies that will help them train others on Affinity Standard Operating Procedures (in a format of short 15-20 minutes training sessions called 'skills pills') on an ongoing basis to embed them in the company 'DNA'.

• Newly designed centres to improve patient comfort

Patient experience was also considered when it comes to the physical environment of our centres.

The new design we have created is geared around patient experience, designed to reduce anxiety and ensure comfort and privacy for our patients, relatives and friends. We want our patients to feel safe, supported and confident that they will receive high quality medical service.

Affidea Lithuania case:

From a leading healthcare provider to the "Best employer"

Numerous studies have linked strong employee engagement with significant improvements in patient care and satisfaction.[4]

Our Affinity programme has already shown its results, by Affidea being recognised as a great place to work in

one of the countries where we have already launched our Programme.

In March this year, Affidea Lithuania has been awarded 'AON Best Employer Baltics 2017'.

This is proof of our long-standing commitment for staff satisfaction and a living outcome of our Affinity programme for staff and patient experience. ■

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The Simu-Leader programme

Simulation for building patient safety and quality leadership capacity

Simu-Leader is an interactive simulation designed to build the skills needed for today's safety and quality leaders. This article provides an overview of its assets and role in leadership development.

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Do healthcare leaders need simulation?

Leaders and managers at all levels of healthcare organisations play critical roles in patient safety and quality improvement efforts. This includes creating clear and compelling visions for the organisation, establishing and communicating goals, ensuring accountability, and engaging members of the organisation intellectually and emotionally in improvement work. This is complex work, and most leaders have few opportunities for formal development and mastery of these skill sets.

We know from decades of empirical research that practice and feedback within a simulation-based curriculum are more effective means of acquiring these types of competencies than more passive learning strategies. Simulation has become more commonplace for clinical care teams, but remains a relatively untapped strategy for developing organisational leadership and management skills. The Simu-Leader programme is designed to address this gap.

What is Simu-Leader?

Simu-Leader is an interactive, online, multi-player simulation designed to build skills in the areas of leadership, management, and implementation of patient safety and quality programmes. Leaders participate as a team, managing the implementation of a complex safety and quality improvement programme. Specifically, they go through three phases of interacting with a simulated hospital:

1. Leaders assess their organisation. This includes reviewing clinical process and outcome data, interviewing key stakeholders, and participating in simulated unit leadership rounding. The team seeks information and collaborates to identify opportunities and challenges, prioritising their efforts moving forward.
2. Leaders develop a plan for moving the organisation forward in improving safety and quality. They discuss and prioritise different tactics and develop their best plan based on time and cost constraints.
3. Leaders implement this plan and receive feedback on the impact their plan has had on the safety and quality performance in their simulated hospital. They see changes in process and outcome data, and how different tactics played a role in those changes. Teams can then reflect, re-plan, and try to improve their performance.

Simu-Leader's development

The development and initial evaluation of Simu-Leader was done via collaborative effort between patient safety experts at the Johns Hopkins University Armstrong Institute for Patient Safety and Quality and wargaming and organisational simulation experts at Johns Hopkins Applied Physics Lab. Simu-Leader was funded by the Agency for Healthcare Research and Quality to address gaps in patient safety and quality leadership development.

"THEY SEE CHANGES IN PROCESS AND OUTCOME DATA, AND HOW DIFFERENT TACTICS PLAYED A ROLE IN THOSE CHANGES"

Who is Simu-Leader designed for?

Simu-Leader addresses learning needs for leaders across boundaries in the organisation, both hierarchical (ie, different levels of leadership) and horizontal (ie, different professional disciplines or departments). It targets leadership teams consisting of executive leaders, mid-level managers with quality and safety roles, and unit or departmental leaders. Patient safety and quality improvement work commonly happens in teams; therefore, we believed it was important to practise leadership of teamwork.

To date, approximately 1,000 learners have used a version of Simu-Leader. This includes Simu-Leader implemented as:

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1. A stand-alone learning activity within the Armstrong Institute's Fundamentals of Leadership for Patient Safety and Quality Program, which targets practising safety and quality leaders
2. Part of formal educational programmes in Johns Hopkins Schools of Public Health and Nursing; and
3. A component of the Improving Surgical Care and Recovery (ISCR) programme, a national dissemination project for enhanced recovery pathways in the U.S.

What are the Simu-Leader objectives?

Simu-Leader can be adapted to different scenarios and learning objectives. Common learning objectives for Simu-Leader scenarios include:

1. Identifying common misalignments in accountability across the organisation, including:
    a. Role clarity, responsibility and feedback mechanisms
    b. Building capacity (formal and informal learning); and
    c. Time and resources (transparency of budgeting processes and alignment with organisational priorities).

"LEARNERS ARE FREE TO EXPERIMENT AND LEARN FROM ONE ANOTHER WHILE BEING EXPOSED TO EVIDENCE-BASED PRINCIPLES"

2. Implementing evidence-based management tactics for improving accountability in your organisation
3. Applying transformational leadership and boundary spanning behaviours to accelerate the impact of management tactics
4. Developing new tactics for building accountability in your organisation.

The overarching goal is to provide an interactive environment for leaders to engage with a simulated hospital in a situation where there are no risks to failure. Learners are free to experiment and learn from one another while being exposed to evidence-based principles and practices for healthcare management.

Conclusion

The safety and quality improvement goals set out before the healthcare industry are challenging. Improvement requires change. Change requires leadership. And leadership requires skills that are not easily acquired, and not frequently formally developed in today's healthcare leaders and managers. These leaders need more and more effective means to develop the fundamental knowledge, skills, and attitudes necessary for leading healthcare into the future. Simulation will no doubt be a significant component of the healthcare leadership development programmes of the future. ■

KEY POINTS

- ✓ Leading safety and quality improvement efforts requires a unique set of skills
- ✓ Many people serving in leadership roles have few formal opportunities to build the skills they need to be effective in their roles
- ✓ Simu-Leader is an interactive simulation designed to fill this gap—to provide healthcare leaders with a safe place to practise and learn

Critical compassion

The Compassionate Care Initiative at the University of Virginia

Compassionate care is essential to provide quality care and support a resilient workforce. The Compassionate Care Initiative offers programmes that support resilience for critical care providers and hospital leadership.

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"Compassion is central to being fully human" (Halifax 2018); it is good for one's health as it can improve one's outlook on life, decrease risk for depression and reduce perceived stress (Neff 2016; Klimecki et al. 2012). Though challenging to quantify, compassion is crucial to quality care. Fast-paced work areas with critically ill patients demand focus, the ability to work with a team for long hours and the capacity to bounce back when results are not optimal. From unit staff to hospital leadership, the demands of patient care are taxing on everyone. Families and patients not only expect wise nurses, physicians and administrators, but they also expect—and deserve—compassionate care while in the hospital. Far too often, compassion falls to the wayside of the autobahn of technological and surgical advances. When compassion dissipates however, patient satisfaction can decrease (Newcomb et al. 2017). What is worse, with less perceived compassion, staff face the increased risk of burnout and the negative sequelae that are associated with it—depression, lost work hours, suicide (Dev et al. 2018). Thus compassion is both central, and crucial. It is a practice for others and the self.

Since 2009, the Compassionate Care Initiative (CCI) at the University of Virginia (UVA) has developed and implemented programming with a focus on resilience and compassion. Housed in UVA's School of Nursing, the CCI works closely with hospital administration and clinicians at the UVA Health System; faculty and staff at the university; and of course, students. Its impacts are longstanding and its methods of outreach are feasible and inexpensive. Its mission is to "cultivate a resilient and compassionate healthcare workforce—locally, regionally, and nationally— through innovative educational and experiential programs" (**cci.nursing.virginia.edu**). This article will share the conceptual model of the CCI and then focus on two key elements of the CCI's work that have shaped compassionate care in critical care settings.

Conceptual model

The cultivation of compassion arises through the practice first and foremost of self-care (Alkema et al. 2012). The CCI defines self-care as a broad spectrum of actions that an individual or group can take that are both prosocial and effective in improving physical or mental health. Self-care is broad. A growing body of evidence supports yoga, meditation, prayer and exercise as forms of self-care. In 2016, the CCI surveyed its nurses to learn about their self-care practices. Results suggested that self-care can be defined by the person who practises it (some considered cleaning a form of self-care as well as gardening or preparing food for loved ones). What mattered most was the *intention* behind the action that determined whether it was self-care or not (Cunningham et al. under review). Self-care practices enhance the ability for a care provider or leader to face adversity and essentially *bounce back* so as to be their best performing self in a professional setting. Thus self-care improves resilience (Shapiro et al. 2007). We propose that a more resilient workforce, one that is able to face challenging situations, make the changes needed to ameliorate the root causes of those situations and remain attuned to the needs of the present moment (moment by moment), will be able to provide more compassionate care. Some evidence suggests that compassion training as it is related to mindfulness can improve compassion, presence and resilience (Engen and Singer 2015). The CCI conceptual model (**Figure 1**) is therefore simple and direct.

Figure 1

Clinical ambassadors

Since its inception, the CCI has offered a meeting space for its clinical and faculty ambassador programme. We have worked with chief nursing officers, unit managers and other top-level leaders in addition to staff nurses and physicians. The goal of the ambassador programme has been to offer a place for colleagues to meet monthly and discuss resilience-based interventions that can be rolled out on hospital units. The ambassadors, who volunteer their time, work as a think-tank that examines ways to build resilience and compassion in our health system. The CCI provides a small amount of funding in the form of grants to further develop the programmes. Of a long list of interventions that have been started at a very "grassroots" level and that have moved upwards into the top levels of leadership, two profound projects have arisen and will be discussed next.

"The Pause" is an intervention developed by an emergency department nurse (Bartels 2014) that is now used in many intensive care unit (ICU) settings at the UVA Health System, various states across the United States and also in Australia, South Africa and Ireland (Ducar et al. under review). This practice occurs when a patient has an untimely death in a hospital setting—most frequently in ICU or emergency settings. Any caregiver in the room, nurse, physician, chaplain, social worker or cleaning staff, has the opportunity to ask the group to pause. They take 45 seconds of silence and introduce the silence by asking everyone to recognise the life in front of them that just ended as well as to recognise the combined effort of the team that tried to save the patient's life. The practice is simple and profound (**thepause.me**).

Another initiative that was inspired from the CCI ambassador's programme was devised by two paediatric nurses. They recognised that in the paediatric intensive care unit (PICU) and neonatal intensive care unit (NICU) settings there was not a physical space where staff could retreat safely to process the effects of untoward events. There were


Credit: Hannah Crosby (2018)

"quiet rooms" on the units, but those rooms were often in use by family members grieving or receiving bad news. These nurses petitioned hospital leadership and established funding to build a "resiliency room" that sits between the PICU and NICU. This small room is accessible only by the swipe of an ID card, thus only hospital staff can access it. In the room there is a couch, meditation cushions, contemplative reading material, tissues and a mirror. This space, very close to the patient care areas of the ICUs has been designated as a safe space for staff members to take some quiet time or alone time after a sentinel event. The proximity to the units allows staff members to step away for short periods of time without having to leave the unit and their other patients. Since the building of the ICU resilience room, other units in the UVA Health System have built their own spaces for staff resilience.

These two exemplars illustrate the collective support that the CCI gives to clinicians in its affiliated health system. What's more, these examples show the "grassroots" nature of the CCI's support. These initiatives have gotten supportive attention from hospital leadership to the extent that the CCI now consults with leaders in the UVA Health System on systems-wide self-care and resilience practices.

Resilience retreats

Another hallmark of the CCI is its resilience retreat programme. Based on structured mindfulness practices, such as mindful movement, walking meditation, sitting meditation, mindful eating and listening practices, the CCI provides half-day or full-day retreats for learners and practitioners. The retreats are offered free to all participants and they are facilitated by trained mindfulness and yoga instructors. Funding for these retreats comes from the UVA School of Nursing, alumni donors and also from the UVA Health System.

"RESILIENCE IS COMPLEX AND COMPASSION IS HARD TO MEASURE, BUT THESE TWO TOOLS ARE ESSENTIAL IN THE CARE OF OTHER HUMAN BEINGS"

These retreats are inclusive and they offer staff members the opportunity to interact with each other outside of the hospital setting. The retreats are held at a local farm where staff members not only can participate in mindfulness-based activities, but they can also spend time out in nature. Retreats such as these are thought to reduce stress, improve working relationships and improve resilience (Henry 2014; Aycock and Boyle 2009). The CCI offers unit-based retreats to any unit on the hospital, including leadership units (such as nurse managers) as a resilience practice. Continuing education is offered as well.

Culture change

Though a more resilient workforce is essential when it comes to staffing and safe, quality care, it must be recognised that making staff more resilient is by no means a *single solution* to deeper structural issues in healthcare. It is important to train caregivers with skills so that they can bounce back in the face of adversity. It is equally as important to train caregivers with the skills to make systemic changes so that work related stressors may, over time, become less poignant hindrances to quality care. Research on burnout suggests that it is systems issues, technology concerns, long work hours and staffing issues that make caregivers less resilient (Rushton et al. 2015; Ehrenfeld and Wanderer 2018; Shanefelt et al. 2012). The CCI recognises that most self-care and resilience practices can be started at the individual level and they can have essentially low or no financial costs. We also recognise that self-care must not stay at the individual level if we are to see changes in workplace culture and a more resilient workforce. Unit and hospital leadership must also adapt resilience practise and support staff with time and finances so that they may practise self-care and resilience. If leadership does not also recognise and embrace the importance of self-care and resilience, then individualised efforts will not sustain themselves, and the potential of improved quality of care and improved staffing will not be met. A colleague at the UVA Health System made this point clear when he said that if hospital leadership does not embrace *and practise* self-care and resilience, then talking about it is nothing more than lip-service, and resilience will be utterly meaningless.

Conclusion

The Compassionate Care Initiative is a multi-faceted organisation that strives to improve resilience in healthcare settings. From individualised approaches to self-care to strategic planning with hospital leadership, the CCI recognises that quality and compassionate care can arise from a resilient workforce. Resilience is complex and compassion is hard to measure, but we assert that these two tools are essential in the care of other human beings. CCI programmes are designed to meet specific needs of caregivers and the units within which they work so that they may be prepared to meet ever-changing challenges that arise when treating critically ill patients in often critically distressed health systems. ■

KEY POINTS

- ✓ The Compassionate Care Initiative (CCI) at the University of Virginia strives to build a more resilient workforce
- ✓ The CCI facilitates resilience training, clinical outreach programmes and research on aspects of self-care, resilience and compassion
- ✓ With ambassador support programs and resilience retreats, the CCI has seen marked improvements in resilience and self-care practices among staff working in critical care settings
- ✓ Health systems that do not embrace resilience training for their staff in all settings run the risk of experiencing increased levels of staff burnout and staffing shortages as well as decreased patient satisfaction

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1. FDA submissions P080003, P080003/S001. **2.** Results from Friedewald, SM, et al. "Breast cancer screening using tomosynthesis in combination with digital mammography." JAMA 311.24 (2014): 2499-2507; a multi-site (13), non-randomized, historical control study of 454,000 screening mammograms investigating the initial impact of the introduction of the Hologic Selenia® Dimensions® on screening outcomes. Individual results may vary. The study found an average 41% increase and that 1.2 (95% CI: 0.8-1.6) additional invasive breast cancers per 1000 screening exams were found in women receiving combined 2D FFDM and 3D™ mammograms acquired with the Hologic 3D™ Mammography System versus women receiving 2D FFDM mammograms only.

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A patient-centred approach to mammography

Head radiologist provides feedback on department's three-year use of the Hologic Selenia® Dimensions® 3D Mammography™ System

In an exclusive interview with HealthManagement, Dr. Annie Philippou Papoutsou explains how the implementation of Hologic's Selenia® Dimensions® 3D Mammography™ System has helped radiologists to detect more cancers, and positively impacted on the department's workflow, signalling a bright future for breast imaging at the Polyclinic.

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Having heard about the vital research that Hologic had put into providing mammography with much less radiation while still providing accurate results, I didn't want anything less than this for my clinic. I was very keen to implement the Selenia® Dimensions® 3D Mammography™ system. he whole department was eager to get started with the new digital system, so we installed it in April 2015, and we have been more than delighted with the results.

Catching more small cancers

I was very excited to try out the Selenia® Dimensions® 3D Mammography™ System as it offered the first breast tomosynthesis technology with proven superior clinical performance to 2D mammography—much more detailed, with less radiation. I was particularly keen to use it since it was designed to clearly reveal subtle lesions and fine calcifications to help pinpoint cancers early. The outcome? The system has helped me tremendously in characterising lesions, and I can find more cancers—more small cancers that could have been missed with conventional mammography. I found a cancer of about 2.5mm, which could have been missed if I didn't have the 3D mammography unit. The resolution is fantastic, so it is very easy for me to interpret a mammogram using this equipment.

There are three key areas in which the Selenia® Dimensions® 3D Mammography™ System has performed well for me and my team:

1. **Dense breasts:** 3D imaging is very fast at under 4 seconds and definitely very good in dense breast tissue where I could miss a cancer. We know that 2D systems can miss up to 48 percent of cancers in very dense and heterogeneously dense breast tissue. On dense breast tissue, the new system is much more detailed.
2. **Lesion characterisation:** 3D imaging can characterise a lesion even on fatty breast tissue—we can characterise a lesion more precisely and we can see the margins in much more detail.
3. **Synthesised 2D view:** Having the C-View™ software gives the benefit to the radiologist of an additional imaging read without the woman having a double radiation dose.
4. **Enables stereotactic biopsy:** We can perform a stereotactic biopsy under tomosynthesis, which is much quicker for the patient, delivers less radiation, and is much more detailed. I therefore feel very happy and extremely confident doing the stereotactic biopsy under tomosynthesis using Hologic's 3D system.

Comfort for radiologist and patient

Our radiologists felt very comfortable with the system from the beginning, and after three years, I am even more pleased with the way it has transformed our service to our patients.

More women have come to us for a mammogram because we have this comfortable system which offers a fast and reliable imaging experience. With 2D mammography systems, compressing the breast caused overlapping of tissue, which could sometimes hide a cancer, or the overlapping breast tissue itself could appear to be a mass, meaning that sometimes the patient would need to return for additional mammogram pictures. With Hologic's Selenia® Dimensions® 3D

Mammography™ System, there is no need to clear the overlapping tissue anymore, so patients are not called back for more tests. They are very happy, and because they don't feel heavy compression during the short screening time they don't feel as uncomfortable as before.

Introducing the system to your clinic

At our clinic, the implementation of the system went smoothly because we did it in stages. Hologic's 3D Mammography™ system is powered by C-View™ software. We installed the C-View™—the synthetic view—from the beginning, and we used 2D mammography in parallel with tomosynthesis and the C-View™ to begin with, to become familiarised. After six months

we turned to tomosynthesis only with the C-View™ 2D synthetic view. We can lower the radiation dose delivered to the woman by about 40 percent using C-View™ with tomosynthesis, while getting very accurate results.

Increased workload and efficiency

We perform around 3000 mammograms a year in our private clinic. Since we installed the Selenia® Dimensions® 3D Mammography™ System our workload has increased 50 percent as many more women have chosen to be screened at our clinic. However, due to well-trained technicians and a faster and more accurate mammography system we have been able to absorb increased patient numbers into our workflow.

"MY RADIOGRAPHERS WORK MORE QUICKLY WITH THIS EQUIPMENT SO WE CAN OFFER THE 3D MAMMOGRAPHY TO MORE WOMEN EVERY DAY"

We hope to get more patients, and our intention now is to install Hologic's Selenia® Dimensions® I-View software contrast enhanced imaging software, in which a contrast agent is given to patients to provide more contrasting mammography images for detection of suspicious lesions. This will help us a lot in decision making as well as in increasing our workflow even more and providing more income for the department.

A revolution for mammography

I would recommend other hospitals use the Hologic 3D Mammography™ system because the 3D imaging it provides is much more detailed in dense breast tissue. It can characterise a lesion even in fatty tissue much more precisely, and the radiation dose using the synthetic view is lower. I don't think we have to use any 2D mammography system anymore. The 3D system is wonderful, and the long- term return on our investment has been extremely positive. ■

Human factor approaches improving EMR usability and satisfaction

The EMR does not have to fail

The much-maligned Electronic Medical Record (EMR) is not necessarily a tool which leads to physician burnout. The KLAS Arch Collaborative shows that proper training, personalisation and teamwork can optimise the use of this digital tool without stress and frustration. (For the purposes of this repaort, the terms EMR and EPR are synonymous.)

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EMRs are being attacked by sensationalist articles in the media regarding their impact for driving increased physician burnout related to poor design that frustrates their efforts to deliver efficient patient care. While these articles may drive higher numbers of readership, they are rarely if ever substantiated by statistically significant data for EMR usability and satisfaction. The KLAS Arch Collaborative has surveyed over 110 organisations globally that have generated over 50,000 clinician responses on the usability and satisfaction with their EMRs in supporting healthcare delivery. Key human factor approaches that drive higher levels of EMR usability and satisfaction are associated with EMR training and follow-up education, an emphasis on helping clinicians use EMR personalisation tools to improve care delivery workflow efficiency and establishing a culture of teamwork between the IT staff and the clinicians for effectively supporting and enhancing EMR capabilities. Employing these human factors approaches for implementing and supporting the EMR can have significant positive satisfaction impacts for all clinicians with their EMR solutions.

Arch Collaborative data overview

The KLAS Arch Collaborative data is collected from organisations using a standard 25 question survey to measure EMR usability and satisfaction from doctors, advanced practice providers, nurses, and allied health personnel. A net promoter scoring system is used to generate a Net EMR Experience Score (NEES) to rate EMR functions, personalisation tool adoption, training approaches, and stakeholder performance (eg leadership/IT, the clinicians, and the EMR vendor(s)). A total NEES is created for the organisation as a whole and compared to three cohorts, the global collaborative, organisations with the same EMR, and with similar organisation types (eg academic medical centres, children's hospitals, large organisations, community health systems, etc). Additionally, Arch Collaborative data is used to conduct statistical analysis to establish key findings.

Initial EMR Training – a key factor impacting EMR satisfaction for several years

Initial EMR training and education is an overlooked factor for improving EMR satisfaction and usability. To many organisations, it is a necessary evil required to drive the clinicians to use the EMR as soon as possible. A notable discovery of the Arch Collaborative is that initial training and education not only provides a key indicator for EMR satisfaction, it can establish EMR satisfaction for several years afterward. As shown in **Figures 1** and **2**, clinicians who strongly agree they received high quality initial EMR

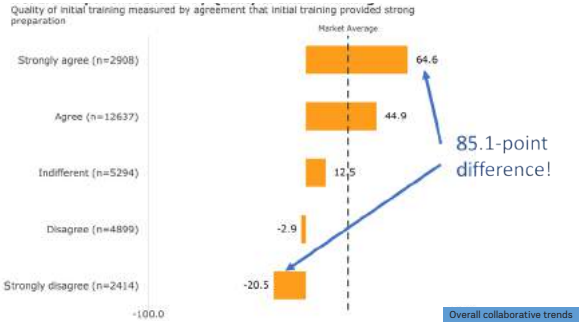

Figure 1. EMR experience score—by quality of intitial training

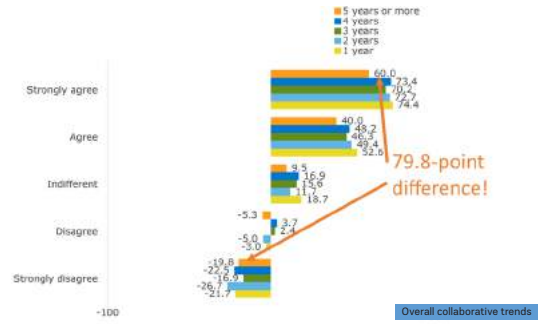

Figure 2. Net EMR score—by years using EMR and agreement that initial training provided strong preparataion

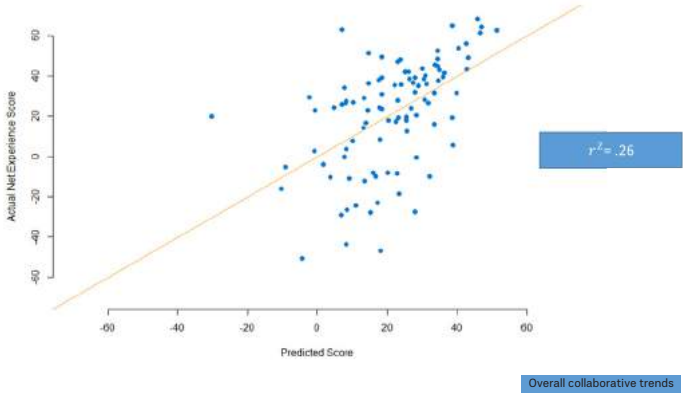

Figure 3. Predicting satisfaction using "Initial Training"

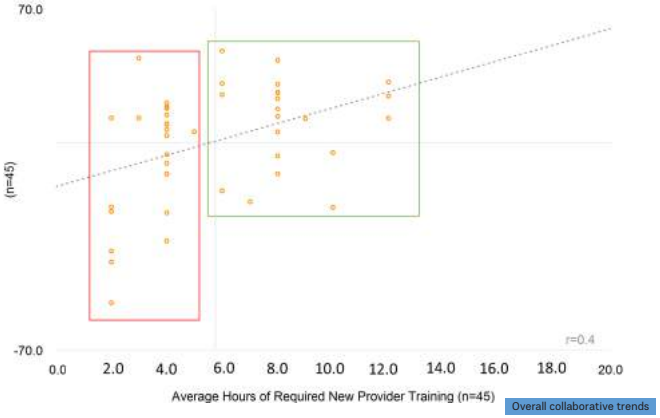

Figure 4. Provider experoence score by Number of House of required provider training

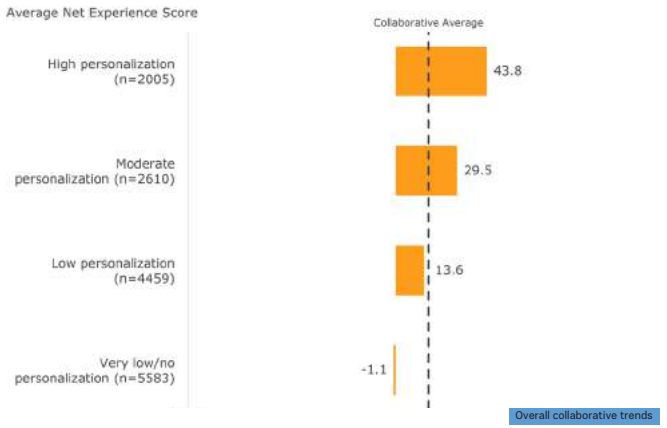

Figure 5. Differences in satisfaction by level of EMR personalisation

training versus those who strongly disagree with this finding, have a NEES that only drops 5.3 points over five years. This is a clear indication that high quality initial EMR training is a key factor in establishing and maintaining higher levels of EMR satisfaction with clinicians.

Using the NEES for initial training as a predictor of EMR satisfaction generates a correlation coefficient of 0.26. See **Figure 3**. This statistic further supports the impact of initial training for establishing a solid foundation for EMR satisfaction.

Another key correlation for EMR satisfaction related to initial training is the number of hours provided. **Figure 4** demonstrates that provider organisations that deliver six or more hours of initial EMR training and education generate higher NEES with a correlation factor of 0.4. The six hours of initial training do not have to be delivered at the same time. Many organisations provide two hours of initial training followed up with additional sessions of at-the-elbow-training 30, 60, or 90 days post the initial two-hour training session.

The combined findings of the Arch Collaborative on the importance of delivering high quality initial EMR training are undeniable relative to EMR satisfaction impacts. Organisations who fail to heed these findings will suffer with additional costs related to higher levels of ongoing EMR support services, as well as lower satisfaction ratings from their clinician base.

"INITIAL EMR TRAINING AND EDUCATION IS AN OVERLOOKED FACTOR FOR IMPROVING EMR SATISFACTION AND USABILITY"

Personalisation tool adoption

A second key factor in predicting EMR satisfaction is the adoption of personalisation tools by clinicians to increase workflow efficiency for care delivery. As seen in **Figure 5** clinicians who have high levels of adoption of personalisation tools have a 14.3 point advantage in NEES over clinicians who have moderate personalisation. This NEES difference is even more pronounced between high and low personalisation clinicians at 30.2 points. The best analogy to EMR personalisation is the personalisation that people adopt for their smart phones. How many smart phone applications are added to a person's smart phone to make them more efficient and connected? How useful would these smart phones be to these individuals if they were removed? Doesn't the same logic apply to the EMR?

Another finding regarding the personalisation factor for EMRs is that tools that support clinicians with efficiently extracting data from the EMR or assisting in improved EMR functional navigation will have the most impact on provider satisfaction. In **Figures 6** and **7**, a comparison of NEES scores between various personalisation tools between Epic and Cerner EMR users that have adopted compared to those who have not adopted the tools, demonstrates this finding. For both EMR solutions, personalisation tools that support data extraction/retrieval and navigation have a higher NEES difference between adopters and non-adopters, than for tools that are used for EMR data input. But, what do we focus our EMR training to achieve? Using tools for EMR data input. Follow-up education for the EMR should focus on creating support to help clinicians use tools for EMR data extraction/retrieval and navigation. This education should be focused on tool adoption related to the workflows of the clinician specialists. Cardiologists will have

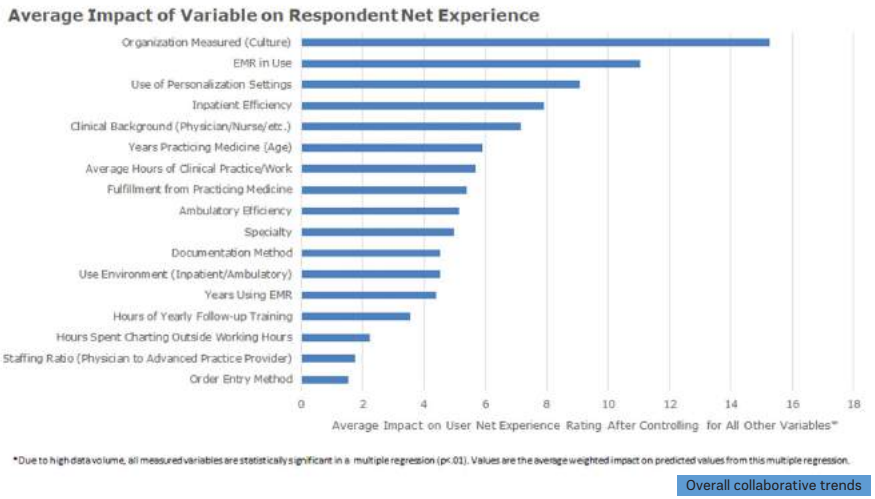

Figure 6. What makes an EMR successful?

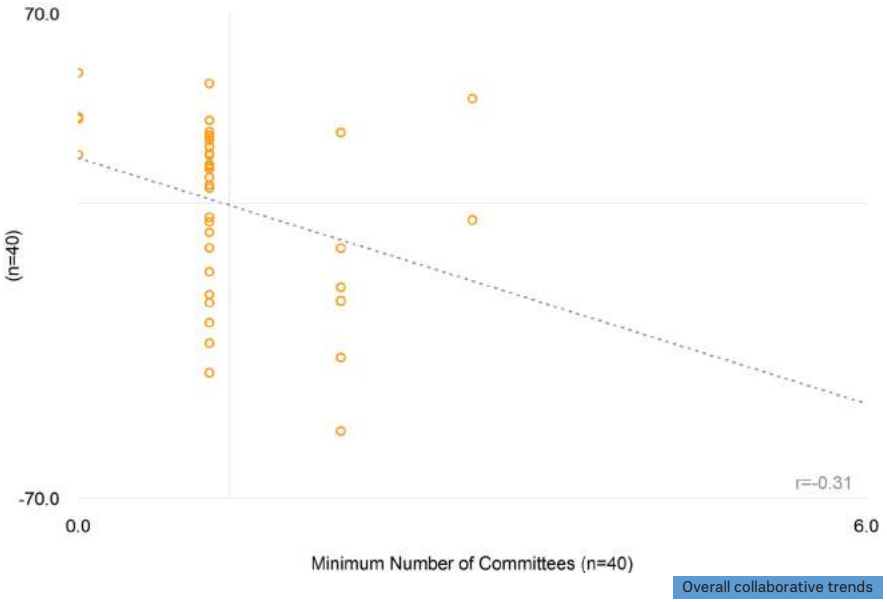

Figure 7. Provider experience score by minimum number of commitees a small EMR change must pass through before being built

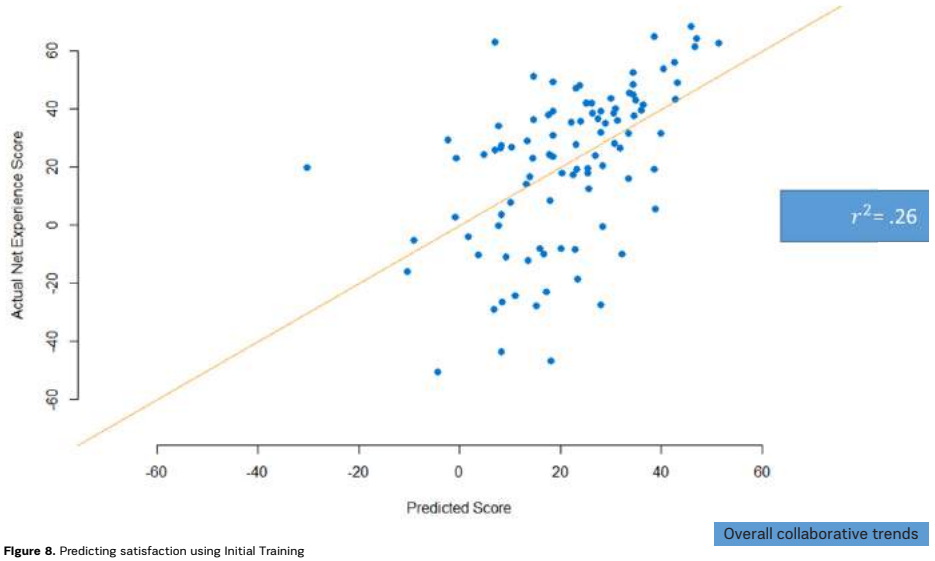

Figure 8. Predicting satisfaction using Initial Training

a much different need for personalisation tools to support their workflows than oncologists, and the same applies to nursing and therapy specialties. With the amount of money we have invested in acquiring EMRs, how can anyone justify short changing the ability to optimise their use?

Establishing a culture of EMR teamwork

One of the most important factors for improving EMR usability and satisfaction is the ability of organisational leadership/IT to establish a trusted role for supporting and improving the EMR with the clinicians. **Figure 8** demonstrates the impact of organisational culture on NEES. The highest performing global organisations to date have established a close relationship with their clinicians for supporting EMR changes that improve the usability of the EMR. To demonstrate this further, **Figure 9** depicts higher NEES for fewer committees a small EMR change must pass through with a correlation coefficient of negative 0.31. No clinician likes to make a request for a simple EMR change and not see it implemented, or implemented several months later. A key consideration for establishing a trusted relationship with clinicians regarding EMR governance is to ensure clinicians are engaged in the strategy and enhancements for the EMR. Delivering quickly on relevant clinician EMR requests initiates the trust relationship between IT and clinicians and will also assist in reducing clinician frustrations with the EMR. The result is effective clinical informatics governance.

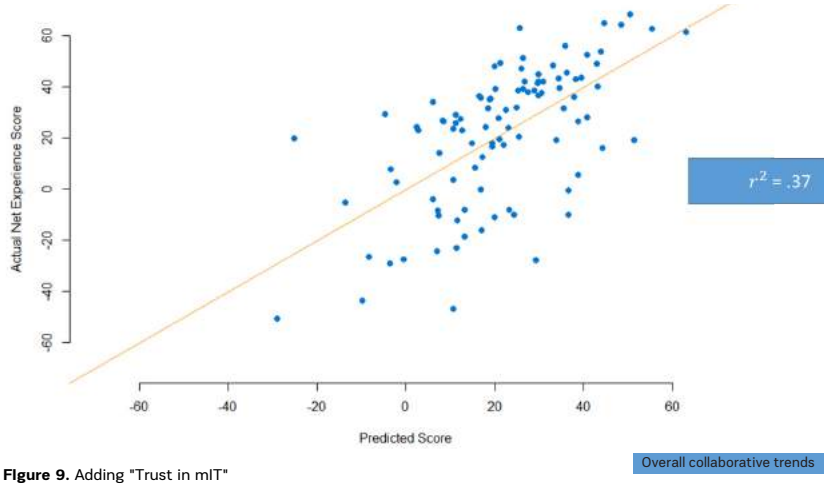

Figure 9. Adding "Trust in mIT"

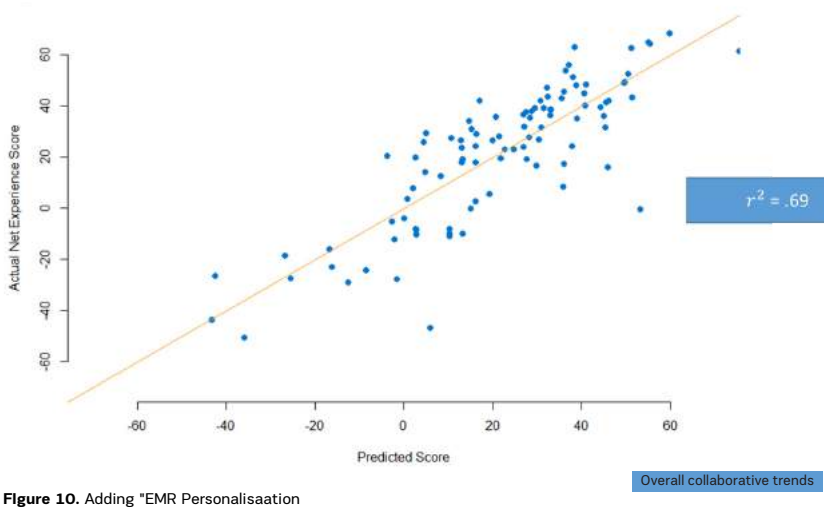

Figure 10. Adding "EMR Personalisaation

A combination of human factors accurately predicting EMR satisfaction

The Arch Collaborative has derived three key human factors that incrementally build on the ability to accurately predict EMR satisfaction. **Figure 10** demonstrates that by evaluating the predictive scores of initial EMR training, "Trust in IT", and the adoption of EMR personalisation, almost 70 percent of EMR environments can be accurately assessed to improve EMR usability and satisfaction. Arch Collaborative survey results help organisations effectively target which of these three (in some cases all three) can be targeted with resources to improve their EMR environments. Ongoing Arch Collaborative research will measure improvements for organisations who have made operational adjustments for EMR training, personalisation adoption, and EMR governance to determine the impact of human factors for delivering an optimised ROI for the EMR. At this time, we also believe improvements in EMR satisfaction will also improve physician wellness/fulfillment measurements, and we will continue to evaluate that aspect of EMR satisfaction.

The human touch is the way forward

The three key findings from Arch Collaborative global research that drive higher levels of EMR usability and satisfaction are related to human factors, not new and shiny technologies. Human factors that provide high quality and effective initial EMR training, the adoption of EMR personalisation tools that support clinician workflows for retrieving EMR data and navigating the EMR more efficiently, and the ability to create a trusted teamwork environment between leadership/IT and clinicians will result in an EMR environment that will help support lower healthcare delivery costs and higher quality healthcare. ■

KEY POINTS

- ✓ The EMR has received bad press with limited insight into any reasons for failure and guidance for workability
- ✓ Training and follow-up education and emphasis on personalisation tools improve EMR adoption and implementation
- ✓ An environment of trust among leadership, IT and clinicians is a strong base for EMR success
- ✓ Organisations that incorporate human approach into EMR adoption enjoy better efficiency and manageable costs

Will robots take your job in healthcare?

Is artificial intelligence set to take over the health sector?

With experts predicting AI will replace human beings in multiple professional settings, Brigette Hyacinth examines the potential impact on healthcare.

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Many consultant firms have looked into the future and predicted that robots will take over jobs in legal services and accountancy. Jobs like insurance underwriters and claims representatives, bank tellers and representatives, financial analysts and construction workers, inventory managers and stock listings, taxi drivers, and manufacturing are coming into extinction. All of these fields employ a huge headcount.

Blue collar manufacturing jobs are being replaced at an increasing rate by the hundreds of thousands as robots are being deployed into many factories and workplaces across the world. Robotic process automation (RPA) offers huge cost reductions. RPA-based processes run non-stop, 24 hours a day, 365 days a year and they're fast.

New technologies will create new opportunities in many fields. There's an unprecedented shortage of programmers, data scientists, cybersecurity experts and IT specialists, among others. For example, there's currently a massive shortage of skilled workers in the cybersecurity sector and it's rising.

I have no doubt that technology will create new job roles, but will displace many more jobs than it creates and at a much faster pace than in previous revolutions. Jobs will be lost at a greater pace than ever before, a rate that might pass the threshold of our ability as a nation to provide a reasonable level of employment for all persons. This isn't like the industrial revolution of the 19th century. This is not replacing some jobs by machinery; it is replacing people with intelligent machinery. There's a fundamental difference in eliminating some jobs from the labour market (to be replaced by other jobs), and eliminating humans in general from the labour market (to be replaced by machines). The industrial revolution involved human augmentation. This coming revolution involves human replacement. The entire point of automation is to reduce overhead. How do you do that? You remove salaries, benefits, and human error. What happens to the humans? Robots and AI will take jobs and not everyone can be re-trained.

Every single technological advance in human history has brought new economic opportunities and increased the living standards of everyone. That is because every single technological advance in human history has leveraged the productivity of everyone. AI will enormously leverage the productivity of those very few who have specialty skills.

Despite the massive potential of AI systems, they are still far from replacing many kinds of tasks that people are good at or tasks that require creativity, innovation, or empathy. The jobs that are most at risk are those which "are on some level routine, repetitive, and predictable." The trend of technology is to always replace the lowest strata of workers. Many of these are unwilling or incapable of improving their intellectual capacity to get ahead of the curve. A big part of today's workforce will still become redundant. Secondly, the ageing population of Western mature countries reinforces the point above.

I believe we could see a world where data and technology replace entire classes of employment. We need to be paying close attention and invest in the job skills and education sectors that are anticipated to grow.

> "I HAVE NO DOUBT THAT TECHNOLOGY WILL CREATE NEW JOB ROLES, BUT WILL DISPLACE MANY MORE JOBS"

It was once believed that the purpose of enterprise is to provide employment. This is no longer the case as boosting shareholder value has taken precedence. Businesses are looking for every method to reduce cost and/or human error so they can maintain a competitive edge in the global market place. It's about competition and they will reasonably do what they have to, to survive. Outsource or automate—whatever will reduce costs. So, take active steps to keep yourself relevant in the job market.

What could this mean for healthcare? Artificial intelligence (AI) is causing some amazing breakthroughs on the medical scene—a new, smarter age of healthcare. It's the path toward an entirely new system that predicts disease and delivers personalised health and wellness services to entire populations. The inclusion of AI would help achieve a more accurate diagnosis and greater efficiency.

Today, empowered by the vast amount of health information available online and on apps, and by the array of health and fitness wearables, many people are much less dependent on their doctors for advice. Chatbots are also being used to revolutionise communication within hospitals and patients.

Many healthcare professionals feel their jobs are at risk. Their biggest concern is that they could be replaced by machines. Yes, jobs would be lost but new ones will be created. The goal isn't to replace physicians or healthcare professionals, but give them better decision-making tools. AI should integrate with the human element of the healthcare service rendered, and not replace it altogether. These developments will allow doctors to focus more on the human aspects of patient care, such as empathy. The only way to win in an artificial world is to be human. It's about incorporating new technologies but maintaining that human factor. We must always remember nothing can replace the "human touch." ■

KEY POINTS

- ✓ Experts predict robots will take over jobs that are repetitive
- ✓ The industrial revolution involved human augmentation while AI ascension involves human replacement
- ✓ AI systems can't replace the human gifts of creativity, innovation or empathy
- ✓ In healthcare, AI could be best utilised for enhanced decision making rather than personnel replacement

Establishing competence in radiology

A UK perspectivea

Competence in radiology is established by the end of training by a variety of summative and formative assessments, collated within an e-portfolio alongside annual educational supervisors' reports and review of competence progression.

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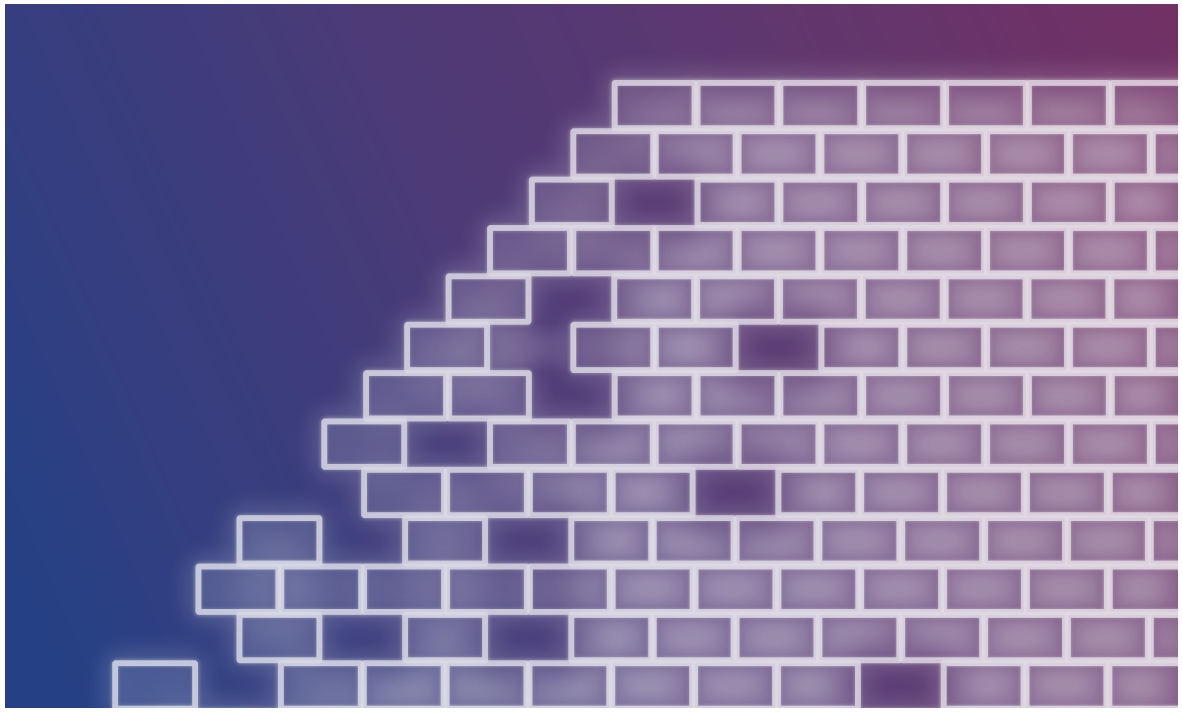

In the United Kingdom training in clinical radiology is undertaken as a five-year programme (six years for interventional radiology), with the aim of producing competent practitioners at the end of this period. UK training standards are defined by The Royal College of Radiologists (RCR), and this article describes what must be learned during training, the methods used to assess knowledge and practical skills, and how these systems are implemented. Challenges to successful implementation include those related to the assessments themselves, as well as the need to engage both the teaching faculty and trainees. These challenges and solutions to them will be discussed in this article, as will the additional issue of maintaining the competence of trained radiologists.

Curricula

The Royal College of Radiologists produces training curricula for both clinical and interventional radiology, with the first 3 years of core training being undertaken by all trainees. The curricula outline the generic capabilities and clinical attributes required of trainees as they progress through core and specialist training, culminating in the award of a certificate of completion of training (CCT). In addition to the specialist skills trainees have learnt during training, the curricula mandate that they must retain their competencies in general acute radiology, equivalent to physicians being able to manage the 'unselected take'.

The current college curricula (Royal College of Radiologists 2016a; 2016b) are competency-based, with lists of knowledge, skills and behaviours, which must be achieved and signed off, as well as familiarity with specific disease entities and diagnoses listed under different clinical subjects. This approach, although thorough,

has led to trainees having to achieve sign-off in long lists of competencies, which can engender an atomised feel to learning individual items, rather than addressing overall performance of wider practice. This has been recognised by the General Medical Council (2017) and they have mandated that royal colleges rewrite their curricula as outcomes-based documents. The next iterations of the RCR's curricula will contain high-level outcomes which must be achieved, rather than numerous individual competencies. Examples of outcomes include appropriately selecting and tailoring imaging according to patient need and managing a multidisciplinary team meeting.

"EXAMPLES OF OUTCOMES INCLUDE APPROPRIATELY SELECTING AND TAILORING IMAGING ACCORDING TO PATIENT NEED AND MANAGING A MULTIDISCIPLINARY TEAM MEETING"

Assessments

Assessments during radiology training comprise both formative and summative evaluations of progress and are organised both locally and nationally. The former tend to comprise pre on-call assessments of competence in reporting plain radiographs, undertaking ultrasound and interpreting CT. Such assessments are usually developed and delivered by individual training schemes (or schools of radiology) and are used to ensure trainees are judged competent to commence on call.

Standardised national assessments mandated by the RCR comprise formative workplace-based assessments (WPBA) undertaken in individual departments and summative examinations (Fellowship of The Royal College of Radiologists – FRCR) delivered by the college. All subjects in the curricula are mapped to a form of assessment, ensuring the most appropriate means of evaluating trainees' progress are used. Both formative and summative assessments have issues related to their enactment and the interpretation of their results, and these are discussed in the following paragraphs.

WPBA were introduced into radiology training in 2010 and comprise formative evaluations of interpretive and procedural work, teaching, quality improvement/audit and managing multidisciplinary team meetings. Trainees also undertake an annual multisource feedback exercise. These assessments are administered locally according to national guidelines, and the outcomes recorded in a standardised fashion.

Despite this, there are issues with WPBA being interpreted and enacted in varying ways by trainers and trainees. They are initiated by trainees, and can be manipulated to obtain 'good' scores by selecting easy cases, requesting assessments in retrospect and approaching assessors perceived as generous. Assessors may collude in such behaviour and will sometimes use the assessments to make a summative judgement, despite their intended formative nature (Ramsden and Roberts 2015). Drivers of such behaviours include trainees wanting to 'pass' assessments, despite their formative ethos, and the need to complete target numbers of WPBA prior to their annual review.

In order to try and restore the formative nature of WPBA, the RCR is removing many of the opportunities for trainees' performance to be scored on the assessment forms, replacing them with free text boxes, thus encouraging the provision of useful feedback, rather than the provision of scores which do not assist trainees' development.

The FRCR examination syllabus comprises all subjects included in core training, and passing it is a prerequisite to future completion of training. This is the RCR's formal summative assessment and the means by which it admits trainees to the fellowship and allows use of the post-nominal letters, FRCR. During their first year of training, trainees sit a first examination in anatomy and the scientific basis of imaging, and passing this allows them to sit the second part during or after their third year of training. This examination is subdivided into two parts, an initial test of knowledge (2a), which, if passed, is followed by an assessment of clinical performance (2b). The latter comprises three components: short and long cases, followed by an oral examination.

Administering the FRCR examination raises issues of reliability and validity, both the subject of rigorous quality control by the college's exam boards. Validity of all parts of the examination is ensured by careful blueprinting to the core curriculum, and all of the examinations (and the questions within them) are carefully scrutinised for consistency between sittings. Inconsistency may be reduced by removing poorly performing questions and (if necessary) adjusting pass marks to take account of more (or less) difficult examinations.

The FRCR 2b is an assessment of trainees' competence in clinical work under standardised 'test' conditions, the latter being necessary to ensure that the examination is reliable, rigorous, and delivered fairly to all candidates, whatever their training background.

Assessment of trainees' actual performance in the workplace is of particular interest, as opposed to evaluation of competence under test conditions, as it is the former which most closely reflects their ability to undertake day-to-day work. Although WPBA is undertaken in the workplace,

its variable delivery and the vast number of assessors of varying experience (almost all of whom will be known to the trainee) mean that it cannot be reliably used as a summative assessment.

"ENSURE THAT THE EXAMINATION IS RELIABLE, RIGOROUS, AND DELIVERED FAIRLY TO ALL CANDIDATES, WHATEVER THEIR TRAINING BACKGROUND"

From both the WPBA and FRCR perspectives, it is hoped that a judgement of trainees' likely performance may be derived from these existing means of assessment, ensuring that trainees progress appropriately and patient safety is maintained.

Implementation

One of the most important factors in successfully implementing an assessment system is to ensure that both trainers and trainees are fully engaged, ensuring participation in initiatives such as WPBA. Good communication ensures that both assessors and assessees are kept aware of any changes to assessments, and also optimises faculty development. This is essential to deliver examinations and WPBAs and particularly important with regard to the latter, as training assessors represents a key means of attempting to 'standardise' the delivery of assessments enacted through numerous trainers. This represents another means of trying to maintain the formative ethos of WPBA, and encourage the provision of high-quality feedback.

Another initiative used to enhance the provision and recording of assessments is the RCR's ePortfolio, used by all trainees to record their progress through training. The ePortfolio is used to record the results of all assessments, including supervisors' reports and the annual review of competence progression (ARCP), both critical informants of trainee progression. The ePortfolio also allows the trainee to record successful achievement of individual competencies, other accomplishments, incidents and their reflections upon them, comprising a complete record of training.

Future developments

Aside from the development of outcomes-based curricula and the removal of the majority of WPBA scoring, the RCR is engaged in a major review of its assessment of clinical performance (FRCR 2b). The purposes of the examination have been articulated as the assessment of radiology knowledge and its application, observational and analytical skills, and communication. The review seeks to optimise the examination in order to achieve these objectives, recommending enhanced blueprinting to ensure full curricular coverage and the use of some anchor cases, seen by all candidates, to enable greater standardisation and allow comparison between candidates.

A further development planned for the examination is the introduction of domain-based scoring, mapped to the purposes outlined above. The purposes are broken down into generic domains, with clearly defined positive descriptors allowing examiners to divide candidates into excellent, clearly passing, borderline and failing categories based upon agreed criteria used during the discussion of a series of imaging cases.

Outside of the examination, the RCR is developing procedure-based assessments (PBAs), predominantly for the assessment of practical work in interventional radiology. These are detailed 'stepwise' assessments of trainees' performance of specific practical procedures, and unlike other evaluations performed in the workplace, may be used both formatively and summatively.

Maintenance of competence

Following certification of the completion of training, radiologists are expected to maintain their competencies, and separate systems are in place to facilitate this, The RCR administers a system of recording credits awarded to radiologists undertaking continuing professional development (CPD) by varying methods, including attending courses and meetings, authoring or presenting research and experiential learning. Radiologists are expected to achieve annual or 5-year targets of points awarded for various activities to show their engagement with CPD, although demonstrating a direct relationship between such engagement and maintenance of competence is difficult.

More direct methods of maintaining clinical competence include participation in departmental learning and discrepancy meetings and other forms of peer development organised between colleagues. The RCR encourages the practice of peer review of a percentage of each radiologist's cases, and although this has been successfully introduced in some areas (eg breast), it has not been introduced throughout radiology, largely due to workforce pressures. In addition, the RCR publishes a regular *Radiology Errors and Discrepancies (READ)* newsletter (Royal College of Radiologists 2012-) based upon cases submitted by individual radiologists, which demonstrate particularly useful or critical learning points. Plans are in place to change the newsletter title to *Radiology Events and Learning (REAL)* in order to highlight areas of good practice. By these means of sharing both discrepancies and areas of excellence, radiologists seek to maintain and improve their practice by various means of peer learning.

All of these activities (CPD and peer learning) feed into radiologists' annual appraisal and 5-yearly revalidation, and demonstrating engagement with them helps practitioners show evidence of maintaining their competencies. Although these processes have a wider scope than assessment of clinical competence, the latter form part of the process, and radiologists can be assisted by discussing their learning needs and including them in their personal development plan (PDP) if necessary. By these means proficiency may be maintained, and radiologists may aspire to excellence by developing their practice in specific areas.

Conclusions

The RCR curricula have multiple forms of assessment mapped to them, including formative WPBAs and summative examinations. Although the latter represent the high-stake assessments undertaken during training, using the results of all assessments undertaken by a trainee has the potential to give a broad-based (and hopefully more authentic) evaluation of their performance in the workplace. The challenges of administering such an assessment system have been outlined in the key points and text, with differing issues affecting WPBAs and examinations.

Systems to enable the maintenance and assessment of competence following the completion of training are less prescriptive, although radiologists are expected to achieve CPD targets and engage in peer learning, engagement with which feeds into appraisal and revalidation. ■

KEY POINTS

- ✓ Outcomes-based curricula designed to 'produce' competent diagnostic or interventional radiologists with retention of acute skills
- ✓ Assessments are based on local requirements or national curricular formative workplace-based assessments (WBAs) and summative examinations
- ✓ Challenges of performance assessment include standardisation, manipulation and purpose
- ✓ Challenges of summative assessment include validity and reliability, blueprinting to the curriculum, fairness, quality assurance and assessment of performance
- ✓ Successful implementation requires engagement of trainers and trainees, communication of changes, educator development, facilitation of delivery and encouragement of participation
- ✓ Maintenance of competence is through continuing professional development, aspiring to proficiency and excellence.

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The power of the #hashtag

Instigating change to theatre environments through social media

Being identifiable in theatre has a multitude of benefits—from improving communication to improving experiences of patients and reducing stress and anxiety in theatre.

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Change within the healthcare system

In an ever-evolving healthcare system, the need for adaptation and change is important. The changing demographic of patients accessing healthcare today compared to just twenty years ago is evident as is the response in terms of technological advancements in care provision and research. The need for change within healthcare is widely recognised and models such as the UK NHS change model, which aims to transform, develop and achieve change to improve patient experiences and safety have been produced (NHS England Sustainable Improvement Team 2012). While change models are usually utilised at corporate or management level to bring about change within a hospital trust or across the healthcare system as a whole, this top-down approach to change can and often does take time to disseminate through the workforce. Initial drivers for change can be lost as the workforce does not usually have an active role in instigating the proposed change idea. Sometimes within healthcare an idea for change comes along, which is brought about by frontline staff and often referred to as a bottom-up approach to change. This kind of change can happen much faster within a workforce as the proposed change is usually patient-focused instead of being service-led which, more often than not, top-down change proposals are.

'Bottom-up' approach to change

Until recently the bottom-up or grassroots campaign or initiative for change has been difficult to instigate as healthcare workers usually work within one sector within a hospital and are limited in terms of dissemination of a change idea across a trust and even more restricted in terms of being heard from higher up the management ranks. However, the use of social media over the past decade has seen an increase in the number of healthcare change campaigns in the form of hashtag campaigns. This has enabled the frontline work force to be more active in spreading the word, and the accessibility social media brings in terms of inter-trust relations seems to be a valuable asset to the bottom-up change approach. Another benefit to social media is that hierarchical barriers are often broken down, allowing students such as myself to be proactive in facilitating change not just within one trust but on an international level.

Hashtag campaigns and initiatives are more and more being recognised as a reputable way of raising awareness of change or where change is needed within the healthcare system. One very poignant social media campaign, which inspired me as a student, was that of fellow student midwife, Hannah Tizard. Hannah's #BloodToBaby campaign helped in raising awareness of the importance of delaying clamping and cutting of the umbilical cord after birth. This campaign was formally endorsed by the UK National Institute for Health and Care Excellence, and the change in national guidance and policy has arisen from this (Tizard and Burleigh 2016). Other important hashtag campaigns include the #HelloMyNameIs campaign by the late Dr. Kate Granger and husband Chris Pointon and the #SkinToSkin campaign by midwife Jenny Clarke. Campaigns such as these are usually born from observing current practice routines and seeing a need for change or from personal experiences. The power of social media in the spreading of a popular hashtag campaign has been experienced by myself over the past year as my #TheatreCapChallenge campaign went viral, spreading across the world to countries as far as Australia, America and China.

#TheatreCapChallenge: a hashtag is born

At Lancashire Teaching Hospitals Trust (LTHTR), delivery suite manager, Emma Gornall, and the team have been working hard to improve birthing experiences of women having surgical birth. The importance of positive birthing experiences outlined in the Better Births Review (NHS England 2016) make clear the need to reduce the numbers of women entering maternity services having experienced birth trauma and post-traumatic stress disorder (PTSD) directly relating to

birthing experience. The implications of negative birthing experiences include postnatal depression, tokophobia (fear of birth) as well as issues with bonding and breastfeeding (Ford and Ayers 2012). It has also been shown that anxiety and stress can delay healing (Kim et al. 2014). While we can improve experiences and outcomes of women having normal birth with midwifery-led birth centres, we also need to look at what we can do to improve the experiences of women in theatre. At LTHTR, the focus on improving experiences for women and families in theatre has seen a number of changes, including the introduction of low lighting in theatre, music, battery-powered candles, immediate skin to skin, breastfeeding support while on the operating table and birth partners present throughout. Feedback has been positive from women and families so we looked at where we can do more. After a conversation on social media, Emma Gornall suggested writing our names on our theatre cap in a bid to reduce anxiety for women and I immediately recognised how this could be beneficial in more ways than one.

Driver for change

From personal experiences in theatre having a surgical birth, I knew first-hand how scary it can be. I also remember how I felt anxious because I wasn't sure if the woman in scrubs

"HASHTAG CAMPAIGNS AND INITIATIVES ARE MORE AND MORE BEING RECOGNISED AS A REPUTABLE WAY OF RAISING AWARENESS OF CHANGE"

was the midwife who had been caring for me up to the point of going to theatre and I was just too fearful to ask. I also remember feeling confusion as different people all wearing the same set of scrubs and hats spoke to me and this alone brought about feelings of a loss of control which now looking back impacted massively on my birthing experience in theatre that day. As a student observing other healthcare professionals in theatre it is easy to see how recognising these feelings in patients can be missed. For people regularly working in theatre, the theatre environment becomes normal and not scary at all, which is understandable, but this comfort

in our own surroundings and working environments can subconsciously cloud our ability to empathise with the patient.

One day, while caring for a woman who I knew was particularly anxious about going to theatre, I decided to write my name and role on my theatre cap. Being a student is scary enough in theatre, but being the first to do such an alien act was even more scary. However, feeling particularly brave that day mixed with a passion to improve women's experiences I did it! After a mixed reception from theatre staff from a few odd looks and questioning of what I had done to others instantly saying how it was a fantastic idea it was the feedback from the woman in my care and her partner that clinched it. She said it put her at ease and this was what mattered to me. I instantly wanted to share with Emma and my colleagues that I had done this so I posted a picture of my hat on social media and came up with the hashtag in a bid to inspire others to do the same. Little did I know that not only would it inspire colleagues within my trust to do it, but it also inspired theatre teams all over the world to do it too. Shortly after posting the hashtag, an anaesthetist called Rob Hackett from Australia who had previously written about the importance of writing names on theatre caps in improving patient safety and reducing human factors began to share the campaign and more benefits to this simple act became apparent. After a few weeks the campaign grew as more and more people posted their #TheatreCapChallenge pictures on social media.

Since it began almost a year ago NHS trusts up and down the country have implemented and championed the practice of writing names and roles on theatre hats. While it was originally born from a passion for making birthing experiences for women in theatre better, the idea has been adopted by different theatre teams including day case theatres, transplant teams and paediatric teams to name a few. While some question the evidence behind the practice in relation to patient safety before wishing to put pen to cap, for me the only evidence I need that this has huge benefits within the theatre environment is that of the feedback from the women and families within my care. While women and families feel the benefits from this simple act, I will always champion #TheatreCapChallenge. ■

KEY POINTS

- ✓ Social media is now seen as an important tool in instigating changes within healthcare
- ✓ A simple hashtag campaign can spread quickly and inspire change across the world in a short space of time
- ✓ Being identifiable to each other and to patients in theatre has many benefits

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Captivate staff with animation

Explainer videos as a communication tool

Whether you want to teach staff, motivate them, alter their perceptions, or simply share an idea, animated video is an engaging and memorable approach.

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The introduction and evolution of innovative ways to represent concepts and topics via animated video have vitalised the learning environment, and these continue to develop. Not only technological advancements but psychology and neurology research are opening new avenues. Striking visuals, illuminating sounds, inspiring music, text and narration accompanied by well-structured content appeals to a variety of different learning types. Animated videos are also perfect for expressing ideas quickly while content that activates an emotional response is memorable. A popular use of animations is to show things that can't be shown easily in real life, such as dynamic content and the interaction of invisible phenomena. From illustrating the performance of cells in a disease to showing the benefits of a computer programme, anything can be simulated in an animated video. There are many types of animations. Lowe (2003) identified three sorts of animation: transformations, in which the properties of objects such as size, shape and colour alter; translation, in which objects move from one location to another; and transitions, in which objects disappear or appear.

The science of learning with animation

Many different factors can influence the way people learn with animations and the success of any particular application will depend upon the interaction of many different factors (Ainsworth 2008). Ainsworth suggests that there are six levels to understanding learning through animation: expressive; cognitive, motor and perceptual; affective and motivational; strategic; metacognitive; and rhetorical.

• Expressive

There are many ambiguities to consider with expressiveness, which if not considered can affect the way an animation is interpreted. They should not be overly abstract. Expressiveness also looks at the need to represent actions in a specific sequence in order for them to be properly interpreted. This is usually great, but can be problematic if the dynamic activity being represented involves separate, often overlapping sequences.

• Perceptual, motor and cognitive

According to Ainsworth, an analysis of the perceptual, motor and cognitive aspects of learning with animation indicated that while animation might make dynamic information clearer, reducing the amount of cognitive effort needed, it could introduce problems—the short-lived nature of perceptual processing and memory can become a barrier, so supporting animation with other tools could be useful.

• Affective and motivational

Motivational and affective descriptions of learning with animation propose that some learners report a boost in motivation after being exposed to animation, reports Ainsworth.

• Strategic

The strategies which students use when learning with animation are key to their essential understanding. The indication is that more experienced learners find it easier to study with animation.

• Metacognitive

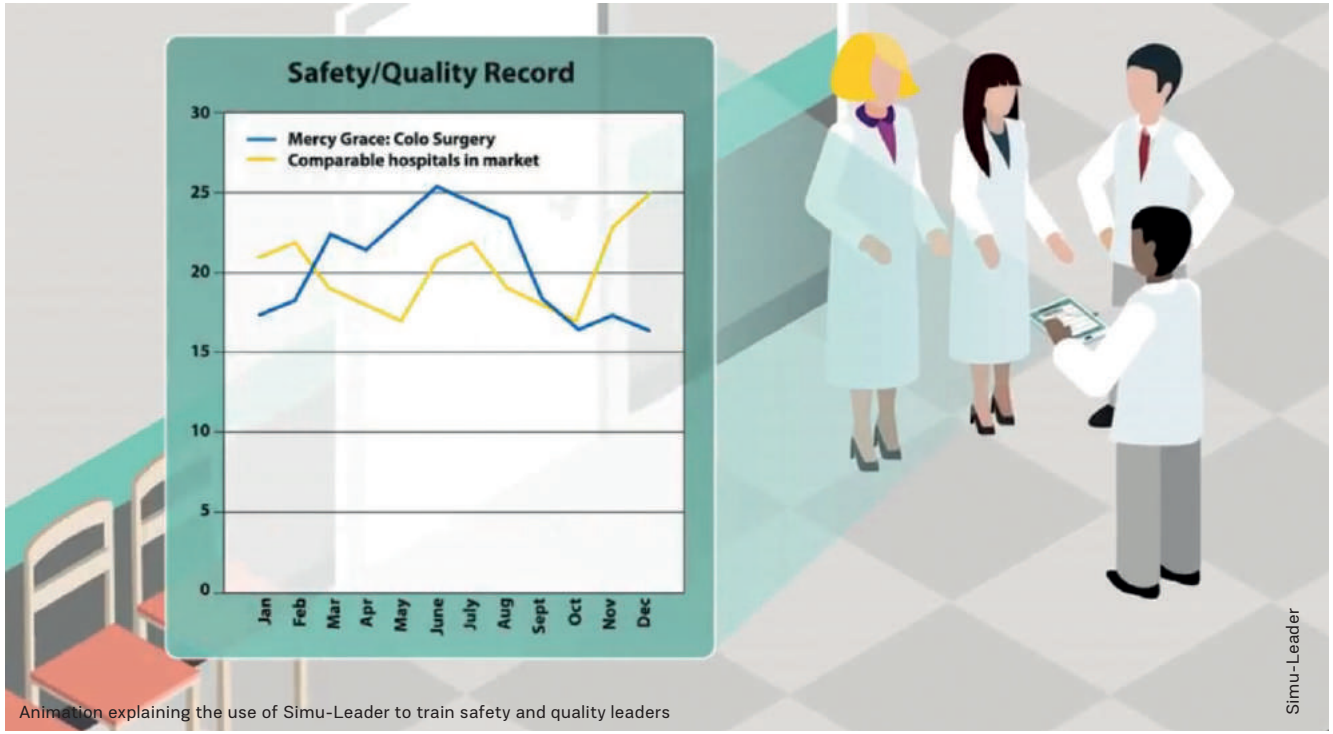
Ainsworth suggests that there is limited evidence to suggest that animation helps learners to achieve effective metacognition, so again it is important to support animation with other methods.

• Rhetorical

Concerning learning in social situations, evidence is mixed—some researchers report increasing effective communication with animation in social situations and some decreased.

Combine emotion with information

By using animation as an educational device, we are acknowledging the brain's limbic system's inextricable link with emotion, memory, attention, drive and learning. Emotional responses affect attention and memory and are intricately linked to whether or not we act on



Animation explaining the use of Simu-Leader to train safety and quality leaders

Animation about the immune system and phagacytosis

information. Research has shown that the emotional area of the brain is linked to the cortical areas where cognitive learning occurs (Goleman 2010). Far more neural fibres project from our brain's emotional centre into the logical/rational centres than the reverse, so emotion is often a more powerful determinant of our behaviour than our brain's logical/rational processes (Hayes et al, 2015). In his research on how animations influence learning, Ainsworth (2008) highlights that one positive emotion that has been linked to increased learning is that of flow (Csikszentmihalyi 1990). Flow is considered to be the mental state in which people are fully immersed in whatever they are doing, and is characterised by a feeling of energised focus, full involvement, and success in the process of the activity—ie, a pleasurable emotional state.

Your animated explainer video might include humour, adventure or just be a happy story. To achieve the desired emotional response, thought needs to go into all areas from the storyboard to characters to voiceover. Animated agents—characters that show enthusiasm and useful gestures—have become very popular in educational animations. A friendly or recognisable voiceover can also make a lot of difference to an animated video's appeal.

"A POPULAR USE OF ANIMATIONS IS TO SHOW THINGS THAT CAN'T BE SHOWN EASILY IN REAL LIFE"

The desire to learn and progress in a certain area or organisation is another relevant part of the limbic system. Just the production of animated videos may motivate employees as they see that they are valued, which appeals to their feelings of worth and can improve attitude. If in the animated story you recognise exactly the issues and challenges involved in their jobs, you could enhance their respect for management and raise morale. The content of the animated explainer video should reinforce these values. There is plenty of empirical evidence that people will choose animations when provided with learning environments that include them, found Ainsworth (2008).

Apply powerful visual imagery

The most important element about any communicational content is that the target audience engages in it. According to Web Marketing Group (n.d.), 90% of information transmitted to the brain is visual, and visuals are processed 60,000 times faster in the brain than text. Findings also show that 40% of people respond better to visual information than plain text.

Furthermore, *The State of Video in Education 2015: A Kaltura Report* (Kaltura 2015) found that 66% of higher education institutions use a variety of video for remote teaching. It's clear that making learning within your hospital, ward or clinic more enjoyable makes it more gratifying and effective, and the desired outcome is more likely to occur. One thing that is now widely accepted is that accompanying animated images with narration rather than text is more effective (Ainsworth 2008).

What your animated video can achieve

Have you considered using animated video to present corporate policy guidelines, or even monthly newsletters? How about as a tool in staff training programmes? The key for any animation is to have a clear objective in mind. This will involve a lot of decisions regarding the script, illustrations, animation technique, the length of the video and style. Popular uses of internal communications animations include:

- To teach new procedures
- To communicate corporate policies and health and safety guidelines
- A tool to support staff training
- A way to improve communication between employees and departments
- To present a monthly newsletter in an engaging format
- To explain new products and services
- To announce company changes in an attractive way; and
- As a way to show recognition and motivate staff.

Animation's potential for storytelling can help achieve many of these objectives, since placing information within engaging stories is a great way to encourage people to retain facts. A story can also help employees to identify with the organisation, its values, culture and objectives and the direction it is taking.

Captivate with whiteboard animations

The best choice of animation technique will often depend on the purpose of the video. The Royal Society for the encouragement of Arts, Manufactures and Commerce (RSA) was the first to successfully apply whiteboard animation in a way that explains complex ideas clearly, and its use has since skyrocketed. You have probably come across some of these yourself—usually identified by the presence of an illustrative hand which draws pictures on a whiteboard-like screen to guide the viewer through images which illustrate the audible narrative. Infographics can be included to provide more detail in a structured way. This makes a concept easy to follow and avoids overwhelming the audience. Whiteboard video is a popular way to share a lot of complex information in a short space of time.

Animation is exceptionally versatile, and does not restrict imagination. For example, the image of a huge puffing rain cloud to represent cloud storage could form part of an entertaining story and make a complex explanation far more interesting and memorable. The cloud could also form part of an infographic, with an affable animated character leading viewers through the topic. Likeable characters that employees can relate to will rouse positive emotions.

Other useful techniques for clarifying concepts are split screens and time lapses. Animations can be valuable for presenting dynamic content, including changes over time. You can also include some live-action footage within your video.

If you opt for a series of videos, it can be a great idea to harmonise them in some way, such as by including the same characters and voiceovers in each, so that employees feel a sense of familiarity as they watch them.

Facilitate visualisation with motion graphics

Motion graphics are fantastic for storytelling, but a lesser known benefit are their potential to describe detailed concepts that are difficult to explain via text or real-life demonstration. A medical procedure can be explained with audio and animated images, with organs shown clearly. Even cells and their interaction can be explained concisely. It enables the audience to actually see what happens in an easy-to-follow manner. Animation can expand or minimise things when needed and provide a 360 degree view. Specific functions and changes can be shown simply and clearly. This facilitates quick understanding and is usually less tedious than learning through reading text. An area where animation has been extensively studied is algorithm animation (a dynamic visualisation of a programme's data, operations, and semantics). Kehoe et al. (2001) reported that students typically respond positively that they are "relaxed, more confident in their knowledge and more open to learning."

> "PEOPLE WILL CHOOSE ANIMATIONS WHEN PROVIDED WITH LEARNING ENVIRONMENTS THAT INCLUDE THEM"

When it comes to explaining new processes and policies at work, creating animated characters that represent each role (or even employee, if your company is small) is an effective and fun approach. Staff can even be presented as superheroes. If your internal communications explainer video is enjoyable, staff will discuss it between themselves, improving retention. No doubt there are some quirky and inspiring children's cartoons that have never left your mind which you could use as inspiration.

Creative and memorable animation for Datadial illustrating teamwork

Spiel

Presenting and sharing your video

The manner and location in which your audience view your video may depend on its purpose. They could be shown first in an office environment without distractions to minimise cognitive load and improve employees' ability to process the video's content; then they might be placed on a video-sharing site like Vimeo to be shared in social media or distributed via email. If employees have access to the video on their computers and mobile phones, they can watch it again and again and increase their level of understanding if needed. A Cisco study found that by 2021, as much as 82% of consumer internet traffic will be devoted to watching video; up from 73% in 2016 (Cisco 2017). Furthermore, online video viewing on mobile devices has been expected to take over desktop viewing.

Conclusion

No doubt there are also many more ways you can make use of this innovative tool. Just assess your objectives, explore animation's potential, and use your imagination so that your video is informative as well as memorable. Support the concepts taught via your animated video with other educational methods such as detailed documents, presentations and other uses of multimedia and you are likely to achieve great success. ■

KEY POINTS

- ✓ Animated explainer videos can be used towards effectively and efficiently educating and motivating staff
- ✓ They can be used in various departments and for diverse purposes, including algorithm animations and medical animations
- ✓ Animated videos combine emotional and logical stimuli, which is effective for rousing attention, improving memory and cultivating learning
- ✓ They are a popular choice for learners

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STAFF MATTERS

1.8m PRACTISING PHYSICIANS IN THE EU (2015)

Source: https://iii.hm/n7k

WOMEN LEADERS IN HEALTHCARE

44% UK

34.5% USA

Sources: https://iii.hm/n7l
https://iii.hm/n7m

UK NHS HEALTHCARE ORGANISATIONS: 44% OF CEOs ARE WOMEN

Source: https://iii.hm/n7m

BURNOUT

"A burned-out physician costs between **US$500,000** and **$750,000** a year—in terms of replacement costs, lost productivity, etc"

Source: https://iii.hm/n7p

PHYSICIANS REPORTING BURNOUT

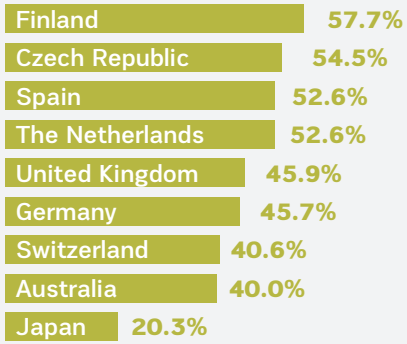
38% MEN

48% WOMEN

Of these, 56% reported too many bureaucratic tasks (eg, charting, paperwork) contributed to burnout

AN EQUAL WORKFORCE?

% OF WOMEN DOCTORS



Source: https://iii.hm/n7o

5 STRATEGIES FOR COPING WITH STRESS

1. Emotional self-awareness:
Understand and be aware of your emotions, skills and abilities

2. Emotional self-management:
Manage your emotions and behaviors.

3. Empathy:
Actively listen and seek to understand others.

4. Teamwork:
Stay connected to others.

5. Conflict management:
Acknowledge and manage conflict

Source: https://iii.hm/n7s

WHAT TO DO ABOUT BURNOUT

Learn - understand the latest developments

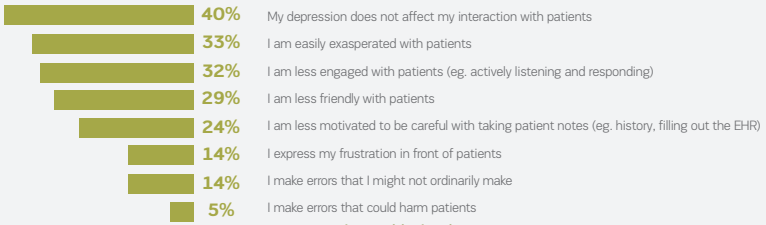
Listen - to how physicians feel about their work

Measure - measuring burnout's impact is an important step towards resolution

Rethink - shift approach to clinical work, making physician vitality and wellbeing an *explicit* institutional priority

Source: https://iii.hm/n7r

DOES YOUR DEPRESSION AFFECT PATIENT CARE?



Source: https://iii.hm/n7q

9 ORGANISATIONAL CHANGES THAT LEAD TO PHYSICIAN SATISFACTION

Engage senior leadership	Track costs of burnout	Create a champion position	Measure burnout across the organi-sation	Strengthen local leadership	Track impact of interven-tions on well-being	Improve workflow efficiency	Cut electronic health record (EHR) time	Support physician self-care

Source: https://iii.hm/n7t

The boundaryless hospital

The new role of hospitals and the triple aim challenge

The concept of the boundaryless hospital, in combination with the value chain approach, provides the theoretical basis for an effective and efficient network design.

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Initial situation

The highly developed healthcare systems of the western countries will, generally, face similar challenges over the next five to ten years. These include:

- The phenomenon of an ageing society which is causing a rising number of multi-morbid patients
- The increase of age-related diseases
- In addition, a rise in the number of chronic diseases, especially those related to an unhealthy lifestyle (work stress, poor nutrition, lack of activity)
- Medical-technological progress will enable more precise diagnoses and innovative intervention techniques, which also makes it possible to treat aged people more effectively
- A growing mentality of entitlement among patients regarding the diagnostic and treatment potential of modern medicine

On the one hand, these trends will undoubtedly contribute to a rising demand for qualified health services. But on the other hand, strict financial limitations narrow the policy option for healthcare provision. Moreover, ethical questions arise and dominate the discussion surrounding the ethics and equity of health services distribution and the limits that medical interventions have to respect. There are many questions. Should we administer any medical service to patients that we basically can?; do the economic factors override the medical aspects?; is rationing an appropriate approach for balancing an excess demand for health services and the limitations of financial resources? These questions will have a central impact on the design of medical service structures in the future. In other words, the increasing demand for state-of-the-art medical services, performed in a healing environment, has to be achieved with limited budgets.

Against this background, it is necessary for a viable structuring of the health care system in future, to find medical supply forms that:

- Conform to patients' expectations
- Ensure the fair distribution of effective evidence-based medicine to the community and
- Integrate innovative treatment into the healthcare system in a way that ensures clear benefits and financial viability

These organisational forms of provision, which focus on therapeutic effectiveness and efficient use of resources, require the goal-driven cooperation of different medical specialists.

Therefore, the economic component, as a design parameter for medical service structures, plays a more and more important role. As a consequence, the successful organisation and management of a hospital requires:

- A patient-centred medical service portfolio, which is strictly oriented to the needs of the healthcare market
- Offering selected, highly specialised and innovative medical services ("lighthouse" performance), as well as state-of-the-art care provision for the basic medical needs of the population in a limited catchment area
- Strict orientation of the design of internal processes to patient needs
- Goal-driven and economic cooperation with highly qualified external partners who are capable of contributing to the successful treatment of patients suffering from complex diseases
- A holistic approach to the diagnosis and treatment of patients along the care continuum and
- Assurance of complementary treatments for multi-morbid patients.

The "Triple Aim"

In order to master the future challenges the developed healthcare systems are faced with (increase of elderly people, multi-morbid patients and chronic diseases, cost pressure, technical progress in medicine, entitlement mentality of patients) the provision of medical care has to be organised in networks, which interconnect primary care services with acute care treatment, rehabilitation

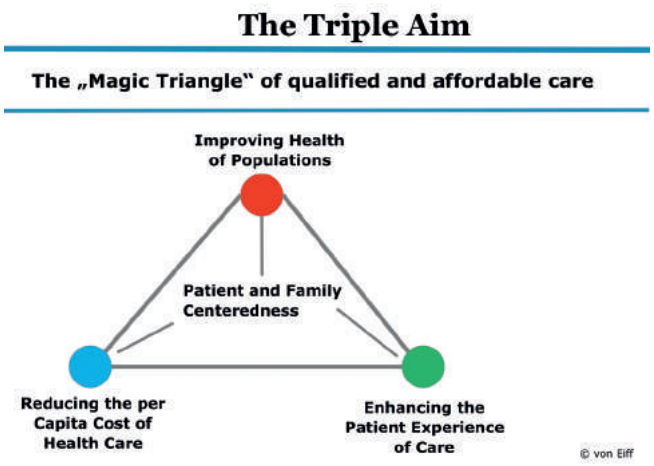

Figure 1. The new approach in providing cross-sectoral medical care

and elderly care (especially home care based on telemedicine, health apps and digitalised monitoring devices).

Healthcare policy should extend medical provision to the community and must focus the care approach on populations.

The "New Magic Target Triangle" of health policy (The "Triple Aim Approach"; see **Figure 1**) consists of three components:

"Patient Experience" expresses the requirement of providing high medical quality as well as excellent service performance for patients and relatives. This relates to the obligation to steer the patient smoothly through the continuum of care via case managers and addresses that quality of care inside a hospital is significantly influenced by the design of architecture, the interior fittings, the milieu, the process organisation, the corporate culture and the hygiene management

The second component of the target triangle pertains to the preventive improvement of the general health status of the entire population inside a community and relates to well-defined treatment pathways for selected populations of patients with complex and/or chronic diseases (eg diabetes, arthritis, coronary diseases)

The third component takes aim on securing a sustainable financing of medical services, contains a value-based reimbursement (pay-for-performance) and claims rules for patient compliance and copayment.

This "Magic Target Triangle" gives orientation for future healthcare provision and requires hospitals to overtake a new role in the continuum of care offering integrated services and ensuring best-in-class medicine by coordinating specialist care in networks: in short, the hospital of the future will become "boundaryless".

The boundaryless hospital approach

The boundaryless hospital is patient-oriented, provides a safe environment, the medical knowledge is state-of-the-art and limited resources are used in a goal-oriented (effective) manner and without waste (efficient). Furthermore, the boundaryless hospital overcomes typical negative characteristics of hospitals: multi-bed rooms, lack of privacy and lack of patient autonomy. Therefore, the boundaryless hospital approach incorporates the mission of transforming a typical healthcare setting into a healing environment that improves patient outcomes and employee motivation through the creative use of evidence-based design (M.C. von Eiff 2007).

The boundaryless hospital offers a medical service portfolio alongside the continuum of care, orchestrates cross-sectoral treatment processes by using case managers and information technology (digital health, telemedicine, health apps) as a leverage for optimising clinical processes and services.

The procurement philosophy is oriented to life-cycle costs and patient benefit of a medical device and not driven by purchasing at the lowest possible price level.

Internal boundaries, caused by a silo mentality between professions and departments, with the consequence of poor communication and process inefficiency, are torn down by interdisciplinary delegation, centre organisation and an incentive system that connects both ethical and economic decision criteria.

To realise external integration, approaches like telemedicine, cluster strategy, portal clinics, networks for infection prevention, emergency supply and managed care concepts are used. The basis for a structured implementation of these concepts is the value chain approach.

The medical value chain approach refers to the sequence of supply stages for the complete treatment of a disease (eg cardiovascular diseases; diabetes) with regard to the individual and personal situation of the patient. The medical value chain is defined independently of institutions.

The hospital value chain (Porter and Teisberg 2006) includes all internal and external resources and institutions which are necessary to treat a disease comprehensively. This value chain approach focuses on the division of labour between medical service providers and aims at the appropriate design of outsourcing, cooperation and networks as supply forms.

Networks in medicine and the health business: the "boundaryless hospital" as network coordinator

Networks in medicine constitute a specific organisational type for providing a population or group of patients with healthcare services. The added value of networks, in comparison to individual (centralised) forms of supply organisation results from the following medical and economic aspects:

- Networks are virtual knowledge centres. They mobilise and distribute expert knowledge and make it broadly available

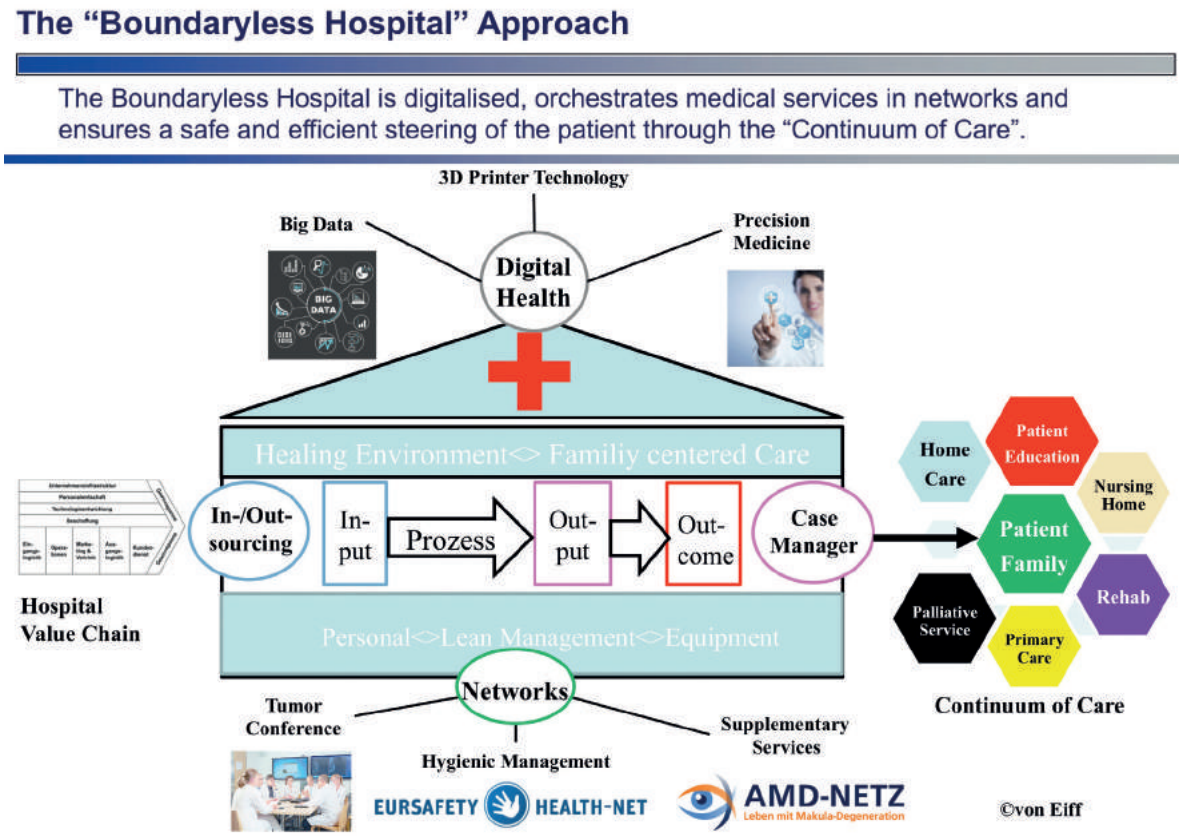

Figure 2. Role and characteristics of the "Boundaryless Hospital".

- Networks create near-to-patient services by dividing up specialised tasks and continuous medical care duties in a capability- and demand-oriented manner
- Networks enable resource sharing and ensure secure investments and utilisation efficiency

The benefit of networking between medical service providers in the healthcare system is not only motivated by a desire to improve quality or to optimise resources, but is also fostered considerably by the intention of saving costs. So, it is indicated that a medically efficient and cost-effective cooperation along the value chain (in the sense of the patient care process from initial treatment until the completion of follow-up treatment) is supported by networks.

The aim of networks is to:

- Increase patient/customer satisfaction (Nagyrapolt 2002)
- Improve patient's well-being (patient outcome)
- Decrease costs per case
- Optimise the patient's pathway through the entire healthcare system in a case-oriented manner, meaning shortening the process and simultaneously performing it at lower cost
- Increase the quality of medical and social care of patients (and relatives) by mobilising the best medical know-how, as well as nursing and physiotherapeutic capabilities
- Improve image so as to develop a brand status

The portal clinic as an element of a referral physicians network

Portal clinics (Münch and Scheytt 2014) are of particular importance for providing a comprehensive supply of medical services (also for highly specialised ones). Such clinics are highly-qualified primary/secondary institutions for health services, which provide precise diagnoses in order to decide whether or not a patient needs a specialised treatment. They are associated with specialised clinics (eg pulmonary/thorax surgery; neurology; etc.), qualified service providers (eg radiology centres) and maximum providers by a telemedical IT infrastructure. Patient records are documented and distributed electronically. This enables fast and precise diagnoses, second opinion consultations via conference calls and targeted acute care. Portal clinics are also of particular importance in emergency care. They give first aid in trauma networks with telemedical connections to maximum care providers.

Integrated cross-sectoral supply models

Cross-sectoral supply models (Preusker 2015) reflect a strategy of bundling the entire medical service portfolio,

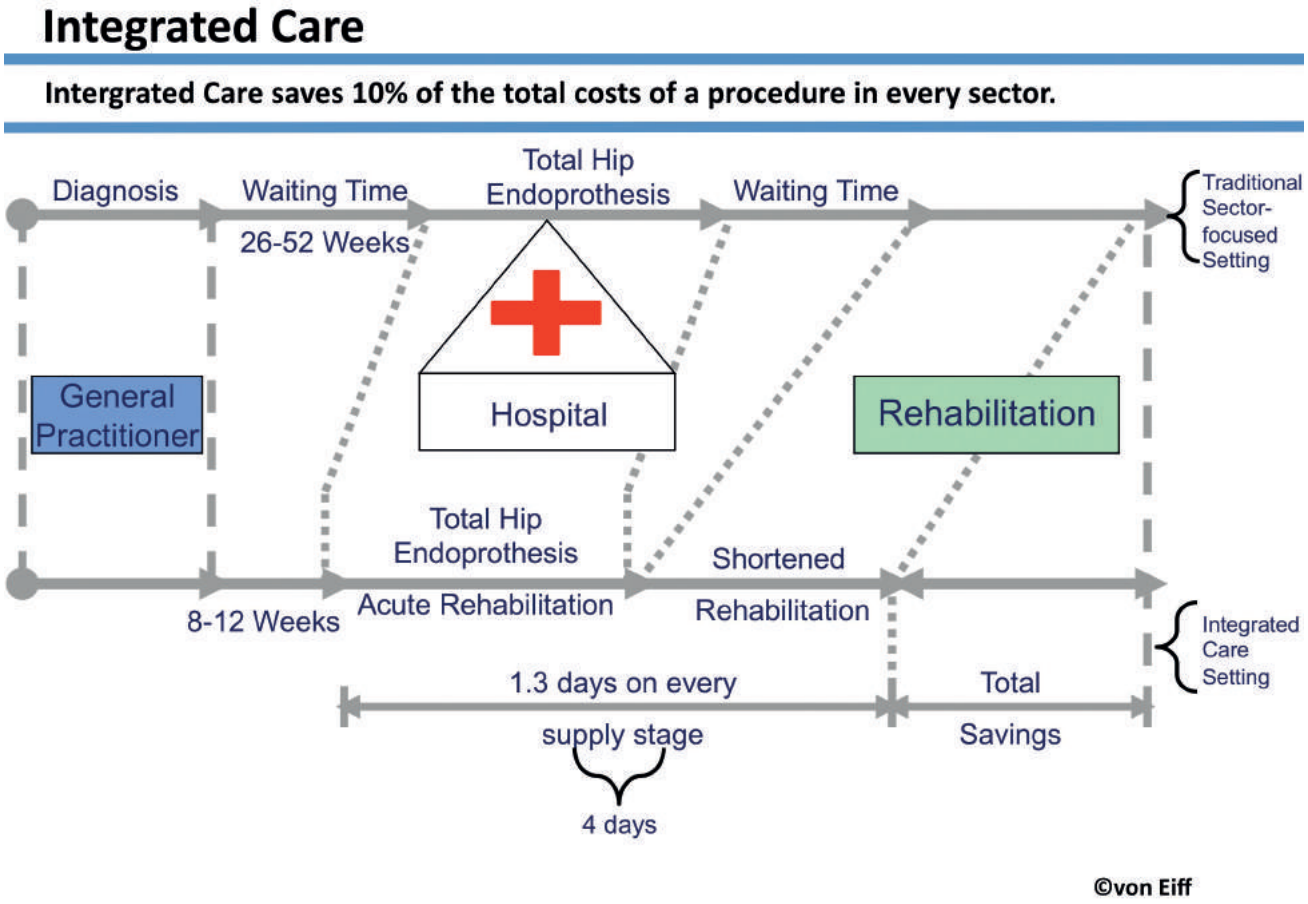

Figure 3. Integrated care provision process flow using the example of hip endoprothesis

which is necessary to treat a disease cross-sectorally and comprehensively, subject to uniform control at a single site or in a single region. These are diseases which on the one hand have an elective character and for which the treatment process can easily be standardised (eg total endoprothesis). On the other hand, these medical provision concepts enable new forms of care for treating multi-morbid patients or those with complexity levels which require intensive medical care in the acute and rehabilitation sector (eg stroke treatment, cardio-surgical patients, transplantations).

Contracts of integrated care

Primary care by family practitioners or specialist physicians, diagnosis and treatment in acute care, rehabilitation and outpatient follow-up are cross-sectorally integrated and allocated to a central case management, which leads to shortened stays in the system, with a simultaneous decrease in treatment costs.

Such care is the basic idea behind integrated care contracts (**Fig. 3**). Diagnosis, therapy and rehabilitation are integrated and achieved without unnecessary waiting times. Follow-up home services enable an earlier discharge.

The integrated care net: supply with managed care character

The integrated supply net (**Fig. 4**) connects medical service providers of different specialisations with the aim of treating diseases without high complexity levels, so as to provide appropriate care and treatment at comparably low cost.

On the one hand such network structures connect medical service providers at different supply stages (family practitioner, hospital, rehabilitation clinic, nursing home, etc.). On the other hand, the medical service portfolio of such networks is the basis for insurance services, which can be obtained at particularly favourable conditions (Herzlinger 1997). Accordingly, the insurance service can be offered together with the medical service from a single source (in a single-contract package = managed care principle). Telemedical services are increasingly integrated into such managed care concepts (Kaufmann 2014).

The road ahead

Networks in medicine are a powerful form of organisation for meeting the challenges of the ageing society, medical and technological progress, as well as the increasing number of more both medically and behaviorally demanding patients. Networks are the organisation of choice, if complex illnesses are to be treated effectively.

Furthermore, networks can be built and steered by financial incentives. Such managed care networks give patients the

choice between different insurance options in combination with the option to request treatment only by selected physicians under contract with a health maintenance organisation.

Networks contribute toward enhancing medical quality for the broader population and specific patient groups and toward simultaneously containing costs in the health system. The "Boundaryless Hospital" plays a pivotal role in network medicine and drives the cross-sectoral digitalisation of medicine along the continuum of care. ■

KEY POINTS

- ✓ In our ageing society, the number of patients suffering from multi-morbidity and/or chronic diseases has rapidly increased.
- ✓ The cost-intensive progress in medical technologies is leading to more precise diagnostic
- ✓ Innovative surgical interventions, enable treating patients with complex illnesses, as well as elderly people, more effectively
- ✓ The idea of the boundaryless hospital combined with the value chain approach, offers a sound base for a productive network design
- ✓ The boundaryless hospital provides medical care in a way that contributes to the new philosophy of health care policy: the "Triple Aim"

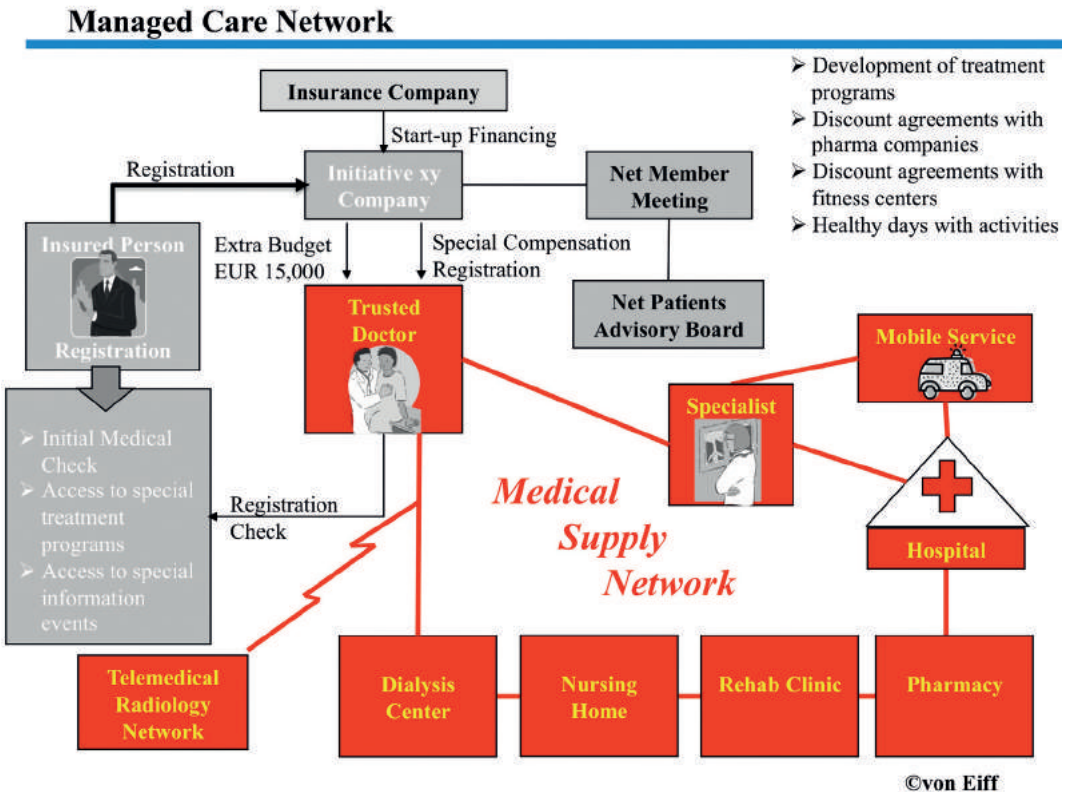

Fig 4. Medical supply networks with a managed care character

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How architectural design is breaking down healthcare silos

Jacobs Institute idea to Reality (i2R) Centre addresses major health crisis

A medical innovation centre shows how a one-stop-shop approach to CVD medical device creation is accelerating impactful results for all stakeholders.

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There is a global health crisis in cardiovascular disease that will require out-of-the-box thinking, collaborations, and partnerships in innovation in order to change course. Hospitals, universities, industry, and more will have to partner to take a fresh approach.

The Jacobs Institute in Buffalo, New York, is hoping to make such strides with the opening of its i2R, or Idea to Reality Centre, to impact medical device innovation and hopes others will collaborate and take a similar path in order to impact patient lives.

The Heart of the Crisis

Stroke and cardiovascular disease are the leading causes of disability and death in the world. According to the World Health Organization, an estimated 17.7 million people died from cardiovascular disease in 2015, representing 31% of all global deaths (WHO 2017).

Of these deaths, an estimated 7.4 million were due to coronary heart disease and 6.7 million were due to stroke. In addition to personal devastation, the economic impact on society, communities and individual families is staggering.

The World Heart Federation notes that by 2030, the total global cost of cardiovascular disease is set to rise from approximately $863 billion USD in 2010 to a staggering $1,044 billion USD (World Heart Federation 2018).

Innovation saves lives

The medical device industry has quite literally transformed modern medicine, saving or improving the quality of life for those suffering from heart attacks or strokes, known as vascular disease.

In vascular disease, thanks to catheter-based procedures using medical devices, minimally invasive treatments of the brain and the heart are today important alternatives to traditional invasive treatments. However, the field is still in its infancy, and the need for better devices is critical.

New breakthrough devices illustrate the potential for significant advances in the treatment of vascular disease. Until recently, the treatment of heart attack and stroke was limited to the use of drugs designed to dissolve the clots inside arteries causing the dangerous blockages. The risk of haemorrhage, lack of success and short time limitations for treatments proved to be major concerns. Today, catheter-based treatment with stents has revolutionised the treatment of heart attack, and stroke appears to be following a similar trajectory. Several recent clinical stroke trials including MrCLEAN (Berkhemer, O.A., et al. 2015) have provided Level I evidence of the safety and efficacy of the mechanical removal of clots in stroke patients to restore blood flow to oxygen-starved brain. New devices used in these trials represent a groundbreaking advance in reducing the number of patients devastated by the 15 million strokes suffered worldwide annually, according to the World Stroke Organization (2012).

Rapid mechanical clot removal to reverse the effects of stroke in its early stages is just one example that clearly illustrates the need for a place where new and better ideas for devices can quickly become reality.

Right people, right place, right time

The Jacobs Institute (JI), located in Buffalo, New York, is dedicated to developing next-generation technologies to treat cardiovascular disease through collisions of physicians, engineers, entrepreneurs, and industry. It recently launched the i2R, or Idea to Reality Centre, which focuses on developing smart-engineered endovascular medical devices at a faster pace and in a more cost-effective way to improve quality of life and reduce costs for patients, providers, and health systems across the globe.

The i2R is located in a one-of-a-kind building in which the entire product development, vetting, and proof-of-concept process, can occur in one place. It is sandwiched between and partnered with Kaleida Health's Gates Vascular Institute (GVI) clinicians and the State University of New York (SUNY) at Buffalo vascular research scientists—yet independent from both entities. The i2R has access to clinical and scientific expertise

and feedback, prototyping and product testing lab space, and imaging facilities. The i2R will take innovation concepts from the initial idea all the way to proof of concept, demonstrating that they will work well in patients. The i2R is, literally, uniquely positioned to transform innovation and address a long-standing health care crisis.

As a not-for-profit 501C-3 innovation centre focused on vascular disease, our biggest killer and crippler, located in the heart of and partnered with a multidisciplinary clinical and research vascular centre, yet fully independent from both partners, i2R is a unique innovation concept. Failure to reach proof of concept results in no cost to the inventor, as innovation is funded by philanthropy and state-funded economic development grants. For successful projects JI will ask for royalties or minimal equity toward an eventual self-sustaining i2R but the inventor will retain all intellectual property and control of the vascular device or drug. And JI will be happy to help the inventor find a commercialisation partner.

i2R strength through partnerships

Having the right partners in-house is a first step, but leveraging strategic external partners will also help to accelerate the kinds of medical device breakthroughs needed to treat this health crisis.

Clinicians, scientists, and entrepreneurs are brought together by the building construct that was designed to create purposeful and valuable collisions among minds, collaborations between people, and innovations from all sources. The JI's invaluable partnerships with SUNY at Buffalo's Clinical and Translational Research Centre and with Kaleida Health's GVI have given the i2R enormous resources at a low cost and access to brilliant scientists and world-class clinical expertise. Imperatively, the i2R sits in the heart of a clinical facility, thereby ensuring physician feedback at every stage of the process. It is a differentiating factor that isn't replicated with consulting firms or device testing facilities.

Creating future technology has a greater chance when tapping into current leaders in the space, those already manufacturing the devices. The JI has extensive relationships with vascular medical device industry leaders and ongoing programmes with them to train and immerse company inventors, entrepreneurs, and product development experts in the clinical environment located just below the JI. These partnerships will lead to opportunities for product co-development and create a favourable environment for industry to acquire proven technologies.

Further, establishing external partnerships serve to bolster innovation capabilities. JI partners have expertise in device manufacturing, clinical research, and data analytics, thereby leveraging device development expertise, federal regulatory experience, and advanced computing for product testing. Each of these partners increases the reliability and validity of the i2R innovation process. The first i2R projects

are collaborating with experts in aerospace engineering and west coast entrepreneurs with a proven track record in creating life-saving technology.

Finally, entrepreneurial relationships are also critical to commercialisation of ideas that translate into devices for patients. JI has ties to the west coast, Boston, and Minneapolis neurovascular entrepreneurial communities. These relationships will drive a continual flow of potential commercialisation opportunities. As we work to expand this network around the nation and the globe, the pace of idea flow will grow dramatically.

There is an urgent need to combat the burgeoning cardiovascular disease health crisis with smart-engineered medical device technology. Physicians, researchers, entrepreneurs, medical device companies, and regulators will need to collaborate to find the best solutions. The i2R's aim is to foster collaboration of those best and brightest minds in order to rapidly create cutting-edge devices to tackle this serious public health issue. ■

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Capture atrial fibrillation using Preventicus applications with >95% accuracy

International validation study published in Europace

The European Journal of Pacing, Arrhythmias and Cardiac Electrophysiology of the European Heart Rhythm Association (EHRA) of the European Society of Cardiology (ESC).

Early detection of atrial fibrillation (AF) is essential for stroke prevention. Emerging technologies such as smartphone cameras and smartwatches using photoplethysmography (PPG) are effective for atrial fibrillation screening.

The study DETECT AF PRO compared a PPG-based algorithm against a cardiologist's ECG diagnosis to distinguish between AF and sinus rhythm (SR). The Germany-based company Preventicus GmbH provided the application for analysis of plethysmographic raw data of the study participants. The application Preventicus® Heartbeats", a CE-marked medical device in the EU, takes pulse recordings by smartphone camera or optical sensors inside standard smartwatches and wearables.

The results of the DETECT AF PRO trial (ClinicalTrials.gov ID: NCT02949180) were introduced for the first time at the European Heart Rhythm Association Congress (EHRA 2018) in Spain and are now published in *Europace – the European Journal of Pacing, Arrhythmias and Cardiac Electrophysiology* of the European Heart Rhythm Association (EHRA) of the European Society of Cardiology (ESC).

DETECT AF PRO is a prospective, double-blinded, international study; a total of 592 patients with at least 1 minute of sufficient PPG signal quality and interpretable iECG were included for final analysis. Total accuracy of the smartphone camera application to detect atrial fibrillation was 96.5% with a positive predictive value of 99.3% compared to the ECG-based diagnosis of two cardiologists by mutual agreement.

The results of the WATCH AF trial, the world's first international, prospective and double-blinded clinical trial (ClinicalTrials.gov ID: NCT02956343) evaluating the accuracy of a smartwatch to detect atrial fibrillation were also presented at the EHRA 2018in Spain. Preventicus GmbH also provided the application for blinded analysis of 1 minute plethysmographic raw data (recorded with Samsung Gear Fit II smartwatch) of the study participants. Total accuracy of the application was 95.7% with a positive predictive value of 97.8% in comparison to the ECG-based diagnosis of two cardiologists by mutual agreement.

The smartwatch application Preventicus Nightwatch® incorporates that algorithm. It can continuously 24/7 analyse plethysmographic raw data and document atrial fibrillation events lasting at least one minute. The application is launched in Europe as a certified medical device (CE mark class IIa).

Why screening of AF with smart devices makes sense and helps prevent strokes

Stroke is the second most common cause of death and is strongly associated with undetected or untreated AF—the most common sustained cardiac arrhythmia. AF may come and go and is often not noticed (silent AF). Its sporadic occurrence is the main reason why it is so difficult to capture. Chances to detect sporadic AF with 'classic' methods (e.g. 24h-Holter-ECG) are around 25% only. It is estimated that every ten seconds a stroke happens in combination with unknown or untreated AF. Only when AF is detected and confirmed, can for example pharmaceutical treatment be started and the rate of strokes be significantly reduced. This is why smartwatches and smartphone camera applications now aim to close a gap. They are considered as new AF screening tools in a recent EHRA consensus statement and make AF population screening—to prevent strokes—available to patients and medical professionals. ■

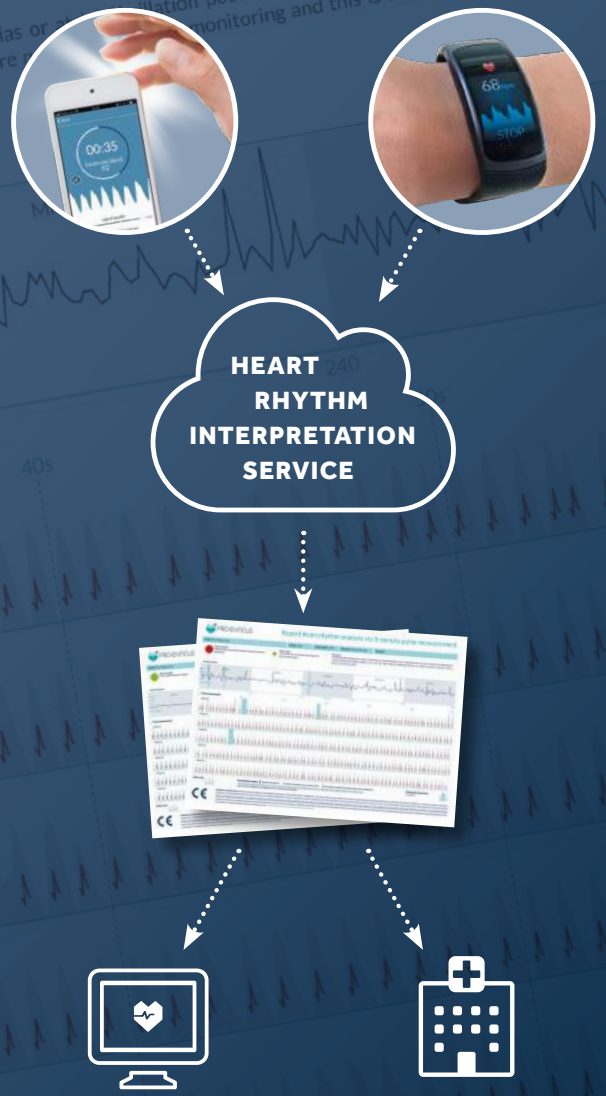
PREVENTICUS
RHYTHM IS LIFE

Long-term heart rhythm measurements and capturing of Atrial Fibrillation simply with smartphones or smartwatches

Large scale and cost-efficient clinical grade solution.

Patients need nothing else than a smartphone for measurements.

Connected to and plugged into your ecosystem.



- Smartphone camera solution for large scale AF screening of risk patients
- 24/7 passive continuous heart rhythm monitoring with dedicated smartwatches and wearables (especially after cryptogenic strokes)
- Leading EU-based smart heart rhythm interpretation service
- Medical grade accuracy and ECG alike documentation
- Connects to your ecosystem: get patient measurements directly into your hospital information system

www.preventicus.com

ECG comparable accuracy and documentation. Comprehensively validated medical applications.

New clinical validation trials: WATCH AF and DETECT AF PRO
www.preventicus.com/en/evidence

Preventicus GmbH is certified according to ISO 13485:2016.

The need and speed of cooperation instead of competition in research

Questions that need to be answered taking into account benefits for the patient.

Academic rivalry is not in the patient's interest, and as long as patients are not involved in healthcare and healthcare research on an equal basis there will be no solutions for the questions that need answering.

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Leó Szilárd wrote in 1948 *The Mark Gable Foundation* (Szilárd 1961). When asked by a wealthy entrepreneur who believes science has progressed too quickly how to slow down this progress, he says:

> *...Set up a foundation with an annual endowment of thirty million dollars. Research workers in need of funds could apply for grants... Have ten committees, each composed of twelve scientists... Take the most active scientists out of the laboratory and make them members of these committees. ...First of all, the best scientists would be removed from their laboratories and kept busy on committees passing on applications for funds. Secondly the scientific workers in need of funds would concentrate on problems which were considered promising and were pretty certain to lead to publishable results. ...By going after the obvious, pretty soon science would dry out.*

The story is funny and says a lot about science and especially the way it's done. The question is of course: 'If it's popular is it also relevant for patients?' and: 'Is cooperation the way to speed up the process or is competition to be preferred?' From my perspective, the second question has to be answered taking into account benefits for the patient.

How does science work?

Research is done for several reasons but ignorance is an important driver. Since we realised we are ignorant and curious and that we should keep learning, we discovered a lot.

(Doing) research is fun to do. Researchers are excited about solving a problem and society may indirectly benefit from it.

Because we need to know something for a particular reason. Think of designing and building a bridge that saves hours of travel but has not been constructed due to technical restrictions. Or we need the knowledge for making better treatments for patients. This is user-inspired basic and applied research.

Research and the attention of researchers is predominantly guided by hype and the possible impact it may have. Of course, not always, but scientists do the science their teachers and senior researchers do. In every biomedical field at any time there are leads and topics that are believed to yield more and better results.

In a remarkable investigation Professor Aled Edwards from Toronto University showed that most molecular biology scientists work on the same genes (Edwards 2017). There are 20,000 genes and they're only working on a small percentage of them. This is not unique to Canada, but a serious worldwide problem. How can we expect to solve the cancer problem (or many other problems) if we only do research on a limited number of genes and topics? How can we expect to solve these problems when we only grant proposals that do research on these limited topics? How can we expect solutions from the same people that were not able to solve the problem in the past because they only look at these limited topics and the solution is probably somewhere else? By doing the same things again and again we will fail in the same way.

The biggest problem we are facing in healthcare, in my opinion, is the medical-industrial complex (Kapitein 2016). Before we can begin productive research we have to be aware of this complex (we don't have to solve it, we have to pass the hurdle while being aware).

The medical-industrial complex

General Eisenhower went public with the expression 'military-industrial complex' in 1962. It refers to the interweaving of the military forces with government and industry. Through politicians (who depend

on industry for their election and jobs after politics) the different parts of the army are influenced by the industry and manoeuvered to the product of the supplier. Whether this product is actually the best is not the most important issue. It must be sold and a lot of means are justified.

"IF YOU'RE NOT AT THE TABLE YOU'RE ON THE MENU"

This complex works the same in healthcare. The medical-industrial complex consists of all stakeholders: government, research institutions, hospitals, industry (pharmaceutical and medical equipment suppliers), insurance companies, and last but not least patient organisations. The lobbies are strong and often focused on revenue, profit (money) and survival. This in itself is not surprising, and when given good thought does not have to be bad either, as long as there is honesty and transparency about their interest, and the right stakeholders are at the table for discussion and decision. I think we've got a problem with the visitors at the table. All stakeholders are present except patients? If you're not at the table you're on the menu.

As long as patients are not involved in healthcare and research on an equal basis there will be no solutions for the questions that need to be answered. It will be hard to raise the right questions at all. Research will be done by researchers without any prior consideration for what questions patients have. How can we expect the outcome to benefit them? Treatments will be designed with quality standards that are not defined in collaboration with patients. Most trials have 'overall survival' as an endpoint. Why can't researchers and clinicians think of 'quality of life' as an endpoint? If overall survival is not improved by a new treatment but the quality of life is, patients want this new treatment.

How can we take care that treatments will benefit patients and bring them a longer life with good quality instead of a marginal life expectancy often burdened with very intense side effects at high costs? I think that it's now time to work on the question 'Speed through cooperation or competition?'

The patient is the problem and the solution

If better research, better treatments, a longer life with good quality don't come naturally from healthcare professionals that have been active for a long time, it should come from patients. How?

In my opinion three groups have to work together to define questions and give answers: patients, clinicians and researchers. The patient has a problem, an unmet clinical need and a need for care. The patient wants to get her/his cancer under control and wants to live with a good quality of life. The available solution most of the time is a treatment for cure or for life extension. Clinicians know (or should know) the available treatments, the side effects and the impact on quality of life. Well prepared and informed by the doctor, the patient starts a treatment and after a while it becomes clear if the solution works or not. If there is no available treatment for a cure or life extension the patient and the doctor will ask the researcher for a solution that works. This is the assignment for research, how it should work and often does. Doing their job researchers find solutions that translate into new treatments. Hopefully fast, but most of the time this takes years.

One of the reasons for delay is, among others, the aforementioned medical-industrial complex. For several reasons this complex works against patients. One of them is money and this we quite easily understand. But also because of change. Change is difficult because people do not like change. This is a common rule but applies even more to old organisations, and healthcare is an organisation that's existed for more than 2000 years. We seriously have to deal with this.

I like to emphasise that this 'working against patients' is not because of bad intention. I am convinced that there is no stakeholder in healthcare with bad intentions, but 'the way we work' makes us do things that we actually do not want to do. We want to help, but 'the way we work' prevents us sometimes from helping. An example: How is it possible that a good doctor tells her patient that she can't give her a specific drug because we do not know yet what the long-term side effects are? And this patient responds: "But doctor you just told me that I'm dead in 3 months. I'm happy with long-term effects." This is a real-life example. Nobody wants this, still it's happening.

When patients collaborate with clinicians and researchers, the relevant questions will be asked and answered and the right decisions made. Right because it's about the life and death of the patients. When well-informed, the patient makes the right decision. A good example is pancreatic cancer. No results so far and also no results on the quality-of-life part. Cold Spring Harbor Laboratories researcher David Tuveson worked with patients and asked them about the most important symptom that influenced their quality of life: "Pain, Dr. Tuveson, pain". Based on these discussions and working with patients Tuveson decided to work on this: "If we can take away the pain we give them 6 to 12 months more with a good quality of life".

By working in cooperation with patients we will be able to improve the research agenda and research the subjects that benefit patients and society. The good news is it can be implemented tomorrow and in some situations, we're already working in this way. We now have to amplify it, and it has been done before in the 1980s and 1990s by the AIDS movement. They sat at the right table together with government, industry and scientists to decide (after a long and activist struggle of course) (France 2016).

Cooperation is the way to speed up the process

Looking at the way science works several things are remarkable. Most of the time there is the drive to compete and win. Researchers almost all want to safeguard the results of their own scientific work. Not sharing it until it's published. Go for number one and number one is you.

Why is there a need to compete? Why is there a need for academic rivalry? It is not in the patient's interest. Not sharing means that other scientists are prevented from helping you in an earlier stage of your work to improve it. Not sharing means that you are not able to reinforce the work of another scientist and speed up his or her work. Not sharing means you or other scientists might work in a wrong direction, wasting energy, time and money. Not sharing means patients have to wait for their treatments longer and they might die because of this.

What if the allied forces had been competitive forces in 1944? We in the Netherlands would probably speak German instead of Dutch. During World War II there was great danger as the Nazis were developing a nuclear bomb. Thousands of scientists and engineers out of different countries gathered in Los Alamos with one assignment: make sure that we (The Allies) realised the nuclear bomb before them (The Nazis). The knowledge and experience of The Allies was brought together and they were asked (and sometimes mandated) to cooperate with each other and compete with the enemy. There was a strong external force, and an urgency, to cooperate and compete.

We humans have a strong external force and urgency as well: cancer kills millions of people each year. Why don't we do the same and work together, share everything we know and compensate what the other lacks in order to compete with the enemy? Don't consider other scientists or companies as your enemy. Please consider cancer as your enemy and reinforce each other. We have lots of proof this way of working speeds up the process.

The data problem

Working together deals with many issues but the sharing of data is one of the most important aspects. We know that some research results cannot be reproduced. Being critical of one's own data is hard to do. Being critical of someone else's data is easier. The data used, however, is not the property of the researcher but the property of the patient. The patient has given their consent for the use of this data, but the patient is not connected with the setting up of the consent. Why is that? At least it should not be this way. If the patient is connected to this process most of the problem will fade away.

When the data is not the property of the researcher, they always have to request consent to use the data. If it's my data (as a patient) I can give it to everyone I want when I'm well informed. Patients want to give access to the data to researchers almost all the time. Just because they know it will improve their quality of life or the quality of life of others. Most of the time patients don't talk about privacy. They know that the fail-safes for the good use of data are thorough. The research that will be done is controlled by institutional research boards. A researcher will think twice before using the data in an inappropriate way.

Privacy is mostly an issue for people who want to protect their own work and prevent others from using the data. If patients want to share their data with scientists, they will (have to) share the data with other scientists. Patients will simply demand this. It will lead to a critical approach and appropriate use of data.

The right incentive and rewards

Researchers' behaviour is a logical and natural response to the incentive and reward system they work in. In academia, to survive and advance one's career one has to play the game. Predominantly, research and researchers are evaluated still on the basis of publications with a strong emphasis on high-impact factor journals. Over the past 30 years this system has developed in an autonomous way, and all actors in the system have adapted to it in order to optimise their cause. Agenda setting of biomedical research is guided by this system, which selects research that has high short-term output and that is appropriate for publications, getting the next grants, etc. High-risk, long-term research which does not yield high-impact papers is avoided. Sharing data and specimens as in Open Science with colleagues is not rewarded and weakens the position towards international competitors.

It has been argued that to improve agenda setting to enhance clinical and societal impact, to accelerate use and reuse of data a fundamental change in the incentive and reward system in academia is required. This affects all actors in the knowledge production process: funders, deans, learned societies, administrators and publishers. Fortunately, increasingly this awareness is growing and will lead to better policies in the near future in Europe and elsewhere (Miedema 2018; Moher et al. 2018; Science in Transition 2015).

Finally.

What would happen if patients were involved in defining the research questions and agenda? What would happen if patients were in the driver's seat when it comes to their data and use of their data? What would happen if patients were to demand this and otherwise stop participation in clinical trials? We believe that the system will change in a more effective way and will benefit patients and therefore citizens and society.

The question is not what is to be preferred, 'cooperation or competition'. The question is when to use what? It's our strong belief that when fighting with the enemy 'cancer' it should be competition. We have to beat cancer by all means. And when determining the right way to do the right thing it should be cooperation. By combining the best expertise and knowledge for the best reason thinkable we enforce ourselves and are more capable of fighting and defeating the enemy. It is what history teaches us. So, we had better listen. It's not about You, it's about Us! ■

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KEY POINTS

- ✓ The biggest problem in healthcare is the medical-industrial complex
- ✓ A fundamental change in the incentive and reward system in academia is required
- ✓ Cooperation is necessary to forward the research agenda for the benefit of patients

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Space technology meets healthcare

How the UK Space Agency is contributing to healthcare

England's National Health Service (NHS) is joining forces with the UK Space Agency to tackle four critical healthcare challenges.

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An example of space tech being used in healthcare is the Vitual Clinic which the UK Space Agency funded to develop the intelligent fixator

The UK Space Agency has launched a multi-million-pound joint initiative with the NHS for healthcare innovators who can demonstrate how technology originally designed for space, from exploration to satellite communications, could be used to improve treatment and care. Previous endeavours to adapt space tech for medical applications include the development of a "pill camera" that can be swallowed by patients to diagnose gut problems, and slippers containing GPS sensors to help track dementia sufferers. The current challenges? Managing long-term conditions, earlier diagnosis of cancer, meeting mental health needs and transforming primary care services. *HealthManagement* tracked down Emily Gravestock, UK Space Agency Head of Applications to find out more about how healthcare is benefiting from space technology.

When was it evident that space technology could be adapted for healthcare?

Space tech has been used in healthcare for decades (for example the vitamins in baby milk were developed for space use). However, as the opportunities from space have become cheaper and better understood non-experts have had the knowledge and ability to bring them into everyday products. This initiative started where we always try and start – with the customer at the centre.

Some of the most senior Doctors in NHS England saw some of the things that space-tech was doing already and asked to know more. So, back in April, the Satellite Applications Catapult and the UK Space Agency presented some of the existing technologies.

We showcased, amongst others, how patients in remote locations in Scotland can now have endoscopies on their sofa at home rather than having a six-hour round trip to hospital (and have the results monitored in real time if necessary); an application – HappySun – which gives people real time information about their UV exposure based on their sunscreen application, and personal characteristics, their risk factors; and how a diagnostic tool transforms the delivery of pre-hospital care and therefore improves patient outcomes by providing accurate and time-sensitive information to clinicians – Remote Diagnostic Technologies.

Photo Credit: Google Maps Street View

Breast screening van beams scans to hospital experts

Photo Credit: Pill Cam

Pill Cam is a swallowable miniature camera for internal examinations

This led to a discussion about 'what if....' and to NHS England setting out the four biggest challenges they are facing and calling on the technological community to come up with ways that Satellite and Space data and information can support patients and clinicians for the best possible outcomes.

"SPACE TECH HAS BEEN USED IN HEALTHCARE FOR DECADES BUT AS OPPORTUNITIES HAVE BECOME CHEAPER, NON-EXPERTS HAVE HAD THE CHANCE TO IMPLEMENT THEM"

How is the European Space Agency (ESA) involved in this initiative?

The up to £4 million funding for this call is coming through the UK's investment in the European Space Agency Business Applications programme – in which the UK is the European leader. ESA staff will therefore be involved in assisting in the evaluation of the ideas, the consideration of the technology and acting as Technical Officers for the project, helping it to go from a gem of an idea into a delivered commercial product which can be procured.

There are four categories contestants have to work within (long term conditions management, earlier diagnosis of cancer, transformation of GP and other primary care services and meeting mental health needs). Why the focus on these areas?

Simon Stevens, the Chief Executive of NHS England came up with these topics as those that would make the biggest impact to both patients and staff if there could be technological support. These areas all individually affect millions of people in England, and more than that in the wider United Kingdom. By tackling them, a significant impact can be made in the delivery of NHS services, and the patient experience. One of the features of this call is that ideas can be entered that are brand new and need to be developed, or that are already in delivery in one area and might be considered to be good 'best practice' candidates to be upscaled for delivery across the whole of the country.

Is there any chance for ideas which show promise but don't win the funding to be followed up by healthcare?

Yes, because this is being run in conjunction with ESA. If there are ideas which are not selected as winners in this programme then they can 'transfer' their idea into the standard application route for Business Applications through ESA in the UK. In fact, there is a feasibility study programme for 'Big Data in healthcare' opening on 2nd October being led by ESA. More information on that is at **https://iii.hm/nb1**

When will the winners be announced and what will the next steps be?

There will be panels which will sift the ideas in October, followed by face-to-face pitches for the best ideas in each topic area in November. Winners will be announced following those events. ■

Clinical diagnostic reference levels in medical imaging

An introduction to the European study on clinical DRLs for x-ray medical imaging (EUCLID)

The EUCLID project was launched by the European Commission to collect data needed for the establishment of DRLs for the most important x-ray imaging tasks, from the perspective of radiation protection, and to specify up-to-date DRLs for these clinical tasks.

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The European Commission (EC) launched the European study on clinical diagnostic reference levels (DRLs) for x-ray medical imaging (acronym: EUCLID) project on 1 August 2017 to provide up-to-date clinical DRLs. The main objectives of the project are to:

a) conduct a European survey to collect data needed for the establishment of DRLs for the most important x-ray imaging tasks in Europe from the perspective of radiation protection; and,

b) specify up-to-date DRLs for these clinical tasks. Moreover, a workshop will be organised to disseminate and discuss the results of this project and to identify need for further action. Detailed information about the project is available on the EuroSafe Imaging website (**eurosafeimaging.org/euclid**)

DRLs should be specified for clinical indications, because different image quality is needed for different clinical indications of the same anatomical area. Kidney stone evaluation, for example, can be performed by using lower radiation doses than those used in evaluation of appendicitis, because detection of high-contrast structures is affected less by high image noise than low-contrast structures.

To fulfil its objectives, EUCLID relies mainly on:

1. An External Advisory Panel (EAP) that has been set up to be consulted on the main project activities and outcomes
2. A Scientific Board (SB) that has been set up to verify the data sources used; and,
3. A network of EuroSafe Imaging (**http://www.eurosafeimaging.org/**) hospitals and their experts.

The project is divided into five work packages (WPs). Each WP covers specific tasks leading to the common objective of carrying out a European study on clinical DRLs for x-ray medical imaging. The five WPs are:

- WP1 is responsible for the management and general coordination of the project, as well as for dissemination of project activities and outcomes.
- WP2 is responsible for the identification of the procedures and clinical indications for which DLRs will be established, as well as for the review of existing DRLs.
- WP3 is responsible for conducting a European DRL survey for computed tomography (CT) and interventional radiology, following a predefined methodology.

"DIFFERENT IMAGE QUALITY IS NEEDED FOR DIFFERENT CLINICAL INDICATIONS OF THE SAME ANATOMICAL AREA SO DRLS SHOULD BE SPECIFIED FOR CLINICAL INDICATIONS"

- WP4 is responsible for specifying/determining up-to-date European clinical DRLs for Europe for the protocols/imaging tasks identified under WP2 and stakeholder consultation/validation of the DRLs.
- WP5 will consist of organising a workshop to disseminate and discuss the results of the project with Member States and relevant national, European and international stakeholders. The workshop should help in identifying any need for further national and local action on establishing, updating and using DRLs.

Table 1. List of CT clinical indications

Clinical task	Anatomical location
Stroke Detection or exclusion of a haemorrhage	Head
Chronic sinusitis Detection or exclusion of polyps	Neck
Cervical spine trauma Detection or exclusion of a lesion	Spine
Pulmonary embolism Detection or exclusion	Thorax
Coronary calcium scoring Risk stratification	Coronary Arteries
Coronary angiography Vessels assessment	Coronary Arteries
Lung cancer Oncological staging First and F-up	Brain Thorax Liver
Hepatocellular carcinoma Oncological staging	Liver
Colic/abdominal pain Exclusion or detection of a stone	Abdomen
Appendicitis Detection or exclusion	Abdomen

EUCLID WP2 has contacted national competent authorities to request information about existing clinical DRLs and has performed an extensive literature review to identify studies on clinical DRLs. Results show that only five countries have some clinical indication-based DRLs for CT and only three countries intend to develop clinical indication-based DRLs in the near future.

In the scientific literature, few articles provide clinical CT DRLs, and usually for a single indication only. Regarding fluoroscopically-guided procedures, the number of existing DRLs is very limited: for example, only one country has established DRLs for hepatic embolisation and there are no DRLs for endovascular aneurysm repair (EVAR) procedures. Furthermore, few important multicentre studies on CT and interventional DRLs have been published very recently (Ruiz-Cruces et al. 2016; Etard et al. 2017; Tuthill et al. 2017; Kanal et al. 2017). Studies on interventional DRLs (Ruiz-Cruces et al. 2016; Etard et al. 2017) support the value of evaluating the level of complexity of interventional radiology procedures. The EUCLID findings show that clinical DRLs are needed for many CT clinical indications and fluoroscopically-guided procedures. **Tables 1 and 2** show CT clinical indications and interventional radiology procedures for which DRLs will be established by the EUCLID project.

WP3 has developed a survey to collect data required for the establishment of DRLs from hospitals across Europe. The basic structure of the survey questionnaires is shown below:

Computed Tomography (CT):

1. General instructions
2. Contact information
3. Scanner specifications and protocol

- Equipment data
- Quality control data
- Protocol data
- Patient data
- Dose data
- Image quality data

Interventional Radiology (IR):

1. General instructions
2. Contact information
3. X-ray system specifications and protocol

- Equipment data
- Quality control data
- Protocol data
- Patient data
- Dose data
- Image quality data
- Data for the grading of procedure complexity
- Data for the assessment of operator skills

The final version of the questionnaires was produced taking into consideration feedback from the SB and the EAP members, recent national and international surveys on DRLs, recent publications on interventional radiology DRLs, and the necessity to assess the complexity of the fluoroscopically-guided procedures.

The European Institute for Biomedical Imaging Research (EIBIR) has established a professional platform for data collection: the EIBIR Electronic Data Capture Platform (**eibir-edc.org**). This platform uses the REDCap software package to facilitate the collection and management of study data. It can collect almost any type of research data, from numerical values or text to DICOM images, and all data

Table 2. List of interventional radiology clinical indications

Clinical task	Anatomical location
Arterial occlusive disease of iliac arteries Angiographic diagnosis and endovascular treatment of arterial stenosis or occlusion causing intermittent claudication or ischaemia	Pelvis
Localisation and treatment of hepatocellular carcinoma TACE: transarterial chemoembolisation	Liver
Arterial occlusive disease of femoropopliteal arteries Angiographic diagnosis and endovascular treatment of arterial stenosis or occlusion causing intermittent claudication or ischaemia	Lower extremity
Biliary drainage Localisation of biliary obstruction and percutaneous treatment of biliary obstruction	Abdomen

is transmitted through a secure connection. In particular, the export function of REDCap fits well with EUCLID WP4 needs, since responses can be exported to Excel or professional software packages for data analysis. Centres participating in EUCLID have received instructions on the use of the EIBIR platform and started uploading data for DRLs determination in June 2018.

Conclusion

Different image quality is needed for different clinical indications of the same anatomical area and, therefore, DRLs should be specified for clinical indications. The European Commission (EC) launched the EUCLID project to provide up-to-date clinical DRLs. As a first step, EUCLID has developed a survey to collect data required for the establishment of DRLs from hospitals across Europe. ■

EUCLID | European Study on Clinical DRLs

Figure 1. EUCLID logo

KEY POINTS

- ✓ The European Commission launched the EUCLID project in August 2017 to provide up-to-date clinical DRLs for x-ray medical imaging
- ✓ Lists of CT clinical indications and interventional radiology procedures for which DRLs will be established have been created
- ✓ EUCLID has also developed a survey to collect data required for the establishment of DRLs from hospitals across Europe.
- ✓ A workshop will disseminate and discuss the results of the project results and identify the need for further national and local action on establishing, updating and using DRLs

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Successful quality management system in a radiology department

Basic components of effective performance improvement programmes include patient safety, process improvement, customer service, professional staff assessment, and education, each of which requires strategies for implementing continuous programmes to monitor performance, analyse data, implement change, and meet regulatory requirements.

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To improve the safety and quality of the care that radiologists provide, and to allow radiologists and radiology personnel to remain competitive in an increasingly complex environment, it is essential that all imaging departments establish and maintain managed, comprehensive, and effective performance improvement programmes. Although the structure and focus of these programmes can vary, a number of common components exist, many of which are now widely mandated by organisations that regulate the field of radiology. Basic components include patient safety, process improvement, customer service, professional staff assessment, and education, each of which requires strategies for implementing continuous programmes to monitor performance, analyse data, implement change, and meet regulatory requirements.

The field of quality management, including performance improvement and patient safety, is characterised by a host of confusing and overlapping terminologies. In essence, a variety of processes can be introduced to monitor quality (quality control) and safety (risk management) under a departmental umbrella (quality assurance) that serves as a cog in the larger institutional culture of safety (total quality management). The ultimate goal is to continuously improve the effectiveness of what we do (performance improvement) (Kruskal et al. 2009).

Who are the customers?

It is important to know precisely who your customers are and to understand their opinions of your services. One approach is to identify who your customers are, determine their needs and expectations, and then meet and continuously try to exceed these expectations (Adams 1994).

Four major categories must be known when evaluating customer satisfaction (Alderson 2000):

- the factors on which customers base their evaluations of the quality of service
- how to identify your customers
- how to measure your customers' satisfaction levels
- how to balance in practice interpersonal and technologic skills.

A process described by Reinertsen et al. (2007) illustrates how improved patient outcome relates to improved efficiency and reduced time wastage. In their system, messages and messengers should be carefully chosen, physician involvement should be visible, trust should be built within each quality initiative, and communication should be candid and open. However challenging such a process may be, an essential goal should be to demonstrate the positive benefits of participation.

Components of a successful quality management system in a radiology department

The structure and components of a departmental performance improvement programme vary depending on the size of the department and hospital, the nature of the practice and the services offered, and the institutional mission and culture of quality and safety. Examples of ingredients that we consider essential to the implementation of a successful quality management enterprise in a radiology department are shown in **Table 1**. Other important elements include a focus on the customer and the processes, an understanding of process variation, a willingness to experiment with implementation of ideas, and teamwork (Applegate 2004). Quality and safety processes fall into five major categories: patient ***s***afety, process ***i***mprovement, ***c***ustomer relations, assessment of physician ***p***erformance, and ***e***ducation ("SICPE"). Many components overlap; for example, a system for communicating abnormal results falls under process improvement, patient safety, physician assessment, and customer relations (Kruskal et al. 2009).

Table 1. Components of a successful quality management system in a radiology department

Institutional leadership and support
"Just culture" of quality and safety
Process for managing customer relations
Process for engaging physicians
Quality management team
Surveillance system for monitoring quality indicators
System that promotes and rewards reporting of events, including near misses
Systematic process for analysing and managing reported events
Process for preventing error and improving safety
Educational programme

Source: Kruskal et al. 2009

Table 2. Dimensions of care performance indicators relevant to a radiology department

Patient safety	Patient falls, contrast material reactions and extravasations, minor and major procedural complications, physician compliance with hand-washing requirements, compliance with pre-procedure time-outs, verification and documentation of patient identification, radiation dose reduction at CT
Effectiveness	Outcomes measures for procedures (eg, biopsy), appropriateness of imaging studies, positive predictive rates for modalities, physician performance assessment and peer review
Efficiency	Reduction of unnecessary studies, number of technologists per scanner, scanner utilisation, scanning room turnaround time, equipment downtime for maintenance
Patient-centredness	Patient satisfaction surveys, analysis and management of customer complaints, communication and follow-up of abnormal results
Timeliness	Report turnaround time, time to next available appointment, interventional suite turnaround time, patient throughput in CT scanner, patient wait times, sample delivery times to pathology laboratory

Source: Kruskal 2009

Dimensions of care

The use of quality management indicators, particularly customer satisfaction surveys, is not a fully standardised and established process in many radiology departments (Ondategui-Parra 2004). In radiology, the identity of the customer is not clear. Is it the patient, the referring physician, or the in-house referring department? All customers should be assessed for their satisfaction levels. Many hospitals are trying to align their stated missions with the dimensions of care highlighted in the Institute of Medicine report *Crossing the quality chasm* (Committee on Quality of Health Care in America 2001), which states that patient care should be safe, effective, efficient, patient-centred, and timely—categories that are readily applicable to the field of radiology (**Table 2**).

Quality management indicators

Because imaging services are widely used and affect patient care in every area of hospital, much attention has been focused on quality assurance in radiology departments over the past several years (Hillman 2006; Khorasani 2009; Johnson 2009; Steele 2009). However, measuring the quality of imaging services is inherently difficult, and scientifically sound metrics are lacking. Moreover, the review of patient records to document the effect of diagnostic imaging on the care outcome is costly in staff time and labour.

In 2001, the Institute of Medicine published the report ***Crossing the quality chasm***, which specified six goals for healthcare quality improvement efforts: that healthcare be safe, effective, patient-centred, timely, efficient, and equitable (Committee on Quality of Health Care in America 2001). Given the growing demands for quality improvement in radiology practice, it is increasingly important to develop a standard set of metrics for the routine evaluation of radiology department operations and patient care. Such metrics also could be used in conjunction with the Practice Quality Improvement programme (part of the American Board of Radiology maintenance of certification process) to measure individual radiologists' performance (Khorasani 2009).

"CONTINUOUSLY PLANNED EFFORT BY A NUMBER OF SKILLED AND COMMITTED TEAM MEMBERS, WITH THE AIM TO DO THE RIGHT THING IN A TIMELY FASHION IN EVERY CASE"

The departmental mission, vision and values must be articulated by the leadership in the formulation of four categories of measurement: patient safety and quality of care, stakeholder management (management of the interests of internal and external stakeholders), operations management (management of core operations and enabling functions), and financial management. These four categories, which were inspired by the Kaplan-Norton balanced scorecard, represent key strategic principles of the department and broadly aim to:

a) accommodate all aspects of department performance

b) provide a common baseline for communicating results interdepartmentally within the institution and to external organisations

Within each of these four categories, key performance indicators (KPIs) must be formulated to align with one of the key strategic principles. Next, one or more specific metrics must be defined to allow measurement of each KPI (Hani et al. 2010).

Radiology-specific KPIs

The definition of radiology-specific KPIs should be a collaborative effort of the radiology department and the hospital administration. Hospital administrators are most knowledgeable about the institution's strategic direction, and the success of the radiology department depends on the alignment of its KPIs with the institutional strategy. Priority should be given to the KPIs that are considered by both the hospital and the radiology department to align most closely with the institutional strategy and vision. The costs of measuring those parameters should be shared between the radiology department and the hospital. The hospital can allocate existing resources and personnel to help the radiology department collect and analyse the data, and radiologists can volunteer their time (Hani et al. 2010).

Conclusion

Healthcare services have a distinct position among other services due to the highly involved and risky nature of services and the general lack of expertise possessed by consumers. This makes conceptualising and measuring service quality in healthcare settings more important and at the same time more complex.

All radiological departments are expected to establish and maintain effective quality, safety and performance improvement programmes. Essential components of such programmes include adherence to the basic principles of quality management and appropriate utilisation of quality tools.

Quality improvement is not a passive process, it requires a careful, dedicated and continuously planned effort by a number of skilled and committed team members, with the aim to do the right thing in a timely fashion in every case. This process can be sustained by offering rewards and celebrating successes, with all lessons learned disseminated throughout the department or organisation. ■

KEY POINTS

- ✓ One approach is to identify who your customers are, determine their needs and expectations, and then meet and continuously try to exceed these expectations
- ✓ Patient care should be safe, effective, efficient, patient-centred, and timely, categories that are readily applicable to the field of radiology
- ✓ Radiology-specific KPIs should be a collaborative effort of the radiology department and the hospital administration

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Follow-up breast cancer imaging widely variable, U.S. study finds

No consensus on surveillance imaging after treatment

Geography affects what post-treatment imaging women with low-risk breast cancer receive in the United States.

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A study that analysed follow-up imaging received by women with non-metastatic breast cancer found wide variation across the United States. Of concern was that many low-risk patients receive high-cost procedures that are not recommended by guidelines, while other patients miss out on annual mammograms that are recommended.

Guidelines from the American Society of Clinical Oncology/American Cancer Society and the National Comprehensive Cancer Network recommend that women with non-metastatic breast cancer receive annual physical exams and mammograms, but not full-body imaging with computed tomography (CT), magnetic resonance imaging (MRI), positron emission tomography (PET) or bone scans (Smith & ASCO 2005; Khatcheressian et al. 2013; Gradoshar et al. 2018).

The study, which analysed data on 36,045 women aged 18 to 64 who had surgery for cancer in one breast between 2010 and 2012, is published in *JNCCN: Journal of the National Comprehensive Cancer Network* (Franc et al. 2018). The researchers found that patients were more likely to receive recommended breast imaging within 18 months of surgery if they were younger or received radiation therapy. About half of the lowest-risk patients—those who received only surgery—received the recommended mammography within 18 months of their initial treatment. Of the cases studied, 70.8 percent of women received at least one dedicated breast image, either a mammogram or a breast MRI, both of which are recommended for these patients. But 31.7 percent had at least one high-cost imaging procedure, and 12.5 percent had at least one PET, neither of which are recommended without a specific clinical symptom. Between 64 and 70 percent of patients who had received a mastectomy and radiation, and were presumably higher risk, received some sort of breast imaging, either mammography or breast MRI.

Cost implications are concerning both for health systems (full-body scans costs between US$2,000 and $8,000) and for patients, who may have large out-of-pocket expenses if they have high-deductible insurance policies

In an email to *HealthManagement*, lead author, Benjamin Franc, MD, MS, MBA, a professor in the Department of Radiology and Biomedical Imaging, the Center for Healthcare Value, and the Philip R. Lee Institute for Health Policy Studies at the University of California San Francisco, explained that he was inspired to carry out this research having noticed illogical patterns of referral for diagnostic testing as well as having had family members with breast cancer ask whether they should be receiving surveillance imaging after treatment. “The findings of our study suggest that no such consensus exists among doctors on surveillance imaging after breast cancer treatment”, he said.

While guidelines for imaging associated with breast cancer diagnosis are specific, a recent research letter by Bensenhaver and colleagues (2018) suggests that

> "THE POTENTIAL FOR OVER-IMAGING MAY BE PARTICULARLY CONCERNING IN THE YOUNGER POPULATION"

adherence to these recommendations has decreased over time, observed Franc. Guidelines associated with advanced imaging for the detection of metastatic disease or regional recurrence of cancer are less well understood, possibly in part due to their vague nature. When guidelines lack specificity, it makes healthcare decision-making difficult: no provider wants to miss the opportunity to diagnose recurrent cancer early, nor does any provider want to downplay their patient’s symptoms or concerns.

Regarding inappropriate use of PET imaging for some patients, Franc noted that the reason is not yet known and is likely multifactorial. Some of the potential levers may include lack of coordinated care among a patient’s many healthcare providers, financial incentives/disincentives of ordering imaging in certain medical practice structures, the attitudes of patients, caregivers, and patient advocates/support groups in any

Benjamin Franc, MD

one geographic region, and the prevalence of legal actions in any particular region. He added that their group of researchers is currently studying the factors affecting the decision to utilise PET and other tomographic imaging modalities by understanding the factors that are most important to each of the stakeholders, including patient, family, and physician.

Franc explained that the optimal use of whole body imaging modalities in this patient population has yet to be defined. Although it is possible, using imaging or blood tests, to find cancer recurrence before it produces symptoms or signs, large randomised controlled trials (Palli et al. 1999; GIVIO Investigators 1994; Rosselli Del Turco et al. 1994a, 1994b) and Cochrane database systematic reviews (Rojas et al. 2000; Moschetti et al. 2016) have found that such surveillance offers no benefit in terms of survival or quality of life for patients with Stage I-III (non-metastatic) disease. However, he noted that some of these studies were performed before modalities such as PET-CT came into widespread use in the U.S., so we don't know if such newer modalities might alter outcomes of breast cancer survivors, and this is an area of active research.

Franc told *HealthManagement*: "We believe that the potential for "over-imaging" may be particularly concerning in the younger population we studied here because many of these young women will require imaging for other disease processes in the future and should not undergo unnecessary exposure to ionising radiation or financial toxicity if they currently are asymptomatic and unlikely to ever have recurrent or metastatic disease."

Next steps

Further research is planned to delve deeper into the potential reasons underlying this variability. Said Franc: "Our future studies aim to provide a foundation of evidence on which to base more specific guidelines for the use of whole body imaging after treatment for breast cancer. We will also explore potential tools that can help patients and providers have an informed discussion around the topic of surveillance testing after treatment." ■

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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The healing power of digital art in hospital environments

How digital art creates a healing space that benefits both patients and staff

At Paris Healthcare Week, Digital Artist Krista Kim showed healthcare how art, sound and meditation can contribute to healing in her new installation.

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Our society is experiencing digital overload; we have become addicted to our digital devices. Capturing moments on our iPhones and posting them on social media to earn “likes” has trumped the actual experiencing of life. As a community, we crave authenticity and self-awareness. But how can we overcome our digital overload?

I believe in the healing and transformational power of light, art and sound frequencies. Digital Consciousness is a video art installation composed of eight artworks with unique dynamic visual meditative experiences, presented with musical compositions with corresponding healing sound frequencies.

Art in the healthcare environment

The stark institutional architecture of standard hospitals is rarely geared towards creating a healing or psychologically-pleasing environment for patients and staff. My installation is suitable for the healthcare space because it is designed to create a meditative, calming and healing experience. This work is for everyone and anyone who is seeking moments of peace.

I wanted to use the light on the screen to create a sublime experience. When I was in Tokyo, I would walk in the middle of the city where there is constant activity and traffic congestion. Suddenly, I would walk into a side street and I would discover a hidden Zen garden and this garden became a vacuum of positive energy. The intention was to create a meditative space, a space of stillness and contemplation, yet just outside the limits of the garden was a bustling city. I marvelled at this phenomenon of the intention to create a space that is meant for mindfulness and I wanted to create that same experience digitally as a digital space. This year I spoke on my digitally-based art at Paris Healthcare Week and found the response from individuals in the healthcare and medical space has been very encouraging. I am currently speaking with architects and developers on upcoming projects so watch this space.

Scientific findings

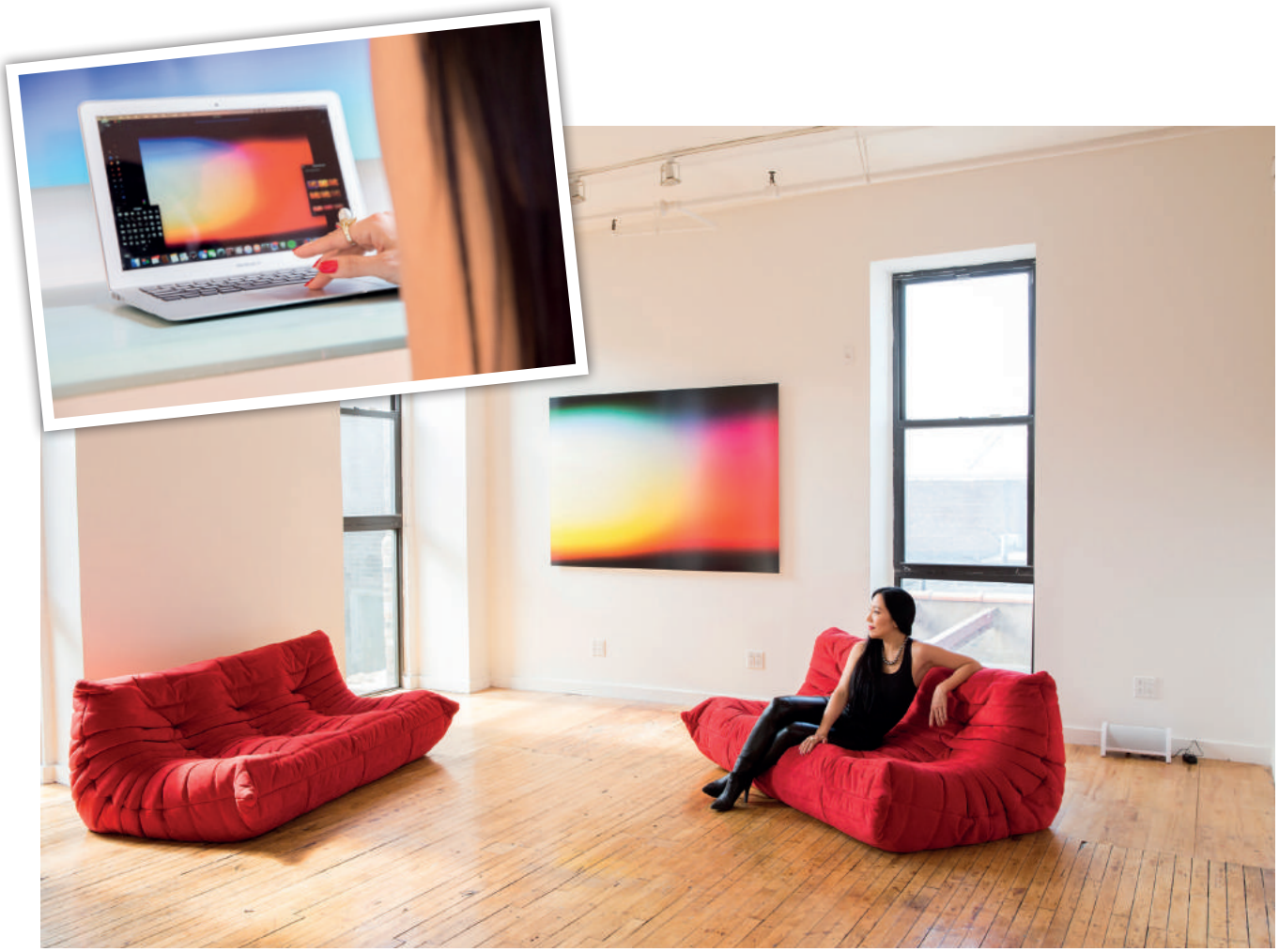
Our innate preference for a soothing painting or sunny park over a dark alley has a scientific basis. A 2011 University of London study (Ishizu and Teki 2011) found that blood flow increased 10 percent to the "joy response" part of the brain when subjects saw a beautiful painting—just like when you look at a loved one. The findings give credence to what we've always suspected. Leslie Faerstein, Executive Director of Arts and Health Alliance in the U.S. said that visual art has a strong, positive physiological effect on the brain (NBC News 2014).

"THE CLEVELAND CLINIC FOUND THAT MORE THAN 60% OF PATIENTS REPORTED STRESS REDUCTION FROM THE HOSPITAL'S CONTEMPORARY ART COLLECTION"

Building on this premise, the Cleveland Clinic recently found that more than 60 percent of patients reported a reduction in stress from the hospital's contemporary art collection—works produced in the last 30 years, including fine art posters in exam rooms, public sculptures, nature images and abstract designs (NBC News 2014).

Technical background

Five years ago, when I began experimenting with different printing technologies to produce my work,



I began my tests in Singapore. Then, digital printing technology was not advanced enough to produce the colour vibrancy and the illumination that I was looking for. It wasn't until 2015 when I discovered a print lab in New York and eventually one in Paris that I could move forward. Printing technology finally caught up with what I've imagined in my mind.

Although my works are printed, they exude a sense of illumination. Many people assume that the pieces are plugged into a wall, when really this phenomenon of illumination and vibrancy and movement in the work is achieved because of the manner in which the printer is able to layer thousands of colours into one small area. This micro layering creates vibrancy and movement that the human hand and a paintbrush cannot achieve. My artwork is a digital translation of the behaviour of light into code and algorithms.

My manifesto is clearly defined by the unique period of history that we are experiencing right now. This is the transition stage of human civilisation from analogue into digital. Because digital disruption has caused immense social isolation, our society needs more spirituality, more mindfulness, more mindfulness for healing. ■

KEY POINTS

- ✓ Healthcare has reported how art can reduce patient and personnel stress and, therefore, promote a healing environment
- ✓ Digital light art and sound frequencies can be powerfully soothing
- ✓ A zen-like art oasis within a stark hospital setting can be a beneficial stop for everyone in the building

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NBC News (2014) The Healing Power of Art: Can Hospital Collections Help? NBC News 23 Sep.

BETHAN HERRING

EMERGENCY DEPARTMENT CLINICAL FELLOW - BRIGHTON AND SUSSEX UNIVERSITY HOSPITALS NHS TRUST, UK

TOP QUOTE FROM BLOG

Prompt cards in the Emergency Department

"Prompt cards do not aim to be a set of box-ticking checklists. Instead they provide a list of simple step-by-step instructions and considerations aimed to guide the clinical team and reduce the opportunities for human factors errors and therefore improving patient safety."

See more at: **https://iii.hm/nbh**

NICOLA STRICKLAND

PRESIDENT - THE ROYAL COLLEGE OF RADIOLOGISTS, UK

TOP QUOTE FROM BLOG

What is needed to ensure radiology and clinical oncology can support the NHS for another 70 years? "AI programmes will no doubt be an integral part of the future ... and will be helping radiologists and clinical oncologists to spot and treat cancer and other conditions. However, in the short-to-medium term, the NHS desperately needs properly equipped imaging and cancer departments, and enough doctors to give patients the care they deserve."

See more at: **https://iii.hm/n8x**

FREDERIC LLORDACHS

ENTREPRENEUR – DOCTORALIA
DOCTORALIA.COM
EHEALTH - ACES
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TOP QUOTE FROM BLOG:

Expanding universal healthcare using a public system undoubtedly calls for measures that only technology can provide.

See more at: **https://iii.hm/n8z**

VIMAL SRIRAM

LEARNING AND IMPROVEMENT FELLOW - NATIONAL INSTITUTE FOR HEALTH RESEARCH COLLABORATION FOR LEADERSHIP IN APPLIED HEALTH RESEARCH AND CARE, UK

TOP QUOTE FROM BLOG:

"Quality Improvement for You (QI4U) is targeted towards but not limited to frontline clinicians, academics, patients, public and service users. QI4U allows individuals, teams and organisations to have a common language and shared understanding of QI terms and methods and how to implement QI well in practice.

See more at:
https://iii.hm/nbj

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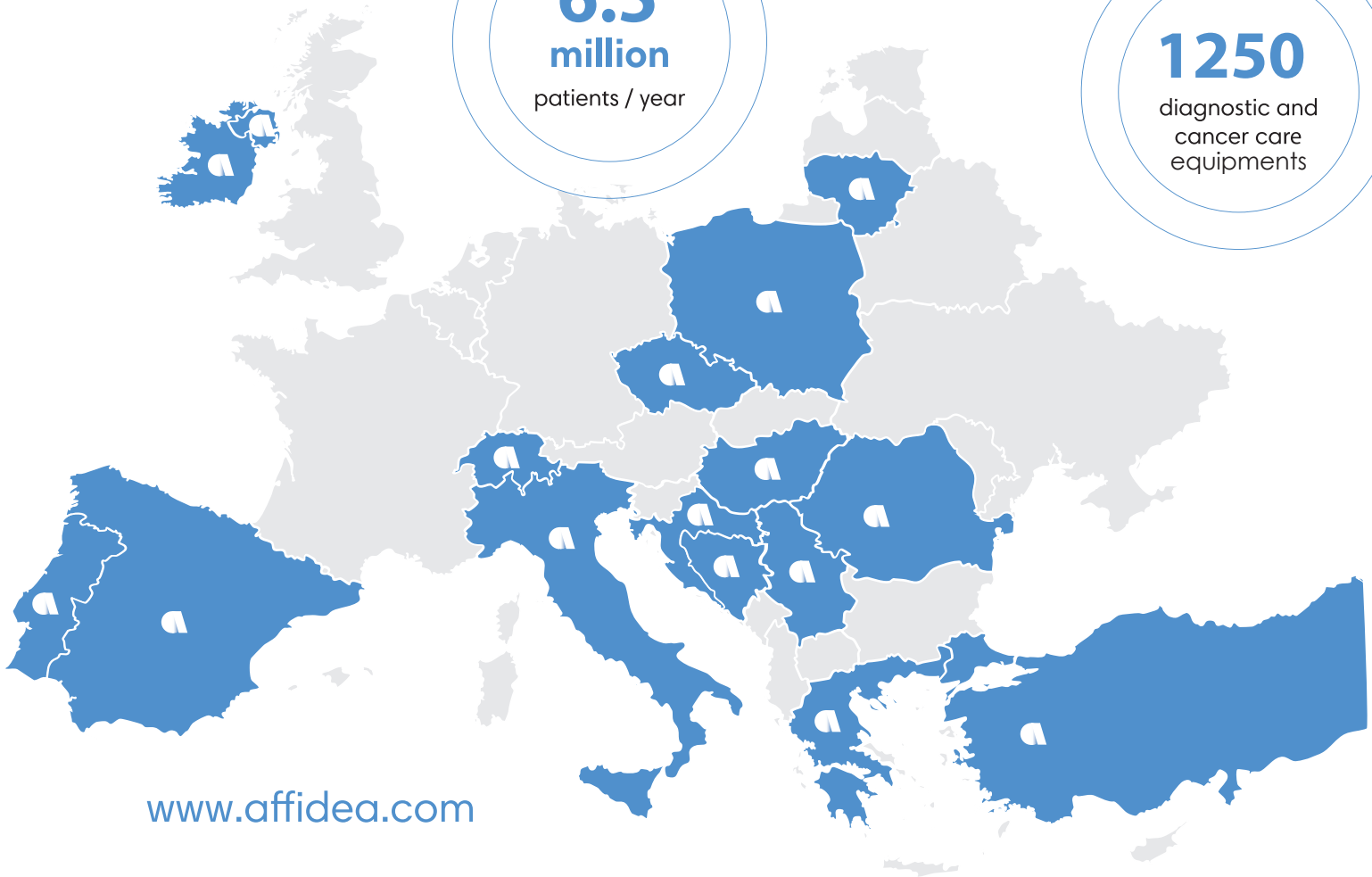

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