Effective Workforce Transformation

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Editorial

Effective Workforce Transformation

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The most important asset for healthcare is healthcare workers. However, this sector faces significant challenges regarding this valuable resource, which have been further exacerbated because of the pandemic.

According to the World Health Organization, there will be a shortfall of 15 million healthcare workers by 2030. Clearly, the future needs new workforce management approaches to ensure staff availability by increasing attractiveness for new and qualified talent and retention, reducing the high turnover and increasing the overall wellbeing of healthcare workers. Workforce management approaches currently in use are not in line with the realities in healthcare today and the healthcare professionals' expectations. The needs of patients and healthcare staff have changed dramatically, and that is why it is important for healthcare organisations to rethink their workforce management strategies and adopt strategies that can address the human resource challenges healthcare faces today. Undoubtedly, the time that patients and healthcare workers would fit to the organisational demands has passed. Healthcare managers need to realise that work models need to be redesigned toward patient and healthcare workforce needs. Probably, the biggest conundrum that health management faces today.

In this issue, our contributors discuss the growing problem of healthcare staff shortages, the challenges faced by healthcare workers, factors that affect the healthcare workforce, new skills that need to be developed, effective strategies for sustainable recruitment, best practices to engage good talent and changes and measures that can help healthcare workers thrive and reduce burnout.

Iris Meyenburg-Altwarg highlights the need to use a different approach to personnel development in healthcare in times of volatility, uncertainty, complexity and ambiguity to be able to react fast and efficiently to the changes, enable employees to develop the necessary skills and competencies, and apply new forms of leadership and organisation.

Donna Prosser outlines a standardised approach to organising the documents that guide care (the 6Ps of clinical practice) to create more reliable healthcare systems and make it easier for frontline clinicians to know what they are expected to do and how to do it, and where to find it.

Michael Seraskeris addresses the problem of the global shortage in the number of health professionals of all specialties (physicians, general practitioners, nurses, laboratory technicians), its impact on the functioning of health systems worldwide and strategies to manage this major human resource challenge in healthcare.

Brian Hill talks about winning recruitment practices in a labour shortage, the consequences of bad recruitment strategies and the importance of filling jobs and hiring the best talent in healthcare.

Isabella Lopez, Bonita Dozier and Theresa Rohr-Kirchgraber talk about the rate of infertility among female physicians and strategies to improve this through increased education and awareness among the medical community and expansion of infertility insurance coverage.

In other feature articles, Cristina Maria Baglivo and co-authors discuss the necessity of reducing unjustified radiation risk due to inappropriate diagnostic investigations by revising the diagnostic reference levels, renewing obsolete radiology instruments and providing the quantification of dose in each report and implementing lifelong learning at all levels.

Inga Shugalo provides an overview of Electronic Health Records (EHRs) and how EHR tools could mark a new era in healthcare interoperability and be a valuable source of patient data for clinical trials.

We hope you will enjoy this issue. As always, your feedback is welcome.

Happy Reading!

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Cybersecurity:
Preventing the
Worst-Case Scenario

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Interprofessional Competence Acquisition in Times of VUCA

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Restrictions on educational offers in person and in the practical environment due to infection and other factors such as the current effects of war in Europe, the increasing shortage of skilled workers and ever shorter length of stay in the job, increasingly complex task profiles requiring a different approach of management in the healthcare system and personnel development, have consequences. Ways must be found to react fast and efficiently to the changes and to enable employees to develop the necessary skills and competencies, and enable new forms of leadership and organisation.

✓ Key Points

- VUCA is an acronym that stands for Volatility, Uncertainty, Complexity and Ambiguity.

- VUCA clearly sets the course for our current and future organisational challenges.

- VUCA Prime is a behavioural leadership model to counteract each of the four elements of VUCA with a specific positive response.

- Nowadays, education and personnel development need a competence management programme that is aimed at both the specific needs of individual employees and their roles in the company.

- Best practice was yesterday, best thinking is in demand, today and tomorrow.

Background

The framework conditions are changing – in society and at work. Driven by the shortage of skilled workers, many professionals today can choose their employer. The result is declining loyalty to the company, higher demands for meaningful work and a good work-life balance. Overall, it is important for companies and institutions to remain an attractive employer in the future and, at the same time, be able to cope with the drastic new challenges in healthcare.

What Does VUCA Mean?

VUCA is an acronym that stands for Volatility, Uncertainty, Complexity and Ambiguity. The term VUCA originated in the U.S. Army in the 1990s. It was used in the U.S. Army War College to describe the changes after the end of the Cold War. When the USSR collapsed, the American military suddenly had no clear-cut enemy. In addition to a loss of orientation, there were also major changes within the military and new ways of seeing and reacting emerged. Currently, the term is used to describe the difficult market environment that many executives are facing. To lead successfully in this context, one must be able to understand how the four challenges of the VUCA world affect companies and our daily professional work.

Volatility	is the quality of being subject to frequent, rapid, and meaningful change. Small triggers may result in substantial changes.
Uncertainty	occurs when events and outcomes are unpredictable. The cause and effect are not well understood, and previous experience may not apply to the situation. It is unclear which direction events will go.
Complexity	involves a multiplicity of issues and factors, some of which may be intricately interconnected. The relationships between items and people are difficult to understand. A change in one place may cause unintended changes to other things down the line.
Ambiguity	is shaped by a lack of clarity and difficulty in understanding exactly what the situation is. Information may be misread or misinterpreted. During ambiguous situations, all the facts are not clear. The goal or intended outcome may not be evident to all parties involved.

Volatility vs Vision

Uncertainty vs Understanding

Complexity vs Clarity

Ambiguity vs Agility

From VUCA Challenge to VUCA Approach

What Works and How to React as a Leader

In response to a VUCA world, Bob Johansen from the Institute for the Future, introduced first in 2007 the "VUCA Prime" model. VUCA Prime is a behavioural leadership model, to counteract each of the four elements of VUCA with a specific positive response. They are:

- **Volatility vs Vision:** Accept change. Build in "slack and wiggle room" for unaccounted issues.

- **Uncertainty vs Understanding:** Consider new viewpoints and invest time to understand the observed triggers and indicators. Monitor key metrics and add indicators of success and failure at every step. Have regular reviews and post-mortems. Perform what-if exercises to help train staff and get ready for unforeseen occurrences.

- **Complexity vs Clarity** Communicate clearly and

frequently with all parties. Encourage collaboration between teams and groups. Identify areas where more insight is needed and address them. Build in fail-safe and backup systems (Heller 2019).

- **Ambiguity vs Agility:** Perform tests to bring clear understanding to ambiguous information. Be prepared to change as more information is discovered.

If you want to apply "VUCA Prime" holistically, this requires a transformation of the company and thus a cultural change. The healthcare system is now challenged because the big wave of digitalisation is still to come, and the shortage of skilled workers is increasing. Agile methods and mindsets provide efficient support to successfully shape change as an organisation, in teams or in projects (Montua 2020).

A typical approach to achieving these goals are small, interdisciplinary teams which work through a problem step by step over short cycles. These teams organise themselves to a significant extent. Planning meetings, in which the steps are defined, is an integral part of this method. In addition, there is regular self-reflection on the work in the team for continuous improvement. Teams and the entire organisation become more effective through this consistent focus on the respective goals - and through "flat hierarchies," they also become more efficient.

The healthcare system is predestined for the application of agile methods. Interdisciplinary cooperation is essential and can be further supported. While specific goals and work functions are often still primarily given to the team, the change to an agile organisation can bring additional tasks, competencies, and responsibilities into the team. The chance of being involved as an individual increases and with it the attractiveness of the work.

Essentially, it is about focusing on people (in the team and on the client/patient), giving higher priorities to solutions rather than documentation, and reacting to changes rather than sticking rigidly to a plan.

What Leadership Skills are Needed

Vision Casting

Clearly defining the core value proposition of your organisation and how you and your team fit into it through your daily contributions is critical in times of change. Setting and communicating a shared purpose and vision, helps your team to understand the bigger picture. When everything is constantly changing, this shared purpose and vision is a pillar to keep coming back to.

Preparedness

Monitoring and tracking trends, competitors, and the business surrounding. Identifying patterns and variables which can impact your organisation and team. This can give you an

early warning of possible impending change. If you incorporate this into your daily work life, you will be able to anticipate and prepare you and your team for change.

Flexibility and Adaptability
When times are uncertain and change is the norm, an ideal leadership is to be able to stay flexible and adaptable. In these times, leadership requires not to be stubborn in your way of managing and rigidly work to your annual plan. It is necessary to be able to flex, pivot and be agile as added information arises, decisions are made, and opportunities are taken.

Decision Making
In VUCA leadership, having a bias for action is critical. It is the ability to decide when you have incomplete information, cannot fully realise the complexity and interconnectivity of the decision being made, and experience cannot be relied on as this problem has never happened before. Leaders must accept that they are operating in an imperfect world, and they must make the best choice for their project, team, and organisation between action or inaction.

Collaboration and Teamwork
When leading through unprecedented times, innovative thinking, and idea diversity, which requires input across all functions and levels in the organisation, is needed to uncover fresh solutions. As there are no best practices when navigating through times of VUCA, facilitating collaboration among employees as a leader becomes all that more important, as everyone is needed to find innovative solutions and quickly adjust to the changing reality.

Customer/Patient/Client Focus
No matter what your function is in the organisation, having a customer-centric focus, on how external forces will impact the customer experience, at the forefront of decisions being made, is an essential component in leading in a VUCA world (Johansen 2012).

How to Deal With an Acute Crisis?
The following three steps will show how to organise, stabilise and reset the course in an acute crisis (Hellet 2019):

Methods for Education and Personnel Development
So far, the Human Resources Department has often formulated learning needs for groups of employees. The appropriate trainers were sought, and subsequently suitable digital formats were often created as further education and training catalogues. The design and implementation were often conducted by allocation according to functions and/or departments. A differentiated and individual needs-oriented personnel development did not take place across the board. Regular compulsory and refresher training courses have been certified by issuing certificates. A real acquisition of competence and the implementation in practice was rarely common.

Organising the Survival Mode	Stabilising the situation	Resetting the course
Crisis – Dashboard transparency and control, timely and pragmatic	**Driver and scenario-based planning** Basis and orientation for the company	**Transformation** out of the crisis with sustainable optimisation
Crisis organisation Agile interdisciplinary teams, experienced and crisis-assessed	**Contingency programme** comprehensive revenue and cost-effective measures	**Strategy review** Check opportunities and prepare for post-crisis
Emergency plan immediate measures, sales, day to day operations procurement and finance	**Supply chain and risk management** security of supply flexibility optimising costs	**Innovation Services** as an answer to the crisis and preparation for post crisis

Adapted Methods of Education and Competence Acquisition
Nowadays, education and personnel development need a competence management programme, aimed at both the specific needs of individual employees and their roles in the company. The previous methods and tools were not sufficient for this purpose. A competency management model integrated into the corporate philosophy is required. A dynamic economic, technological, social, and ecological environment forces every company to permanent adjustment and learning processes, especially with the focus on patients/clients and employees. In other words, this requires the consistent linking of company needs and employees as knowledge circulation (Schüler 2022).
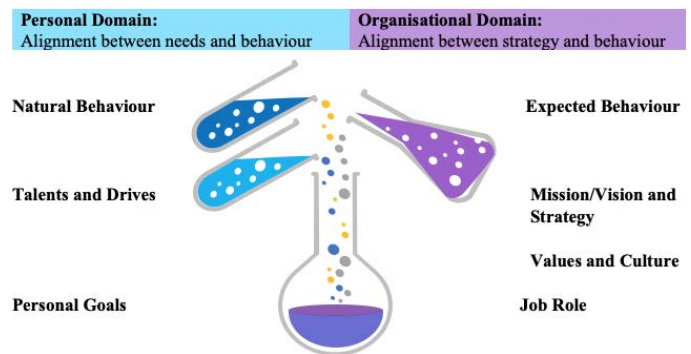
Talent Management/Competence Management. Source: Niagarain-stitute.com

Cognitive Apprenticeship

Cognitive Apprenticeship ("cognitive teaching") is a method that aims to make cognitive processes visible to the learner in the sense of master-apprentice relationships. Attempts are made to use the advantages of practical training for theoretical training. The practical training should make the processes

and forces us to think about what and how business should be done. It describes the challenges we face in our private and professional lives. Business models, strategies and organisational models will have to be revised. Best practice was yesterday, best thinking is in demand, today and tomorrow.

Managers must focus on employees and enable them to do

1. Modeling
mentor demonstrates or walks through the initial steps of the process, while revealing the tricks

2. Coaching
mentor observes mentee's activities along with provision of guidance and feedback

3. Scaffolding
mentor suports mentee while they work through the task with gradual fading of such support

6. Exploration
mentee expl.ores the topic beyound what was shown by mentor

5. Reflection
mentee self assesses own performance

4. Articulation
mentee verbalises reflections

visible and tangible, which remain invisible in theoretical training. Cognitive Apprenticeship is suitable for designing the instructional component of work-oriented learning. The method of Cognitive Apprenticeship is illustrated.

Conclusion

VUCA clearly sets the course for our current and future organisational challenges. VUCA particularly challenges us as leaders

their jobs properly. As Charles Handy (1932) stated, "whereas the heroic manager of the past knew all, could do all, and could solve every problem, the post heroic manager asks how every problem can be solved in a way that develops other people's capacity to manage it".

Conflict of Interest

None. ■

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Reducing Burnout by Building Resilient Systems

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Frontline clinicians are emotionally exhausted, mentally fatigued, and pessimistic about the future, often due to the complex, inefficient environments they work in each day. Solving this requires a systems-based approach to creating highly reliable systems in healthcare. One good place to begin is by making it easier for the frontline to know what they are expected to do, how to do it, and where to find it. A standardised approach to organising the documents that guide care (the 6Ps of Clinical Practice) is outlined in this article.

✓ Key Points

- Clinician burnout began long before the pandemic and has only worsened in recent years.

- The root causes of burnout are system factors that can be addressed by creating highly reliable systems.

- There is often a disconnect between work as imagined (WAI) and work as done (WAD). Making expectations clear, easily accessible, and easy to follow can help to eliminate this disconnect.

- Burnout is reduced in organisations that make it easy for the frontline to understand and follow expectations.

Introduction

The COVID-19 pandemic pushed many health workers across the world to their breaking point, as they faced severe fatigue, high mortality, and fear for their own families. The resulting emotional exhaustion and moral distress has led to unprecedented levels of burnout, but it's important to remember that this is a problem that began a long time ago. The pandemic just highlighted a crisis that we have ignored for years.

In 2019, the National Academies of Medicine (NAM) in the U.S. released the report, Taking Action Against Clinician Burnout: A Systems Approach to Professional Well-Being, and called out clinician burnout as a major, alarming problem that required immediate action. Needless to say, the pandemic that occurred the following year only worsened this already significant problem in healthcare. Clinicians everywhere are now more emotionally exhausted, mentally fatigued, and pessimistic about the future than ever. Many healthcare organisations have responded to this crisis through a mental health lens, providing free psychological help, establishing meditation rooms, or providing free chair massages. These are all wonderful ideas and quite necessary in some circumstances, but most hospitals have still not addressed the real root cause of burnout: the complex, inefficient environments that most clinicians work in each day.

Ever since the Institute of Medicine (now NAM) report, To Err is Human: Building a Safer Health System was published in 1999, healthcare leaders have been working towards using a systems-based approach to redesign care (Kohn 2020). We have implemented lean management systems, focused on improving safety cultures, and advanced technology in many areas. But despite twenty years of this dedicated effort, the 2019 report found that the root cause of clinician burnout remained system factors that make a healthcare organisation a very difficult place to work. The pandemic only worsened this, as many of the systems-based solutions that had been put into place crumbled under the pressure of this extraordinary crisis. With bedside caregivers now leaving the profession at unprecedented rates, staffing shortages have magnified the difficulty of meeting the expectations of providing safe, high-quality care.

Creating the systems-based approach we need to become more reliable in healthcare is not an easy fix. It requires a

culture of transparency, honest reporting of errors, the effective use of data to drive decision-making, a clear framework for improvement, and leaders who are skilled in managing change. If your organisation is already on this journey, then you are on the right track, so keep going! If you are not, begin by learning more about high reliability organisations (HROs) in healthcare and get started. Either way, you can begin improving the work environment today, by making it really easy for the frontline to know what they are expected to do.

development is in the form of online powerpoint modules that are outdated yet still available. And none of these are in the same place.

- There is no standard that outlines whether guidance is provided in the form of a policy, protocol, powerpoint presentation, or wall art in the bathroom. Each team/individual that develops them decides the best way to deliver the information, so the policy may not even be consistent with the protocol.
- The policy, procedure, etc. is not followable: the care

In most organisations, there is a disconnect between what the executives think is happening and what is really happening on the frontline

The 6Ps of Clinical Practice

In most organisations, there is a disconnect between what the executives think is happening and what is really happening on the frontline. "Work as imagined" (WAI) is created by leaders who know the best practice standards in the form of various "documents" (electronic or paper) that guide care. These documents can be summarised into six categories, which I refer to as **the 6P's of Clinical Practice:**

1. Practice guideline summaries
2. Policies, procedures, and standard work
3. Protocols, pathways, and order sets
4. Patient education material
5. Patient care documentation requirements
6. Professional development and training modules

These documents exist in some form in every healthcare organisation and are intended to provide clear expectations for practice. However, "work as done" (WAD) often does not follow the guidance outlined in the 6Ps, for several reasons. Consider whether any of these scenarios are true in your organisation:

- The sheer number of these documents is overwhelming, numbering in the thousands, and making it very difficult for the frontline to keep up. In many cases, they don't even know the documents exist.
- There is duplicate and/or conflicting information between the policy, protocol, or another document, leading to care variations and distrust that any of the information is accurate.
- There is no central location where all of these documents are stored. Policies and procedures are located in an online manual that is difficult to navigate and time consuming to search. Standard work documents were created by performance improvement teams and saved on a shared drive outside of the policy management system. Some protocols are outlined in a policy, others are embedded in the EHR or on paper. Professional

processes, physical environment, or staffing levels make it difficult or impossible to do what is expected.

Some aspects of the above scenarios are true in nearly every healthcare system, adding to the burden of providing clinical care today. Healthcare organisations can begin addressing the issue of burnout just by focusing on how to make it easier for the frontline to know what is expected of them, and then engaging them in process improvement work that makes it easier for them to meet those expectations. You can start by gathering an improvement team that includes frontline leaders and clinicians, and apply the five-step methodology tool known as "5S" to all of the documents that provide guidance for care.

5S Your 6Ps

1. **Sort** all of the documents (paper or electronic) that exist in your organisation according to the 6Ps. How many of each do you have? What outdated documents still exist in various departments that are posted, saved in personal drives, or copied and stored in file drawers? Combine content that is duplicative and eliminate conflicting information.
2. **Straighten** (or set in order) by determining the best location to maintain the documents. Ensure that any online manuals can be easily searched, and that all content related to a specific patient population is retrieved at the same time. For example, when searching for guidance on the care of the patient with restraints, congestive heart failure, or diabetes, all related policies, procedures, protocols, etc. are displayed together. If that is not possible, consider creating links to documents that reside in different systems.
3. **Shine** the documents by building an analysis of WAI (work as imagined) vs WAD (work as done) into the current state assessment of every improvement project. Teams should examine all of the 6Ps that outline organisational expectations and then build process maps that outline what is

actually happening. The solution plans that result from the improvement project should include action items to further "shine" the documents. Each team should continually keep in mind the questions, "Is this easy for the frontline to understand? To find? To do?"

4. **Standardise** the process by aligning this work with all committee work and your policy management review schedule. Ensure that all improvement teams are communicating with each other so that any newly developed or revised content to any of the 6Ps is aligned.

Conclusion

Often, there is a disconnect between the people who know best practice standards, those who create the documents that guide practice, the teams that provide education and training, and the frontline caregivers. This results in fragmented communication of organisational expectations and variations in practice, leading to an increase in unintentional medical harm and burnout. Although a total transformation for healthcare to become highly reliable organisations is necessary to solve problems through a systems-based approach,

Healthcare organisations can begin addressing the issue of burnout by focusing on how to make it easier for the frontline to know what is expected of them

5. **Sustain** the new document management process by aligning improvement efforts with your educational processes. Ensure that the objectives for all training incorporate the 6Ps into the content. For example, locate the documents that guide care, demonstrate applicable clinical skills, discuss relevant protocols, verbalise appropriate education material, and demonstrate accurate patient care documentation.

you can begin to reduce burnout just by making it easier for frontline caregivers to know what to do and where to find those expectations.

Conflict of Interest

None. ■

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Effective Workforce Transformation in Healthcare

Dr Nicholas Spencer | Chief Clinical Information Officer, Northern Europe | Agfa HealthCare **| Consultant Radiologist | Mid Yorkshire Hospitals NHS Trust |** UK
Roberto Anello | Managing Director, Northern Europe | Agfa HealthCare

HealthManagement.org spoke to Dr Nicholas Spencer, Chief Clinical Information Officer for Northern Europe, Agfa HealthCare and Roberto Anello, Managing Director for Northern Europe, Agfa HealthCare to gain insight on workforce transformation, collaboration networks, integrated care systems and application of technology and Artificial Intelligence in healthcare. Agfa HealthCare's class-leading solution, the Enterprise Imaging Platform, has demonstrated "real-life" values in revolutionising clinical workflows in hospital environments, and the Agfa associates were happy to lend their views on the status quo and future visions of this area.

All over the world there is a shortage of healthcare staff, and radiology departments are one of the most understaffed. Do you have any numbers on current shortages in the U.K., and how do you foresee the future in terms of staffing in radiology?

Nicholas Spencer: Shortages in the healthcare workforce are not unique to the U.K. Fortunately for radiology services, workers are both technically advanced and skilled at adapting to the innovative technology that helps them be more efficient. In terms of numbers, there are indeed shortages in the U.K; the Royal College of Radiologists (RCR) conducts an annual census, and, at present, there are around 10% vacancies against a workforce of just over 4000 consultants. Some of those posts have been vacant for more than a year, and so there is considerable reliance on in-sourcing and outsourcing to keep up with demand. The Society and College of Radiographers also monitors its available workforce, and there are significant shortages in the U.K. radiographic workforce as well. Radiology services undoubtedly are stretched - teamwork and the significant technologies which we have at our disposal play a part, and in general, services just about manage to keep going.

Roberto Anello: From a solutions and digital perspective, we focus on optimising the tools that we provide clinicians and the systems that they use. It's important that we offer the right solutions that are easy to use, offer prioritised task management and can speed up clinicians' workflow. It's vital that we support our clinicians and end-users with the best solutions possible given that the healthcare environments continue to be challenged. It is important that, when a

radiologist is at their workstation, the solutions are easy to use, optimised, quick, and give them time back. Artificial Intelligence (AI) is prevalent and now being used in clinical practice to turbo charge clinicians' workflow, which is an exciting journey to be on with clients. The other dynamic consistent across all regions and geographies is the capability to share images, workflow, and reports for peer review and clinical review, or to assist decision-making and share work. Integrated care systems (ICS) and National Systems share this requirement, and similar image sharing approaches are being developed in many regions. Therefore, our tools are designed and engineered to support workflow sharing across communities of care to help improve outcomes.

Given this staff shortage, what are the consequences for patients and staff?

NS: Everybody talks about how long patients wait for investigations. Most waits are very short and proportionate to the urgency of the investigation that's being planned. However, patients waiting for scans, results and waiting to see the referring doctor causes additional anxiety. There is a need for radiology services to be as agile as possible, prioritise work appropriately, and communicate well with patients and referrals. It is also important to consider the consequences of a shortage in the workforce for the people delivering it because the radiology workforce is all about providing care, especially during the diagnostic phase of a patient's journey. The staff are working under continual pressure, day and night. Yet, healthcare workers in radiology keep giving care and striving to deliver results and connect with patients to ensure they have a good experience.

What has been done to solve these issues on the local and national levels by individual hospitals and at the NHS level?

NS: There are ongoing recruitment drives and discussions with policymakers and the government about increasing training numbers. The U.K. has a clear plan that people should be able to work at the top of their license, whatever their skills and competencies. We're building a multi-professional workforce in radiology, more diverse than just radiologists and probably ahead of the curve in terms of other geographies. Also, as we've gone through these difficult and challenging times related to the pandemic, there has been a huge effort to support staff and ensure they are kept as well as possible through wellbeing initiatives, performance reviews and a variety of other things to encourage and support them to continue to be able to work. Retention of staff in the longer term is also important.

One of the initiatives being explored in the NHS, with considerable investment underway, is around community diagnostic centres. Capacity constraint has been a problem in hospitals where there is a mixture of both elective and emergency patient flow. This can sometimes be difficult for patients. It is recognised that the number of facilities in the U.K is not at the level they are in other countries. Investment in community diagnostic centres and integrated care systems in the U.K. are going to provide extra capacity and help separate acute, and elective patient flows to give a better experience and enable patients to have investigations closer to home.

How do you at Agfa HealthCare support your customers to address these challenges?

RA: Enterprise Imaging (EI) is Agfa HealthCare's best-in-suite radiology solution, with functions and features to optimise clinical workflow. EI also includes a leading zero-footprint viewer designed for clinical teams, seamlessly linked with the Electronic Medical Record (EMR). Imaging and reports can be accessed from desktop, a tablet, or a phone. The key focus is enabling clinicians to access our solutions anytime, anywhere.

Enterprise Imaging's functions are further enhanced by integrations with communication solutions like Microsoft Teams, so you can have a dialogue with a clinical colleague or refer a study and have a live conversation with multiple clinical colleagues on a challenging case. Furthermore, AI is embedded within our EI solution through the RUBEE™ for AI platform, seamlessly integrating FDA approved algorithms within the workflow. Overall, our goal is to offer the right tools at the right time, on any device, optimising and enhancing the clinical experience to support what is a very challenging clinical environment at present.

NS: It's also fair to say that the focus on AI has been on assisting interpretation, but Agfa HealthCare provides tools that can assist with triage, prioritisation and smart workflow, and moving through enhancing visualisations, including business intelligence. We see the breadth of AI coming soon, which will help with efficiencies and ultimately, the patient experience.

Collaboration within and between hospitals is key. In the U.K, we see the creation of the ICS. How does Agfa HealthCare contribute to these, and how do its technologies support this transformation?

NS: In the last 12 to 18 months, we've seen the emergence of ICS. They're specifically designed to nurture the cooperation between the healthcare economy and the partners within the ecosystems of local health and social care. This is enabling sharing of clinical information, with appropriate data security to promote that collaboration and to facilitate access across services, at the right place at the right time. Within our ICS, collaboration between expert clinicians within regions is enabling healthcare services across the clinical community, not just within one care setting.

Agfa HealthCare's image management solutions focus on this and have some recognisability in that space. We also have a XERO Exchange Network (XEN), supporting a networked imaging collaborative in Yorkshire that allows clinicians the ability to view the imaging and timeline across the system of radiologists. They can launch a solution from their Enterprise Imaging desktop and can speed up access to those images, download them for review alongside a study being reported and enable them across the diagnostic desktop viewer. Integrated Care Systems are emerging and being used live, and our solutions support that. That is something we want to replicate across all communities and clients.
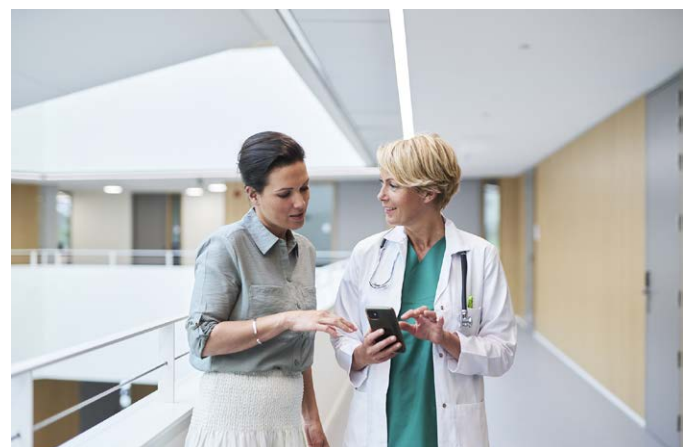
Agfa HealthCare supports the Yorkshire Imaging Collaborative. Can you describe the collaboration and its effect on staff and patients? Where do you see the progress in the future?

NS: As a clinician working in Yorkshire, I was part of the process that created the Yorkshire Imaging Collaborative (YIC), and I was engaged as clinical lead during YIC's early

years. We began as a collective procurement so that seven different institutions could build a PACS contract and begin image sharing as part of its future solution. The YIC delivered a common ecosystem, an intuitive PACS across the region. That meant the workforce that moved between different institutions had that common platform and familiarity. It provided a web viewer that enabled people to look at imaging acquired in other institutions. It facilitated urgent clinical care, such that if a patient who was critically ill had imaging in one institution, it could be viewed immediately in another institution. That's the benefit of Agfa HealthCare's XERO Exchange Network (XEN). This has also improved patient pathways by reducing the number of repeat imaging studies required. It has also enabled assistance between institutions where there are shortages of sub-speciality. There are several use cases where services have been sustained and enhanced by this collaboration.

Image sharing and the concept of imaging networks are now well-established in the U.K and recognised to be a central component in the EI solution for delivering greater diagnostic capacity. We've already alluded to the emergence of community diagnostic centres. Collaboration is the key and going forward, it will help us deliver better services that are more accessible and closer to the patient's homes.

RA: In the environment we're in today, there is a combination of digital ecosystems that leverage different imaging systems, so there is a lot of focus on integration or sharing across clinical boundaries. We are seeing multiple acute systems coming together as a result of Integrated Care Systems and they may use different PACS, because there are existing contracts in place and hospitals have the decision to make on if they are to be renewed or replaced. What is exciting is that image sharing capabilities are already available between acute systems using the same EI system, which enables quicker clinical outcomes. What is new is sharing workflows and connecting different PACS - that will make a real difference, saving hospitals money and time. We have an agnostic solution coming in our EI Platform which will be a game changer. Our solution will have the capability to transfer patient work lists to and from one acute system to another, regardless of system, so the technology is moving at a pace that compliments the future healthcare direction too.

NS: I'm going to expand on that with a specific use case. In Yorkshire there are two adjacent imaging networks, and using Agfa's Xero Exchange Network (XEN) technology, we have successfully connected a local hospital with a remote tertiary paediatric radiology service almost 50 miles away. We are using XEN to connect these two networks to enable better access to experts. This also fits the vision of the UK's Royal College of Radiologists (RCR) for networked services.

How does I.T support and nurture such transformation projects?

NS: The infrastructure in the UK has a secure high bandwidth network between institutions. The Health and Social Care Network (HSCN) provides a reliable, efficient and flexible way for health and care organisations to access and exchange electronic information in the NHS.

RA: Over the last 24 months, we saw how COVID impacted the world and how digital partners working collaboratively with clinical teams can help. Technology and IT leaned in towards investments to support clinicians working from home and delivering collaborative tools to deliver care - this is now the norm. Clinical advocates in our client community are leading the changes and driving the message of what IT can deliver. It is about blueprinting that and evangelising it in a way that can be replicated. It's been immensely helpful having clients promote their digital successes and talk positively about the efficiencies and the optimisations that can be achieved using IT. Our clients are exploring new technologies as much as possible to enable improved ways of working together and crossing larger healthcare geographies.

Does it increase patient satisfaction?

NS: Patients have a better experience because of this. But it isn't as obvious to them that this is happening because radiology is a system in the background. People are very reliant on radiology services to move pathways forward, and the seamless nature of image sharing is something that can facilitate care.

RA: The right word is seamless. That is how we want it to feel for our clients - seamless. But from a patient perspective, it's always just expected. Therefore, having the right solutions creates an environment where a clinician can operate in a calm, optimised way. Agfa HealthCare's clients feel great about the solutions they use to support that environment.

Implementing solutions like Enterprise Imaging to support collaboration networks etc., requires a close collaboration between clinicians and the IT department. What do your most successful clients do? Any recommendations or best practices that you can share?
NS: When the Yorkshire Collaborative was initially formed, people saw it as a procurement solution. It got people to talk together while helping them understand and address their own institution's priorities. It also enabled the cross-fertilisation of working practices and problem-solving and enabled them to deliver a common solution that worked well. The PACS Managers Group, which Agfa HealthCare supports, meets quarterly, and has a dialogue in between meetings so that if they come up against a particular problem, somebody in the network knows how to solve it. It's all about collaboration, teamwork and the delivery of seamless services. In terms of success, it's good communication and learning from one another.

RA: All our clients invest in the right stakeholder engagement. Shared IT and clinical projects are where we get the best success as there is a combination of the best set of resources. Roles like the Chief Clinical Information Officer, Lead Clinician and executive sponsor understand what we're trying to achieve in a project, ensuring that it offers value and achieves the desired outcomes. The cohesion between IT and clinicians delivers the best projects. It's best to have a one-on-one relationship with the client project team, but it works particularly well when you have IT and clinicians represented in one team because it's a change project, not an IT project.

Together with BBC Storyworks you have created a short documentary on Leeds Teaching Hospitals that shows how technology and Enterprise Imaging have enabled greater flexibility and a better work-life balance and faster/better patient care. Can you elaborate on that?
RA: Agfa was fortunate to engage with one of the largest hospitals in the NHS - Leeds Teaching Hospitals. We enhanced the clinical experience, enabling home working and a consistent way of working across clinical and hospital environments. We saw that Enterprise Imaging is ready for the NHS community and has demonstrated how it can support diverse clinical settings with an emphasis on patient care and staff wellness.

The BBC story showed the journey of how our client has revolutionised Imaging using smart technology and demonstrating the versatility of Enterprise Imaging. We're proud of the work we've achieved together. The footage demonstrates a diverse set of voices within an NHS network and how many clinicians take care of a patient during their journey. We can see how that transition modernised a radiology platform, allowing interconnected working through various hospital sites. That flexibility and exchange of tasks between locations at any time, demonstrate how Leeds Hospital invested for their patients and clinicians, improving outcomes and supporting healthcare professionals' wellbeing. We've been given the opportunity to showcase some of that. We're proud of the partnerships that we have with our clients and we think it's making a real difference in the industry. We're also proud of the NHS and the work they do and we know we can support their requirements as they evolve in a very challenging clinical environment. ■

The Shortage of Health Professionals Worldwide – A Modern Human Resources Management Challenge

Michael Seraskeris | Managing Director | Etoloakarnania Group of Public Hospitals and Rehabilitation Institutions | Greece

During the last 40 years, a significant global shortage in the number of health professionals of all specialties (physicians, general practitioners, nurses, laboratory technicians) has been recorded in absolute and relative figures. Given the growing demand for consumption of health services, this shortage has a serious impact on the very functioning of health systems worldwide.

✓ Key Points

- In the U.K., staff shortages rose by 52% during the COVID-19 pandemic, while in other European countries a 25-35% is already recorded.

- Reasons of the shortage can be attributed to the disproportionately increasing demand for health services, generated by factors such as ageing, diseases related to modern life patterns, increase of scientific specialisation, assignment of health professionals to geriatrics, physical medicine, rehabilitation and chronic diseases.

- Younger employees prefer to work in retail stores rather than hospitals or other healthcare providers.

- Patients may suffer inadequate care, as severe staffing shortage can push some healthcare providers to break the rules, especially in care homes and other small facilities.

The reasons of the shortage should be attributed primarily to the disproportionately increasing demand for health services, which is generally generated by major factors such as population ageing, diseases related to our modern life patterns, increase of scientific specialisation, assignment of large percentage of health professionals to geriatrics, physical medicine, rehabilitation and chronic diseases.

The phenomenon has already reached alarming dimensions. Researchers predict that as in the United States and the United Kingdom that really seem to suffer, the rest of the developed countries will follow the same path, concluding to shutdown of health units. It is a severe staffing crisis, not just one of many other problems.

Lack of younger employees in the U.S. or U.K. is estimated to be at least 20%; many of them prefer to work in retail stores rather than hospitals or other healthcare providers. Human Resources Administrators experience substantial pressure, as open positions remain at an unchanged status for many months during each year. Same findings have been recorded in other European countries, with the Germans and the Scandinavian countries looking mainly for physicians, while France and Austria for nurses. With healthcare professionals fleeing every day, still willing to work hard, but somewhere else (supermarkets, hairdressing salons, factories, hospitality), to fill this 20% gap, we may need two decades!

Last, but not the least, patients may suffer inadequate care, as severe staffing shortage can push some healthcare providers to break the rules, especially in care homes and other small facilities. Especially in the U.K., staff shortages rose by 52% during the COVID-19 pandemic, while in other European countries a 25-35% is already recorded.

What about results delivered every day? Average waiting time

at acute and emergency departments almost doubled, while surgery waiting lists also registered new negative records by extending waiting periods.

COVID-19 was the most recent occasion for the problem to re-emerge, but the main cause of it, is sought in our own life-patterns, which have turned the attention of young generations to any other professional specialisations than healthcare. Governments during the last four decades insist on promoting studies such as business administration, marketing, information technology, tourism or even arts, rather than healthcare.

Will we be stronger in the short run, as the pandemic seems to be coming to an end? No, definitely not, as patients prohibited to approach hospitals or primary care facilities now return in droves, many of them with tumours that were left unattended for more than two years.

Health occupations seem to offer more disadvantages than incentives. The most important of them are:

1. Disproportionately higher job risks compared to those of other jobs, in relation to the salaries and benefits healthcare workers receive.

2. Demanding shifts at nights, working weekends and last-minute shift changes.

3. Especially during the COVID-19 period, permanent personnel in many countries did not take annual vacation or regular day-offs for more than a year, while in some countries, a year and a half.

4. Lower sense of professional recognition compared to other much-advertised disciplines, especially among nurses.

5. Demanding family issues such as baby-sitting and other kind of support children need like attending school events or participating in family events.

6. Lower opportunities for ongoing training, in-house or external.

7. As medical and nursing personnel become more and more necessary, opportunities for further career development in other positions such as administrative positions, seems more or less impossible.

8. Occupational risks such as infection from COVID or professional burnout tend to skyrocket. New or chronic occupational stress incidents seem to be unstoppable, while family violence incidents have dramatically increased.

9. Cultural, as well as linguistic constraints among employees of different origins, generate communication problems among health professionals.

10. Due to the lack of new hired employees, hospital demographics are turning "red", as current employees are ageing without timely replacement.

European governments have to recognise the priority of the issue in order to deal with it on a long-term basis. Changes in the standards that must be noted in principle, in order for the health professions to regain a competitive status requires the cooperation of the Ministries of Health, Labour and Education across all European countries.

What has to be done starting "yesterday" as "tomorrow" will be very late?

1. Developed countries have to recognise and therefore, re-prioritise healthcare professions. Healthcare personnel should be recognised as "humanity agents", not just professionals, not just health "technicians", as their role is one of the most critical for our life status.

2. Review all kinds of incentives (financial and other) that are currently provided to health professionals, in order to make them competitive with other sectors.

3. Acknowledge that "praise is better than raise", as many health providers tend to insist imposing orders rather than asking for the collaboration of health personnel; in other words, health management in many countries still insists on disciplinary actions instead of providing personnel with the organisation's vision and calling them for full alignment with it.

4. Provide health professionals with knowledge, by introducing courses in economics, management, health law, etc. in order for health professionals to acquire a broader scientific sense of their professional field and above all, to acquire more skills so that they do not feel isolated from serious decisions.

5. Provide health personnel with psychological support in order to train everyone to administer occupational stress and violence, concluding to life-balancing coaching.

6. Admit that telling the truth is always critical: we have to prepare students to the real working conditions. It is observed that the majority of those who leave the profession for good are among those recently entered the labour market, so we have to keep younger personnel in the system by promoting engagement with it. This is a critical human resources management challenge.

7. COVID-19 found society more or less unprepared. We have to review and renew our crisis schedules, prepare the society to act - not only react - and train general population to follow health maintenance schedules, not just asking health personnel to solve every problem and restore everything to its prior condition. People starved for freedom, but hundreds of millions of people worldwide did not realise on time that health providers cannot guarantee well-being, they only facilitate it!

8. Yes, nurses in our modern times, are scientists, not only patient helpers as they were 130 years ago. We have to promote scientific research within their community, as researchers must remain in the healthcare organisations environment and stop pursuing an academic position in order to escape from working pressure.

Healthcare organisations are by definition, "learning environments".

9. Especially for hospitals, we have to lower the patient-to healthcare professional ratio, by enhancing primary care providers. Hospitals are the tougher employers, thus less desirable by younger candidates, where job dissatisfaction due to the work overload results in less engagement and higher resign statistics.

As the Chinese General Sun Tzu 1.500 years ago, mentioned in the book "The Art of War": "as a leader, if you embrace your soldiers and treat them like if they were your beloved sons, they would be willing even to die for you". Human Resource Managers understand that the triumph of management is life - not death of course - but all of us must conclude the same result: as a society, we have to treat healthcare personnel as they are our beloved sons, our beloved daughters, not just employees getting paid for what they do!

Healthcare personnel should be recognised as humanity agents, not just professionals or health technicians as their role is one of the most critical for our life status

Most of the proposals presented above need two prerequisites: money and better human resources management. Not so self-explained for many countries that pay low salaries to doctors and nurses, when at the same time pay is much better for other occupations like banking, information technology etc., while human resources management and leadership are understated.

This is the most dynamic challenge as healthcare personnel is the only glue our society's broken health pattern needs, in order to keep going to what we all care for: ***TOMORROW!***

Conflict of Interest

None. ■

Building Winning Recruiting Practices in a Labour Shortage

Brian Hill | Principal/Executive Vice President | Ideal Steps Healthcare Recruiting, Inc. | Florida, USA

It is obvious taking too long to fill jobs costs organisations money and often prevents them from hiring the best talent. But did you know a bad hire can cost up to 30% of the employee's wages the first year, according to the US Department of Labor? Bad recruitment strategy and process cost companies a lot of money.

Key Points

- Understanding your organisation's recruitment philosophy and strategy.

- Recruiting versus advertising.

- Designing an effective, efficient interview and selection process with less noise and bias.

It is commonly understood employees are critical to an organisation's success. What is not well understood is how dysfunctional many organisations' recruiting and hiring practices are. Why is that?

Most lack leadership and focus in this critical area.

This lack of attention on hiring is expensive. It is obvious taking too long to fill jobs costs money and often prevents you from hiring the best talent. But did you know a bad hire can cost up to 30% of the employee's wages the first year, according to the US Department of Labor? Bad recruitment strategy and process cost companies a lot of money.

Understanding Your Organisation's Recruitment Philosophy and Strategy

Do you know your company's recruitment philosophy and strategy? If you are an executive, attracting and retaining top talent in your industry should be a top priority:

- How long does it take to fill a key position?
- What is your recruiting strategy for key positions?
- When your company evaluates potential hires, what are the top three criteria and how do you assess them?

Most executives outside of HR would not be able to answer these key questions. They should. They have a vested interest in getting recruitment right and should be at the table for this important conversation. World class organisations know recruitment is a foundational element that transcends the entire leadership team and institution.

As a leader you should be able to say with confidence, "THIS is our recruitment philosophy and strategy, and it is a core tenet of our entire organisation". Or "THIS is why people want to come to work for us". If you don't know what THIS is, you have a recruiting problem.

Recruiting vs Advertising

One reason recruiting is an afterthought for many executives is not understanding the difference between recruiting and advertising. It doesn't help that technology gives a false sense of security. We live in an era of virtually unlimited information and automation, which has led many to believe algorithms will save the day for all their recruiting needs. This is nonsense.

Posting a job online is no different than purchasing an advertisement in the local newspaper back in the dark ages of recruiting. You *hope* someone will see and respond. Is that strategic? This person we hope will respond also needs to be qualified, desirable, and affordable. While technology makes this more targeted and effective than those old newspaper ads, the concept and practice are otherwise identical. In recruiting jargon it's called" post and pray".

How is recruiting different? In almost every conceivable way. In recruiting, a human being takes ownership of the position requirements and applies experience and judgment in discerning applicants. The recruiter seeks out and engages another human being through targeted communication to explore qualifications and the potential for an employment

match. The more informed and skilled your recruitment team, the more successful an organisation you will likely build. Artificial Intelligence cannot and does not do that. If your strategy is advertising jobs online sifted through by an inexperienced team, you have a recruitment problem.

and delays. Others entrust interviewers who are inexperienced or poorly trained in conducting interviews. How can an organisation make good hiring decisions if the people making the assessment do not know what they are looking for or how to objectively evaluate it?

The more informed and skilled your recruitment team, the more successful an organisation you will likely build

Designing an Effective, Efficient Interview Process with Less Bias and Noise

Is your interview process introducing noise and bias into your hiring decisions?

Nobel Prize winner Daniel Kahneman (along with Olivier Sibony and Cass R Sunstein) wrote an intriguing book, "Noise: A Flaw in Human Judgment" that takes a hard look at interview process and decision making. The authors delve into the traditional standard interview and lacklustre performance in making effective hiring decisions (Kahneman et al. 2021). Something as simple as identifying the definition of success in making the decision is often unknown or not agreed upon by those involved. Our experience with successful companies is they clearly identify what they are looking for on the front end and establish an effective interview process to assess candidates on those metrics. The hard part comes up front, which makes execution more efficient and effective.

Kahneman and his team cite numerous examples of standard, unstructured interviews creating noise and bias, yet executives and candidates alike remain enamoured with them because they value their intuition. They apparently don't realise their intuition can be biased.

We have observed companies who introduce so many interviewers into the decision-making process it creates indecision

Kahneman references Google transforming their hiring process from as many as twenty-five interviewers down to four. Less is more in this case. They also require interviewers to rate candidates independently instead of a group discussion to increase validity. Kahneman's own research using structured interview strategies showed higher probably of selecting a better candidate (65-69%) from unstructured interviews (56-61%) (Kahneman et al. 2021).

If your team has too many people involved in an unstructured decision-making process, you have a recruitment problem.

Conclusion

Recognising the importance of recruiting and hiring is not enough in today's competitive talent market. Attracting and hiring the best talent must be ingrained in the company culture, a way of life. Decision criterion and process should be fact-based and measurable in an objective and repeatable manner. Interviews should only be conducted by those who have appropriate experience and are well trained in a structured, well-defined process.

Conflict of Interest

None. ■

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Increasing Care Demand and Growing Workforce Shortage

Sourabh Pagaria | Executive Vice President & Managing Director, Southern Europe | Siemens Healthineers

Healthcare staff shortages are a growing global issue. At the same time, ageing populations and an increasing burden of chronic diseases are driving up demand for healthcare. The gap between rising demand and a shortage of healthcare workers is looming. HealthManagement.org spoke to Sourabh Pagaria, Executive Vice President & Managing Director of the Southern European business of Siemens Healthineers, on challenges healthcare workers face today and strategies to address the issue of workforce shortages.

What are the key challenges healthcare workers face today?

Coping with unfamiliar equipment, insufficient training, excessive work hours due to workforce shortages, and unrelenting work volume can all contribute to stress in healthcare workers, leading to low employee satisfaction, severe burnout, and further exacerbating the problem with additional turnover. Spreading the workforce too thin inevitably increases multitasking, which psychology research has shown to be a significant source of errors. The more complex the tasks involved, the more time and error consequences there will be. This type of stress leads to staff burnout and attrition, which puts additional strain on the remaining staff. This vicious circle exacerbates productivity losses and staff retention issues.

We must also remember COVID-19 experience's long-lasting stress. The sick, dying, and contagious were supported by healthcare professionals, especially those working on the frontline. Additionally, new and unexpected roles were imposed on healthcare workers. In order to boost capacity for COVID-19 patients and secure the safety of other patients, they quickly had to adapt workflows within hospitals and other facilities. They were required to hold the hands of infected patients in place of family members who were not permitted to enter the ICU. They also had to deal with their own individual difficulties, such as a lack of supplies and concern over potentially infecting their relatives at home.

Workforce shortage is a significant issue in healthcare. How do you think this problem can be overcome?

Nurse and radiographer shortages are a growing global issue. At the same time, ageing populations and an increasing burden of chronic diseases are driving up demand for healthcare. As a result, a gap between rising demand and a shortage of healthcare workers is looming. Moreover, during the pandemic, we saw numerous examples of a massive gap between workforce supply and demand. Using a remote workforce outside of the hospital can assist in overcoming this issue. Remote solutions can connect healthcare workers with various tasks and help achieve the right balance. Specialists in low-demand areas, for example, could provide virtual consultations and assist colleagues in higher-demand areas. This method can also improve efficiency and productivity.

Which workforce productivity tools can help healthcare workers?

Two powerful trends will shape the future of healthcare: increasing care demand and growing workforce shortage. By 2030, the worldwide population of people over 65 will double (He et al. 2016). At the same time as demand continues to grow, hospitals are struggling with understaffing. The result is a wide and growing gap between supply and demand, increasing by 14% every year (NHS 2017). The most effective strategy to meet this challenge is to increase workforce productivity within the healthcare sector. How can we do that? In our view, it can be done using three levers: Eliminating waste, reducing necessary activities without value, and ensuring individual growth. Additionally, supplementing the workforce can help to close the workforce gap. Let's go a little bit deeper into these three levers:

1. **Eliminate waste:** Worldwide, between [30% and 50% of healthcare activities](#) can be classified as "wasteful". This includes the unnecessary duplication of tests, overly complicated bureaucratic procedures, and overtreatment, among many examples. To eliminate waste, it is necessary to identify errors and eliminate them, analyse operations and stop unnecessary activities and simplify and streamline to master complexity. One solution can be the use of digital tools to enter the field of intelligent imaging. MyExam Companion, for instance, turns data into built–in expertise to guide users through procedures and helps to

generate consistent results.

2. **Reduce necessary activities without value:** Healthcare has a 36% automation potential (Chui and Manyika 2016). Automation and robotics can significantly reduce the time required by humans to perform many necessary tasks. Furthermore, proven task-shifting strategies, such as outsourcing non-core activities, can reduce expert staff workload. To reduce non-value activities, work must be automated, non-core activities delegated, and multidisciplinary collaboration encouraged. Our eHealth solutions help build healthcare networks and provide seamless access to patient data, allowing health facilities, payers, and patients to collaborate.

3. **Ensuring individual growth:** Nurse and physician shortages are looming trends in healthcare, despite the fact that they are the heart and soul of the system. Increasing workforce productivity will require enabling them to do their jobs more effectively and efficiently. Advanced technologies provide powerful new tools, and digitisation will assist in making expertise available where and when required. By encouraging lifelong learning, augmenting the capabilities of human workers, and making expertise available where and when needed, the workforce can be enabled to focus on what adds the most value to patients. In this case, our PEP Connect solutions and syngo Virtual Cockpit can provide online access to learning activities and make expert knowledge available across sites in real-time.

Do you think remote training is a feasible strategy to improve the skills/qualifications of healthcare workers?
During COVID-19, remote work in the healthcare sector emerged as one of the most effective ways to reduce coronavirus infection rates, gain access to necessary medical expertise, maximise resources, streamline patient treatment, and allow employees to continue working even when quarantined and forced to stay at home. We've all participated in what TIME magazine dubbed "the world's largest work-from-home experiment". During the pandemic, workforce training was more important than ever, and because of the situation, training sessions were also conducted virtually/remotely. Virtually managed education platforms are important tools for healthcare administrators to streamline staff education while providing performance insights and optimising clinical operations. As Siemens Healthineers, we provide a variety of virtual training solutions that are supported by immersive technologies such as simulators, AR, and VR, as well as webinars that help to increase on-the-job competencies with personalised hands-on experiences and a learner-centric approach to train and practice fully individual and independently in a safe environment. Furthermore, virtual training can increase efficiency by leveraging innovative technology for continuous equipment education and skill development while improving staff satisfaction with innovative learning tools accessible anytime and anywhere without disrupting clinical operations. Finally, it boosts performance at a lower cost by leveraging innovative technology for continuous equipment education and skill development. Another tool for improving skills and qualifications is the use of our PEP platform, which has various subscription options and, for example, allows customers to add their own learning content to their group.

Many healthcare workers feel their work is hindered because of unnecessary administrative tasks. Do you agree? If yes, how do you think this can be addressed?
It is a fact that there is an increasing demand for administrative tasks to be performed by healthcare workers. According to a Medical Economics (January 2021) article referring to the United States, if doctors had to chart their feelings about practicing medicine, many would list "paperwork" as their main complaint. In countless surveys and studies, physicians consistently rank the time and effort required to fill out forms and other administrative tasks near or at the top of their list of

What healthcare providers are asking for …		…what MedTech partners can offer:	
Attract, retain and develop workforce	**Personalized learning experience** Instant access to digitalized education and information at the individual's fingertips	**Share and connect with experts** Information and updates on cutting edge trends from online network	**Empower the learner** Creation of individual profile, education plans, and transcripts to record trainings
Standardize quality of care	**Drive staff competency** Instant access to formal education, supported by social learning	**Enhance workforce performance** Education experience for the institution with learning plans for assignment and management	**Customized workforce management** Customizable education plans combining education for employees designed by Siemens Healthineers and/or your institution
Reduce risk and act compliantly	**Monitor progress** Dashboard and reporting tools for instant viewing of education status	**Streamline Audit Preparations** Integrated management and administration tools	**Manage entire teams of departments** Creation of tailored education plans with group assignments and tracking functionalities with a single solution

Source: Siemens Healthineers

grievances. "This isn't why I went into medicine" is a common refrain heard throughout the profession. Furthermore, time and focus are diverted from more clinically important activities of physicians and their staff, such as providing actual care to

to ensure that only people who absolutely need to be there are allowed through the door; physically separating potentially infectious patients in triage locations; and setting up dedicated spaces, equipment, and personnel for infectious

The most effective strategy to meet this challenge is to increase workforce productivity within the healthcare sector

patients and improving quality, and may prevent patients from receiving timely and appropriate care or treatment. Paperwork and administrative demands have also been linked to an alarming increase in physician burnout rates, particularly among primary care physicians. Technology and digital solutions can be of assistance in this situation. I'm referring to digital intake and check-in tools. For example, allowing patients to check in digitally helps to streamline the intake process and registration and allows providers to process completed patient forms more quickly. It also provides a more comprehensive and accurate evaluation of patients' medical histories and medications or expanding the use of telehealth, leveraging the experience gained during the pandemic when remote patient care helped reduce administrative tasks and enabled patients living in rural communities or at high risk of COVID-19 complications to more easily and cost-effectively access healthcare. Finally, improving patient engagement, particularly among those with chronic disease as a more engaged patient is more likely to adhere to treatment plans, track their health, and question their clinicians.

Healthcare workers have borne the brunt of the COVID-19 pandemic. Do you think the workforce was given adequate support and protection?
The COVID-19 pandemic has served as a stark reminder to the world that the safety of healthcare workers must be prioritised by governments, health systems, and executives. Frontline caregivers were frequently exposed to SARS-CoV-2 due to the nature of their work. In many locations, particularly early on, this risk was exacerbated by a lack of personal protective equipment (PPE). According to the World Health Organization, healthcare workers accounted for approximately 14% of global COVID-19 infections. Healthcare workers, especially those on the frontline were caring for the sick, dying, and contagious. Healthcare workers were also thrust into new and challenging roles. They had to quickly modify workflows within hospitals and other facilities in order to increase capacity for COVID-19 patients while also ensuring the safety of others. They were forced to stand in for family members who were not permitted to visit the ICU, holding the hands of infected patients. At the same time, they had to deal with personal issues, such as a lack of supplies and the fear of spreading the virus to their families. Some safety measures were implemented, and we have all seen them: restricting access to healthcare facilities

patients, reducing the need to move them and ensuring that as few people as possible come into contact with them. Not to mention the remote training, which increased during the pandemic, allowing healthcare professionals to continuously train themselves while also being protected. But, at the end of the day, we can't protect patients unless we protect the people in charge of their care, and protecting healthcare workers means protecting both their mental and physical health.

Burnout is a major problem in healthcare. How do you think this can be addressed?
It is obvious that healthcare systems will never be the same after COVID-19. Healthcare workers have faced unprecedented challenges at a high personal cost. In addition to overwhelmingly stressful and sometimes traumatic work environments, many people experienced loneliness and isolation at home as they were forced to distance themselves from loved ones whom they feared they might infect. The healthcare systems and the way they previously operated were disrupted. Traumatic events, such as being faced with a pandemic or being diagnosed with a life-changing disease, can activate the body's sympathetic nervous system (SNS), causing stress hormones to be released and physical reactions such as a racing heart, impaired immune function, and high blood pressure. A better understanding of how stress and trauma affect healthcare professionals is critical for protecting them at a time when they are most needed. Taking precautions to protect their health and well-being helps them navigate this crisis safely and ensures that patients receive the care they require. Siemens Healthineers recommends the following three resilience-building strategies for healthcare providers:

1. **Promote mental and physical self-care** - It is okay for healthcare professionals to not feel okay. They must also believe that their organisation cares about their well-being. Healthcare leaders must ensure that all employees have the skills necessary to be mentally and physically healthy and resilient. Mind-body techniques like mindful breathing, active meditation, movement, biofeedback, and guided imagery are included in the programme to teach self-awareness, self-care, and self-expression.

2. **Incorporate stress and trauma relief into the workplace** - Healthcare systems that incorporate and support proven and scientifically-based mind-body medicine programmes in small group formats will have better

long-term outcomes. Effective trauma relief and resilience building are critical for the well-being of employees and the organisation as a whole.

3. **Develop a true culture of caring and well-being** - Healthcare leaders can help their employees manage their stress by implementing institution-wide self-care programmes based on facilitated small groups. Organisations can collaborate to create a culture that values everyone's well-being and promotes feeling "cared for" as an organisational principle.

What strategies can be adopted to assure healthcare workers that Artificial Intelligence is a source of support rather than a threat?

Currently, the demand for diagnostic services exceeds the supply of experts in the workforce. Creating solutions to manage this ever-increasing workload is critical for the healthcare industry. Furthermore, as the workload increases, diagnostics and treatment become more complex. Diagnosticians and physicians require new tools that can process large amounts of medical data quickly and accurately, allowing them to make more objective treatment decisions based on quantitative data tailored to the needs of the individual patient. When analyses are too difficult, time-consuming, or inefficient to perform alone, artificial intelligence (AI) can help clinical professionals stay focused on their patients and better use their expertise. Artificial intelligence-enabled tools detect meaningful relationships in raw data, extract relevant insights, and apply those lessons to new patient cases. AI is an indispensable tool in all fields of healthcare, including drug development, patient care, and operational decisions, because it assists physicians in making more informed clinical decisions.

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Female Physician Infertility in the U.S.

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The rate of infertility is much higher among female physicians than in the general population. This could be improved by increased education and awareness among the medical community in conjunction with the continued improvement and expansion of infertility insurance coverage throughout the United States.

✓ Key Points

- One in four female physicians is diagnosed with infertility.

- There are several ways to combat the increased prevalence of infertility among female physicians, such as making this statistic more familiar to the medical community.

- Increased education among current medical students and residents will better prepare the next generation of female physicians to combat this obstacle and consider earlier intervention.

- Expensive infertility treatment can become unmanageable without insurance coverage.

- Infertility insurance coverage has become more customary in recent years, and state mandates regarding infertility coverage laws continue to be established.

- Offering infertility coverage benefits leads to greater employee satisfaction and less turnover without significantly increasing medical plan costs.

Female physicians have a two times greater incidence of infertility compared to the general population with one in four receiving such a diagnosis (Stentz et al. 2016); however, this grim statistic is not widely recognised or understood.

Medical education is a long and arduous process that interferes with a woman's most fertile years. The Association of American Medical Colleges (AAMC) notes the average age at matriculation into medical school is 24, which corresponds to the beginning of declining fertility that can start as young as 25-30 before a substantial decrease around 35 (Vander Borght and Wyns 2018). Concurrently, a female medical student or resident may not feel prepared to become pregnant and raise a child until she has completed her education and training, full of intense study demands, clinical rotations, and little flexibility. Because of these commitments, many delay childbearing; in fact, most female physicians have their first child just before

completing residency, 7.4 years later than the general population (Stentz et al. 2016). Most physicians complete their postgraduate training at an average age of 32 years old, and infertile physicians receive their formal diagnosis at an average age of 33 (Stentz et al. 2016). This leaves many female physicians struggling with infertility while nearing the advanced maternal age, sometimes called geriatric maternal age, of 35, when the odds of a successful pregnancy significantly worsen. While all this data may be unsettling, the U.S. is far from powerless in keeping its female physicians from becoming "involuntarily childless" due to their career choice (Kemkes-Grottenthaler 2003).

There are several opportunities to help combat female physician infertility in the U.S.: heightened awareness, increased education, and widespread infertility insurance coverage. Young female medical students need to be made aware of

this increased prevalence and educated about infertility more generally. This includes what a woman can and cannot do to control her fertility, what treatment options may look like, and information about fertility preservation such as cryopreservation or egg-freezing (Marshall et al. 2020). In a survey of female physicians previously diagnosed as infertile, retrospec-

recognised that many potential employees either completely avoided or were hesitant to ask about infertility coverage, so she created a one-page document outlining the benefits that Northwell offers. These currently include artificial insemination, medications, surrogacy, and different assisted reproductive technologies (ARTs) such as in-vitro fertilisation (IVF).

Infertility insurance coverage helps combat the issue of "involuntarily childless" female physicians in the U.S.

tively, 17% would have cryopreserved their eggs (Stentz et al. 2016). It would be impossible, however, to make such a decision without being aware that these options exist. Reproductive health and infertility are existing elements of early medical school curriculum; it would be seamless yet impactful to incorporate statistical data on infertility's increased prevalence among female physicians. Nearly half of the respondents were either "quite a bit" or "very much" surprised by their infertility diagnosis (Stentz et al. 2016). Earlier recognition of the potential for infertility along with an action plan and insurance coverage could have significant impact on management.

Beyond the emotional and physical tolls that infertility evaluation and treatment can carry, the financial toll is daunting. A 2011 study on the costs of infertility treatments noted the median costs per person ranged from $1,182 for those requiring medication only, up to $38,015 for IVF-donor egg users (Katz et al. 2011). Moreover, these numbers become higher when success is considered: $5,894 and $72,642, respectively (Katz et al. 2011). With these costs being additional to those associated with pregnancy once achieved, one might think that insurance coverage for the evaluation and treatment of infertility should be required. Luckily, mandated infertility coverage in the U.S. began in the 1980s (RESOLVE. org 2021). In the past five years, five additional states have passed infertility coverage laws, bringing the total number of states with an infertility coverage law to twenty (RESOLVE. org 2022). While these laws are certainly a step in the right direction, they vary from state to state with many exemptions, specific eligibility criteria, and hidden caveats that significantly limit those who effectively receive mandated coverage for their infertility (RESOLVE.org 2022). Ultimately, it is up to individual employers to support their employees by offering such health benefits.

One large health system in New York, Northwell Health, recognised that coverage for infertility treatment and management would be an employee recruitment and retention tool. Vice President of Physician Recruitment at Northwell Health in New York, Ms Judith Heller, gave a unique perspective on the progress that has been made during her 14 years with Northwell and explained the pivotal role that comprehensive infertility benefits has played for Northwell's employees. She

Creating an incredibly supportive environment where fertility is facilitated and pregnancy is celebrated has led to an increase in recruitment and retention of female physicians. "Such a work environment leads to relationships of trust and loyalty, with happier employees who feel better supported", shares Ms Heller.

Infertility insurance coverage helps combat the issue of "involuntarily childless" female physicians in the U.S. It also leads to more satisfied employees with less turnover (Kemkes-Grottenthaler 2003; RESOLVE.org 2021; 2022), and offering such benefits does not carry any significant increase in medical plan costs (RESOLVE.org 2021). In a 2016 survey of 700 employees undergoing rounds of IVF, those with employer-provided IVF benefits were much more satisfied with their employer when compared to those without such benefits (RESOLVE.org 2022). They were less likely to miss work, more likely to recommend their employer to job seekers, and felt more listened to and cared for by their employer (RESOLVE. org, 2022). A similar survey in 2017 found that employees who underwent insurance-covered IVF were more likely to work harder and retain their job for longer (RESOLVE.org 2022). With such a high benefit-cost ratio, it is no surprise that more and more companies have adopted similar benefits, including additional family-building benefits such as adoption or fostering. Since 2019, there has been an 8% increase per year in the number of large companies that newly offered or expanded their infertility or family-building benefits (FertilityIQ 2022). At Northwell, infertility coverage became a part of the benefits offered after their annual Employee Engagement Survey. While other employers are beginning to listen to the needs of their employees and take action to support them, health insurance for infertility is still not consistently offered.

While the statistical evidence regarding infertility insurance coverage seems to be trending in the right direction, there is more work to be done to support and treat infertility among female physicians. After conquering their infertility battle, female physicians often face additional difficulties; there are substantial increases in complications such as gestational hypertension, preterm labour, and placental abruption among female physicians (Stentz 2016; Finch 2003; Grunebaum et al. 1987; Rangel et al. 2021). Increasing research into the

aetiology and management of these pregnancy-related conditions may lead to changes in training and work-life balance. Inclusion of adoption benefits would be an additional means of support for physicians seeking to start a family. Currently, only 20% of companies that offer fertility coverage also offer foster or adoption benefits (FertilityIQ 2022). Of those that offer such

many fertility treatment options earlier on and better educated on this issue, and it is imperative that this awareness and education penetrates U.S. medical schools. Unfortunately, a recent study revealed that there is inadequate coverage and large limitations to fertility benefits at the majority of top medical schools across the country (Hoang et al. 2022); this

Many female physicians may have unwittingly sacrificed their fertility for the sake of their passion for medicine

benefits, the average level of coverage is less than 25% of that offered for fertility (RESOLVE.org 2022). While treatments to become pregnant can be decidedly beneficial, millions of children are already born and in need of loving homes across the globe, and adoption may be a viable alternative. By allowing infertility coverage benefits to grow and evolve while education efforts are initiated and further research is funded, the odds for the next generation of female physicians to become successful in both their career and parenthood improve.

Due to the conflicting timing of medical education with maximum fertility, many female physicians may have unwittingly sacrificed their fertility for the sake of their passion for medicine. Unfortunately, female medical students and residents will continue to struggle with the balance between their chosen career path and their personal life due to the time and energy commitment that their education requires. The next generation of physicians must be made aware of the

speaks to the lack of attention this issue is receiving where it is needed most. As the number of female medical students has climbed to roughly 50% in recent years, the percentage of female physicians in the workforce is expected to increase as well (Boyle 2019; Boyle 2021). With this rise, a greater number of our nation's female physicians will face infertility struggles. Education and continued strides on both a national, legal level as well as within individual businesses and institutions regarding infertility coverage will contribute to bettering female physicians' odds of successful pregnancies. Becoming a physician should not preclude women from growing their families. Such dedication to serving others deserves better support, education, and insurance coverage for the future of U.S. female physicians and their families.

Conflict of Interest

None. ■

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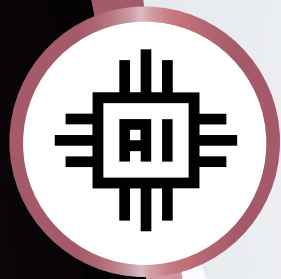
AI: Opportunities
Capabilities
& Limits

A New Era in Operational Excellence – Predicting With Precision to Enable Better Patient Care

Zisis Sotiriou | SVP Regional COO | Affidea

An overview of new technologies by Affidea designed to improve patient experience and medical outcomes while making clinical operations safer.

✓ Key Points

- Unplanned downtime from clinical equipment can negatively affect every aspect of the care delivery.

- Innovation is part of Affidea's DNA, and it comes to offer an outstanding patient experience, proven clinical outcomes and high safety standards.

- Affidea has become the first medical provider in Europe to use OnWatch Predict, an AI solution that will predict technical malfunctions in the MRI fleet before they occur.

- OnWatch Predict leverages digital twin and machine data to create a unique virtual MR model, based on AI learning.

4.5 days - that's the average delay in patient care that an unforeseen failure in an MRI equipment might generate.

Unplanned downtime from clinical equipment can negatively affect every aspect of the care delivery. From patient care, as their appointments and diagnosis could be delayed, to staff productivity, as they would need to handle all rescheduling activities.

Imagine a world where we can predict technical malfunctions in the MRI equipment before they occur.

Innovation is part of Affidea's DNA, and it comes to offer an outstanding patient experience, proven clinical outcomes and higher safety standards.

We believe the future of healthcare is around predicting with precision in a world where clinical teams are empowered by technology to enhance care. With customer care in mind, we adopt new technologies that can continuously improve patients' experience and their medical outcomes, while at the same time, making our clinical operations safer.

Failures can happen, but if we know in advance then we can mitigate the impact. This enables the impact of unplanned disruption to be minimised and replaced by planned corrective actions at the most-convenient time. As a result, it helps medical professionals to improve patient care, while achieving greater efficiency and productivity.

Therefore, Affidea has become the first medical provider in Europe to use OnWatch Predict[1], an AI solution, that will predict technical malfunctions in the MRI fleet before they occur. This way, we increase the availability of performing more MRI examinations, since the maintenance can be planned out of working hours.

OnWatch Predict leverages digital twin and machine data to create a unique virtual MR model, based on AI learning. Information is collected on a daily basis, and then compared to the virtual model to predict the estimated remaining life of the component monitored. Models and alerts cover different assets of the system, such as Environment, Image Quality, MR magnet and Cryogens, Patient Handling and Main System.

The AI solution OnWatch looks over 1500 parameters in the MR technology, analysing and pre-empting potential machine failures, which normally happen without warning and can therefore cost several days' delay in services.

This is a new era in operational excellence. With the use of the new AI solution, we can now predict with precision and with enough lead time when an equipment needs corrective maintenance.

And all goes down to better patient care. We understand that

[1] AI solution developed by GE Healthcare

patients will often be anxious and worried about their condition when they come to see us. That is why we continually invest

benefits for our patients – they will take the exam that they need, when they need it, receiving their diagnosis and

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With the use of the new AI solution, we can now predict with precision and with enough lead time when an equipment needs corrective maintenance

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in their comfort and wellbeing, making sure they receive the best possible care, delivered quickly, effectively and safely.

The recent innovation that we have installed to predict possible technical failures in our MRI fleet brings tremendous

treatment plan as fast as possible, mitigating the risk of technical interruptions.

Our promise to put patients first is now stronger than ever, and we show it in everything we do. ∎

Affidea at a glance

- Multinational healthcare provider, with presence in 327 centres across 15 countries in Europe, providing high quality affordable care for more than 12 million patients every year

- Working with over 11.000 professionals, producing 20 million scans every year

- Establishing a network of 13 sub-specialty expert groups in every country to collaborate across Europe and define the best medical protocols, allowing for timely and high-quality diagnosis, faster and better treatment.

- 50% of the 5 stars awarded centres by the European Society of Radiology, for patient safety and radiation protection, belong to Affidea

Medical
Imaging

The Exposure to Ionising Radiation in Territorial Medicine: The Need to Act to Reduce the Risks

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Given the proven increase in exposure to ionising radiation by over 600% (diagnostic bulimia) it would not only be wise but also necessary to reduce the unjustified radiation risk due to inappropriate diagnostic investigations, by the following sustainable measures:
- revise the diagnostic reference levels for CT, interventional and paediatric radiology;
- renew obsolete radiology instruments and provide the quantification of dose in each report;
- implement lifelong learning at any level, starting from general practitioners and paediatricians;
- launch systematic communication campaigns to increase citizens' awareness on the potentially harmful exposure to radiation in biomedical imaging exams.

☑ Key Points

- Over the years, the advancement of imaging tools and techniques, along with very significant improvements in the diagnosis of different pathophysiological conditions, has been accompanied by an increase in exposure to ionising radiation, even at low-dose.

- In the case of radiological procedures, the first question to be asked is whether there are alternative methods that do not emit ionising radiation (such as ultrasound or magnetic resonance imaging) that can answer the same clinical questions.

- Numerous studies have shown that the principle of justification and precaution is not followed scrupulously and that between 20 to 50% of medical imaging examinations are considered inappropriate.

- One of the reasons of diagnostic bulimia is a lack of information about radiation risk.

Present Scenario of Radiation Exposure

Over the years, the advancement of imaging tools and techniques, along with very significant improvements in the diagnosis of different pathophysiological conditions, has been accompanied by an increase in exposure to ionising radiation, even at low-dose (Narasimhamurthy et al. 2022).

concepts have been made even more stringent by Legislative Decree 31 July 2020, n. 101, in implementation of Directive 59/2013, published on 17 January 2014 in the Official Journal of the European Union, which establishes the fundamental safety standards relating to protection against the dangers deriving from exposure to ionising radiation, and which repeals

Radiological examinations that do not meet diagnostic appropriateness criteria are almost a third of all investigations performed

In particular, the use of computed tomography (CT) in emergency departments has skyrocketed over several decades, as physicians increasingly depend on imaging for more refined diagnoses. Therefore, both patients and medical personnel are put at risk due to the frequent exposure to and higher levels of radiation (Azman et al. 2019).

As a result of the changes in use of imaging procedures that rely on ionising radiation, it has been estimated that the collective dose has increased by over 700%, and the annual per-capita dose by almost 600% in recent years (Gerber et al. 2009). No wonder someone has referred to this phenomenon as "diagnostic bulimia".

Late-onset effects of exposure to ionising radiation on the human body have been identified by long-term, large-scale epidemiological studies. The cohort study of Japanese survivors of the atomic bombings of Hiroshima and Nagasaki (the Life Span Study) is thought to be the most reliable source of information about these health effects because of the size of the cohort, the exposure of a general population of both sexes and all ages, and the wide range of individually assessed doses. Radiation exposure increases the risk of cancer throughout life. At high doses, and possibly also at low doses, radiation might increase the risk of cardiovascular disease and some other non-cancer diseases (Kamiya et al. 2015).

In the case of radiological procedures, the first question to be asked is whether there are alternative methods that do not emit ionising radiation (such as ultrasound or magnetic resonance imaging), that can answer the same clinical questions. If this is not possible, it is then necessary to assess the risk-benefit ratio for the patient in the use of radiation-emitting technologies. The choice of a diagnostic method must in fact provide for the evaluation of the risk-benefit ratio based on diagnostic appropriateness.

From a regulatory point of view, in Italy these concepts were already clearly expressed by Legislative Decree 187/2000 which transposed Directive 99/43/Euratom. Today these

all previous Legislative Decrees on the subject. The Directive recalls that, according to the World Health Organization, the concept of health should refer to the physical, mental and social well-being of the person and not only to the absence of diseases or infirmities. In the recent Legislative Decree 101/2020, Article 157, paragraph 1 states that "unjustified exposure is prohibited" (Council Directive 1997; Council Directive 2013; Decreto Legislativo 2020).

Despite this directive, numerous studies have shown that the principle of justification and precaution is not followed scrupulously and that between 20 to 50% of medical imaging examinations are considered inappropriate (Al-Mallah et al. 2017). Radiological examinations that do not meet diagnostic appropriateness criteria are almost a third of all investigations performed (Picano 2009; Herzog and Rieger 2004; Rehani et al. 2020).

As the latest European data show, the exposure of patients to inappropriate diagnostic investigations, in addition to exposing patients to an unjustified risk, produces an increase in public health costs and a concomitant growth in waiting lists for the same radiological procedures.

In the public facilities of Puglia (data July 2021), for example, the waiting lists for urgent diagnostic tests are very long - Abdominal CT: 15 bookings and only 2 examinations done within 3 days (13.33%); Skull CT: 61 bookings and only 8 examinations done within 3 days (13.11%).

One of the reasons of diagnostic bulimia is a lack of information about radiation risk. Physician awareness of the risks of ionising radiation exposure related to medical imaging is poor. Effective educational interventions informing physicians of such risk, especially in emergency medicine (EM), are lacking (Sheng et al. 2016).

In a study conducted in 2004 in an American hospital, only 27.5% of doctors who were subjected to a questionnaire on dosimetry topics were able to obtain a score above 45%; in addition, 28% and 10% of the doctors who participated in the test believed that both MRI and ultrasound made use of

ionising radiation (Jacob et al. 2004).

Of course, there is also a lack of information about radiation risk provided to the patients prior to the diagnostic procedure. Efforts should be made to ensure that patients receiving multiple medical imaging tests are aware of the radiation they are receiving (Alawad and Abujamea 2021).

that uses ionising radiation is performed with the lowest possible dose of radiation such as to allow the radiologist to answer a specific clinical question, but, as stated in Article 158 of the aforementioned Legislative Decree, it is necessary that "optimisation" includes the choice of medical radiological equipment, the production of appro-

There is also a lack of information about radiation risk provided to the patients prior to the diagnostic procedure

In Italy a study was conducted in 2019 to assess patients' knowledge about medical radiation and related risks. Among 3039 patients invited to participate, the response rate was 94.3% (n = 2866). Participants included 1531 women (53.4%); mean (SD) age was 44.9 (17.3) years. Of the 2866 participants, 1529 (53.3%) were aware of the existence of natural sources of ionising radiation. Mammography (1101 [38.4%]) and magnetic resonance imaging (1231 [43.0%]) were categorised as radiation-based imaging modalities. More than half of the 2866 patients (1579 [55.1%]; P = .03) did not know that chest computed tomography delivers a larger dose of radiation than chest radiography, and only 1499 (52.3%) knew that radiation can be emitted after nuclear medicine examinations (P = .004). A total of 667 patients (23.3%) believed that radiation risks were unrelated to age, 1273 (44.4%) deemed their knowledge about radiation risks inadequate, and 2305 (80.4%) preferred to be informed about radiation risks by medical staff (Bastiani et al. 2021).

The Need for Action
With these premises, precisely to promote the implementation of Legislative Decree 101/2020 and safeguard the health of citizens, in Puglia (Italy) a project called "Ionizing Radiation in Territorial Medicine" coordinated by ISBEM and the Department of Innovation Engineering of the University of Salento started in July 2022.

Design and methods
The above designed project - which will last 18 months – aims:
a) To suggest with priority the updating and revision of the Diagnostic Reference Levels (DRLs), especially for CT, interventional radiology and paediatric radiology. This activity aims to respect the principle of optimisation, which was once summarised in the radiological field with the acronym ALARA (as low as reasonably achievable), but which - with Legislative Decree 101/2020 - takes on a much broader meaning. In fact, this principle not only provides that every radiological procedure

priate diagnostic information or therapeutic outcome, practical aspects of medical radiological procedures, as well as quality assurance programmes, including quality control, examination and evaluation of doses or activities administered to the patient.

b) To carry out an inventory of diagnostic equipment in territorial medicine, to encourage the renewal of the instruments installed in radiology, counteracting their widespread obsolescence. The inclusion of the dose on the report, provided by the new devices, will facilitate a constant verification of the quality of the processes in radiology. In fact, the fulfillment of the norm, with the highlighting of the dose data in the report, will strengthen the habit of systematically controlling the dosimetric behaviours of all operators, avoiding the occurrence of clinically unjustified dose variability.

c) To design training courses and continuously update both in the university environment and for general practitioners and paediatricians. When clinicians were made aware of the risks from high-dosage CT radiation, there was a significant (>50%) reduction in scan requests (Gimbel et al. 2013). Radiologists should be taking the lead in educating their colleagues, residents, technologists, nurses, and patients to help close the knowledge gap.

d) To carry out a campaign to raise awareness of citizenship with dedicated information events.

Conclusion
Over the years, the advancement of imaging tools and techniques has been accompanied by an increase in exposure to ionising radiation, even at low-dose. To protect patients and to avoid unjustified radiation risk it would be advisable:
- to update the Diagnostic Reference Levels, especially for

CT, interventional radiology and paediatric radiology.
- to renew the radiological equipment.
- to design training courses and life-long learning both in the university environment and at general practitioners and pediatricians.
- to carry out campaigns to raise awareness of citizenship with dedicated information events.

Conflict of Interest

None. ■

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The Future of Healthcare Workforce Development and Management

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The healthcare workforce crisis is a global reality. The healthcare workforce is experiencing a shortage in staff and expertise, impacting staff wellbeing and satisfaction. Fear of exposure to infection and transmission, staff shortages, inadequate personal protective equipment, and work stress has added an extra burden to an already stressful lifestyle resulting in increased burnout rate and suicide. The overall environment of healthcare work has changed, and Siemens Healthineers enhanced their education and workforce offerings to ensure the challenges are met with solutions.

Key Points

- It is projected that there will be a shortfall of 15 million health workers by 2030, mostly in low- and lower-middle-income countries.

- It is estimated that there will be 40% more people over 60 years by 2030.

- 40% of US technologists report symptoms of burnout.

- The 2021 World Health Organization (WHO) annual health report recorded 7,00,000 deaths by suicide globally (Awan et al. 2022).

- 61% of patients continue their search for a healthcare provider to find an earlier appointment.

- Healthcare faces several workforce challenges, including limited staff, limited skills and competencies, changing roles, tasks and expectations on work-life balance, excessive workload impacting staff retention and satisfaction and keeping up with evolving technology.

Today's workforce challenge is larger than expected, impacting overall performance with decreased revenue and financial and operational challenges. Healthcare workers lack the skills and expertise as technology changes and increase in augmentation and automation. This contributes to reduced confidence, burnout and decreased mental health, which can cause them to leave the institution and suffer from illness or even death. Lack of skilled staff or resources poses pressure on the patient, and it is seen in reduced patient satisfaction rates, increased number of deaths and even an increase in violent attacks against medical professionals (Boyle 2022). Healthcare workers are key to providing patient care, so this crisis is top of mind for healthcare institution leaders. Three of the five key actions to close the gaps within the workforce are building skills, hiring, and contracting, and 58% of organisations state the skills gaps as a higher priority since the pandemic. With approximately 56% of healthcare providers' expenses going into personnel, this is their largest investment (LaPointe 2018).
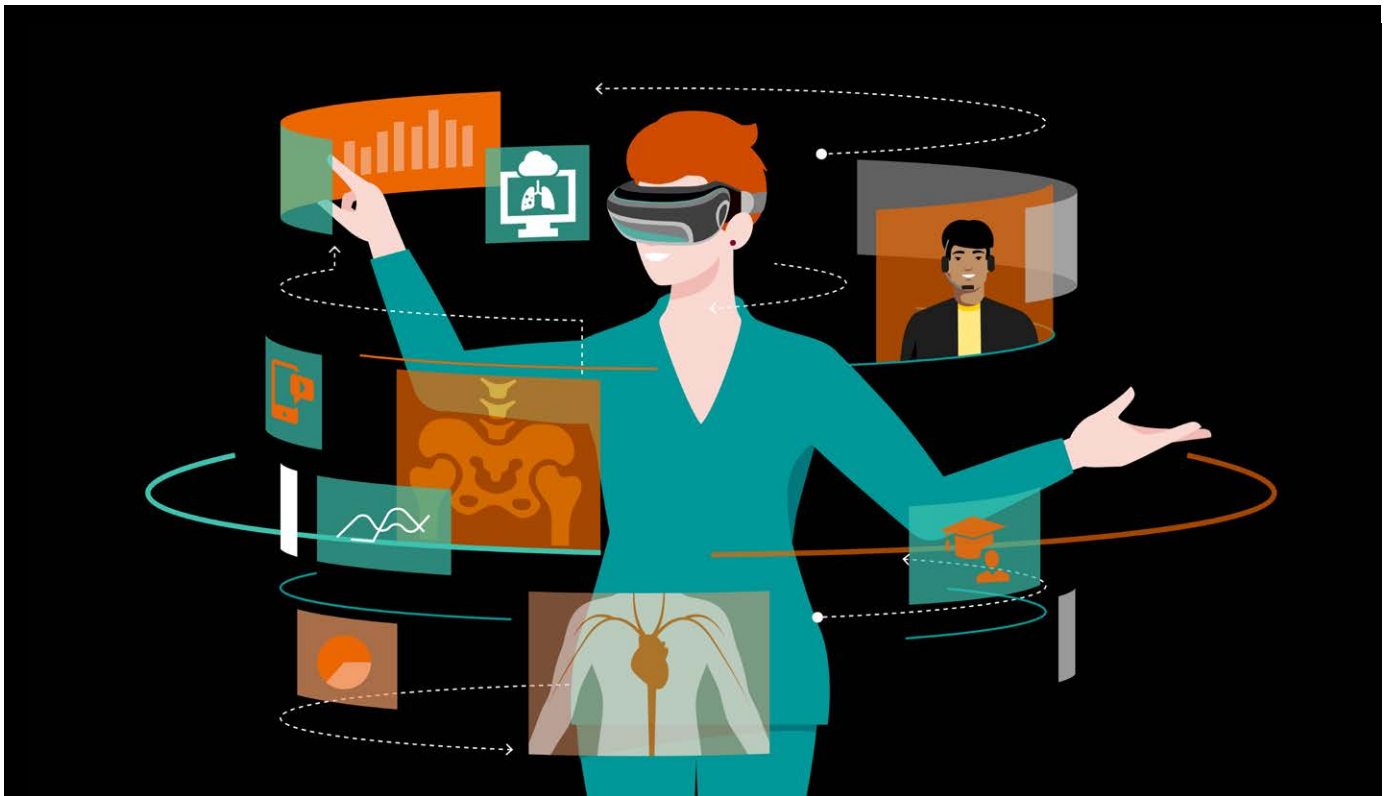
Image Credit: Siemens Healthineers

Siemens Healthineers offers services and solutions that enable healthcare workers to excel. These solutions allow healthcare organisations to create a sustainable workforce, manage their staff better with smart workforce management tools, address staff shortages, integrate hybrid learning, and ensure targeted education and coaching. This results in less stress and pressure for healthcare workers, increased confidence in their skills, and more flexibility in scheduling, leading to greater staff satisfaction, productivity, improved operational performance and outcomes, as well as revenue.

An important social trend that became prominent during the COVID-19 pandemic is the use of remote working/learning. Remote modes of higher education will continue to evolve in a post-pandemic future and will require innovative technologies and approaches to addressing the different needs of learners and accelerated adoption of new learning technologies and tools. Education delivery models will continue to evolve, and hybrid learning will be widely adopted. To remain ahead of the curve and deliver meaningful education to learners, it is essential to use innovative technologies like virtual, augmented and extended reality.

Siemens Healthineers hybrid learning approach offers a lifelong learning strategy to ensure access to needed education, skills and experts, with optimised processes and digitally enabled solutions. These solutions allow healthcare workers to:

- Improve and gain new knowledge and skills when and how they need to
- Learn from experts on demand
- Improve operations, workflow and processes
- Improve turnaround times with patient scheduling and results
- Build a learning health system

Some of Siemens Healthineers innovative management, education and coaching, and staffing solutions include:

Workforce Management
PEPconnections

PEPconnections supports a clinical institution's performance growth with integrated workforce education management and administration features. It can help organisations manage the education of teams or departments and personalise the education experience of individual employees by combining education designed by Siemens Healthineers, the healthcare institution, or independent providers.

Education and Coaching
PEPconnect

PEPconnect is a complete personalised cloud-based education and performance management experience designed for healthcare professionals. It offers education and real-time support in Medical Imaging and Therapy, Laboratory
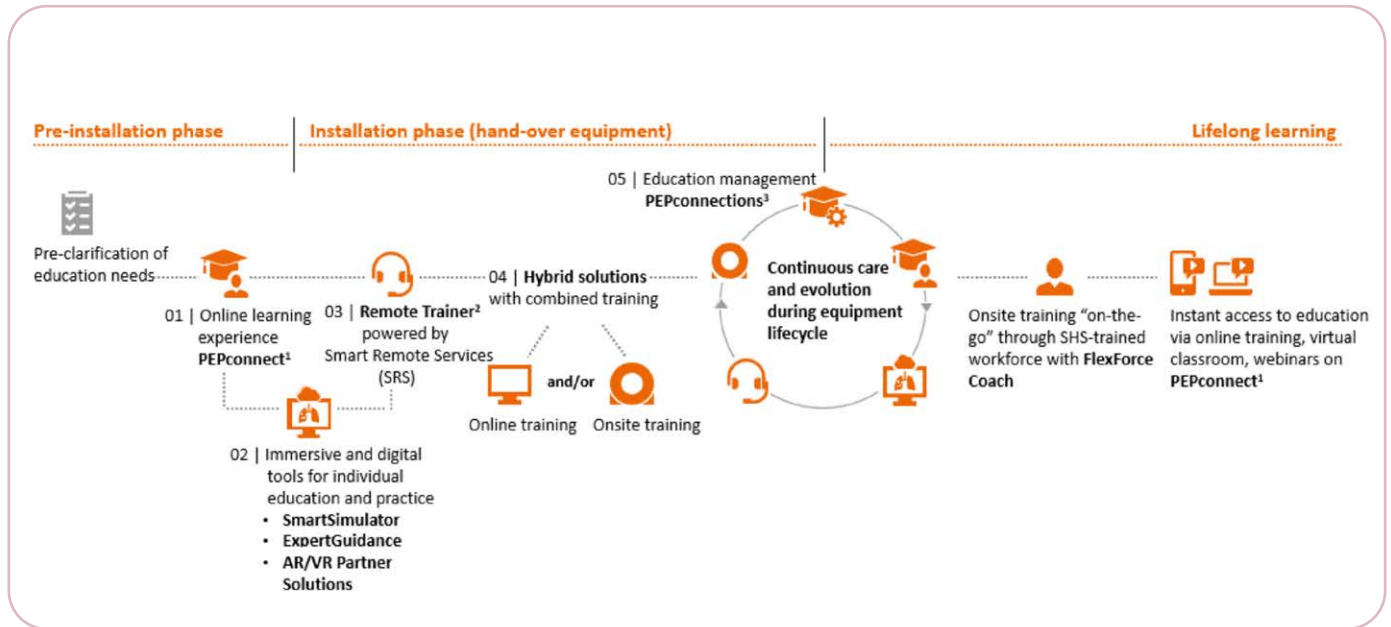
Image Credit: Siemens Healthineers

Diagnostics, POC, and other healthcare-related topics via e-learning, webinars, job aids, and more. Learners can access the material anytime, anywhere, and on any device and can access more than 19,000 in-vivo and in-vitro and over healthcare-related learning activities, as well as Advanced Digital Education Subscriptions. Learners can benefit from the online network of professionals and connect, communicate, and be part of social learning groups whilst acquiring the certification they need.

SmartSimulator

SmartSimulator allows staff training through a simulated version of a medical device to reduce ramp-up times for new devices and workflows. It enhances confidence by providing staff with extensive training possibilities using the equipment and the latest imaging applications. SmartSimulator will help healthcare organisations enhance the confidence of staff by providing them with hands-on experience using a virtual medical device to improve scanning efficiency. It can also boost performance by leveraging innovative technology for better scan practice and scan protocol optimisation on simulated, cloud-based medical device interfaces.

ExpertGuidance

ExpertGuidance is a mobile Augmented Reality training application that provides guidance on basic functionalities, step-by-step instructions on equipment use, and complex clinical workflows. The instructions can be accessed anytime and anywhere on a mobile device.

AR/VR Partner Solutions

AR and VR Partner Solutions from Siemens Healthineers are easily accessible and applicable for various clinical fields. These learning tools go beyond equipment usage - from instrumentation and procedure training to gaming simulations in different emergency situations, interactive radiation safety simulation based on original 3D models and virtual training in x-ray handling.

FlexForce Coach

FlexForce Coach is a comprehensive staff development and performance consulting solution provided by experts from Siemens Healthineers. It drives change management and enables standardisation of equipment protocols across multiple shifts and locations. A FlexForce Coach also provides equipment and applications training to your radiographers, improving the quality and efficiency of work of an entire department. Working with a FlexForce Coach also increases your attractiveness as an employer through a reputation for taking better care of your workforce. This helps you retain talent and attract a greater number and higher quality applicants.

Staffing
FlexForce Tech

FlexForce Tech is a workforce solution that provides highly skilled radiographers with Original Equipment Manufacturer training and support. These radiographers have in-depth knowledge of equipment and applications so that your equipment from Siemens Healthineers can be operated at a high level of quality and productivity from week one. This helps you to reduce your staff shortages while increasing the total number of procedures performed and leading to improved outcomes – both financial and clinical as well as improved

FlexForce Tech   FlexForce Coach

Image Credit: Siemens Healthineers

access to care. The minimal ramp-up times combined with flexible contract terms enable you to adapt your headcount to your operational needs.

Partner Testimonials and Feedback on Siemens Education and Workforce Solutions

Danielle Coleman
Imaging Manager, WakeMed Cary Hospital, North Carolina, USA

"At WakeMed, we needed our technologists to be able to scan stroke; we needed them to be able to perform procedures; we needed them to be able to work with trauma patients, all at a very quick pace to be trained and up and running very quickly. Working with Alex, a FlexForce technologist for Siemens Healthineers, has given us confidence in working with their workforce solutions. We got a technologist who we did not have to do any training to get them up and running. Alex was reliable and patient-friendly; he was always smiling and taking care of his co-workers. Overall, I think this was a very successful relationship. We are very glad to have him".

Prof Louise Rainford
Associate Dean for Radiography, UCD Health Science Center, Dublin, Ireland

"It is important to engage students, and they expect certain things from educational programmes. We also need to meet the needs of different types of learners, as students learn

in different ways. With a mix of lab-based, lecture-based, and VR-based material, you are more likely to be successful across a broad spectrum of learners than if you only use one or two ways of teaching".

Prof Franz Fellner
Dean of Studies/Faculty of Medicine, JKU Liz, Linz, Austria
"Computer graphics allow learners to enlarge graphics, rotate them and move to a complicated three-dimensional anatomical model. This makes it easier to understand complex three-dimensional anatomy. The multiplayer reconstruction we recently installed is a sensational leap forward, and this is only the beginning. It has incredible potential".

Somjit Jinapuk
Head of the Laboratory Department, Ramkhamhaeng Hospital, Bangkok, Thailand
"PEPconnect helps me manage the training programme of all our technologists efficiently. It improves our competitiveness by ensuring that all our technologists, including newcomers, have been effectively trained. There is standardisation of knowledge which will help to improve patient outcomes. It also enables me to learn with my friends and colleagues and become experts together".

Prof Michael Scholz
Anatomical Institute Friedrich-Alexander University Erlangen
"The quality of the visualisation of structures and tissues with Cinematic Rendering is amazing. It allows for lively lectures and intensifies the understanding of anatomical structures and spatial characteristics through photo-realistic visualisation. I am totally convinced that this application must and will find its way into anatomy education in the near future".

Erica Trevisan, Radiographer
Santa Maria della Misericordia, Udine, Friuli Venezia Giulia, Italy
"The virtual training provided us with operational effectiveness during the COVID-19 outbreak. All the team was able to attend and join remotely. Thanks to the SmartSimulator, we could learn the user interface and the acquisition parameters and simulate the operativity of the scanner CT SOMATOM go. Top without any pressure. Despite the lack of previous knowledge about Siemens technologies, we've been able to scan routine examinations before on-site training could commence. Thanks to the blended learning, the training was faster and easier".

Conclusion

Siemens Healthineers supports an excellent sustainable workforce with access to workforce management and development solutions in forms of education, staffing, and management that are easy, scalable, smart and of high-quality standards,

so healthcare providers can improve staff satisfaction, productivity, patient outcomes and revenue.

Disclaimer

The products/features and/or service offerings (here mentioned) are not commercially available in all countries and/or for all modalities. If the services are not marketed in countries due to regulatory or other reasons, the service offering cannot be guaranteed. Please contact your local Siemens Healthineers organisation for further details. For PEPconnections, subscription is required. Availability of subscription depends on country.

For Customer Quotes:

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

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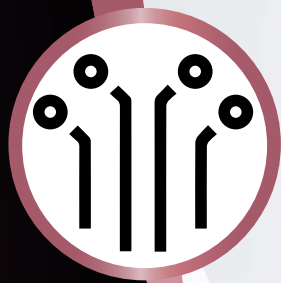
Successful Digitalisation Pathways

How EHR Interoperability Can Facilitate Successful Clinical Trials

Inga Shugalo | Healthcare Industry Analyst | Itransition | Colorado, USA

An overview of Electronic Health Records (EHRs) and how EHR tools could mark a new era in healthcare interoperability and be a valuable source of patient data for clinical trials.

✓ Key Points

- Clinical data exchange is crucial for patient treatment and clinical trials.

- EHR tools that communicate without barriers could mark a new era in healthcare interoperability.

- EHRs can become a valuable source of patients' health information for clinical trials.

- However, interoperability, or sufficient access to data stand in the way of mainstream EHR use for clinical trials.

Clinical data exchange is crucial for not only patient treatment but also clinical trials. However, so far its level has proven insufficient. As a Veeva 2019 Clinical Operations Survey found out, 99% of the interviewees note the need to unify clinical applications to achieve better visibility and control (70%), swifter trials (63%), and smoother stakeholder cooperation (61%). Will EHR interoperability ever reach a sufficient level for providers to achieve all this? Let's figure it out.

EHR Interoperability: The Current State

Today, EHR is used by 86% of providers, so EHR tools that communicate without barriers could mark a new era in healthcare interoperability. But is it the case with the present-day EHR solutions? Unfortunately not. The efforts to promote EHR interoperability are ongoing, with providers following two main paths:

FHIR-driven interoperability

The lack of universal data standards in the U.S. healthcare industry had been blamed for insufficient interoperability in the field. But then, the Fast Health Interoperability Resources (FHIR) standard was adopted across the industry.

The standard provides a clear collection of data formats and application programming interfaces (APIs) that providers can employ to exchange electronic health records. On the surface, the standard seems to successfully solve the basic issues industry players deal with. However, at a closer examination, the task is not that simple.

The point is that the key FHIR elements contain 5 to 50 assets

or resources. However, healthcare facilities tend to select only some of them, and this can undermine the intended interoperability because the main FHIR elements are closely connected. To establish interoperability with the FHIR standard, providers need to embrace broader sets of elements and resources.

Health information exchange

Health information exchanges (HIEs) are IT solutions that enable healthcare organisations (hospitals, providers, their patients, labs, and other medical facilities) to share patients' data safely and efficiently without the need to establish integrations with disparate healthcare systems. Besides, vital patient information transmitted in due time can enable informed decision-making at the point of care and let providers:

- Lower spontaneous readmissions rate
- Prevent errors in medications and treatment
- Scale up diagnostics
- Avoid repetitive tests and procedures

Given the promise HIEs hold, state governments have started investing in the solutions. As a result, diverse HIEs operate statewide and cross-state.

Statewide HIEs

Seeking to improve care coordination and patient experience, healthcare organisations from many states came to the decision to set up statewide HIEs. Though such HIEs serve the needs of providers, researchers, and patients from one state, their significance is hard to ignore. For example, Indiana HIE

(IHIE) scattered across 92 counties of the state propelled vaccination efforts during the pandemic. IHIE experts still maintain informative vaccination dashboards in six languages to keep their patients informed about the present-day situa-

several times a day.

Such research can help speed up scientific discoveries and provide insights for proper treatment approaches and strategies consolidation, patient safety, and evidence-based care

One of the biggest advantages of using EHRs for clinical trials may be their facilitation of patient recruitment and its outcome assessment

tion. Moreover, the team strives to enable health information sharing across the state's clinics.

Regional HIEs
These programmatic solutions cast the net for secure health information sharing across several clinics in neighbouring states. One of the brightest examples of such a solution is New England HIE Consortium uniting HealthInfoNet from Maine, RIKI from Rhode Island, and VITL from Vermont. The Consortium helps build up regional interoperability, which contributes to improving population health and the overall quality of care in the region.

EHR Interoperability for Clinical Trials: Three Use Cases
EHRs can become a valuable source of patients' health information for clinical trials. Here are the three primary cases describing how EHR data can be employed for medical research:

EHR for patient recruitment
One of the biggest advantages of using EHRs for clinical trials may be their facilitation of patient recruitment and its outcome assessment. Such a method is called EHR screening for eligibility. According to a 2021 article in Trials Journal, about 50% of the study participants used EHRs to recruit patients for clinical trials (O'Brien et al. 2021). However, they pointed out that there are some difficulties in implementing this type of screening, including restricted access to EHRs across providers. Improved EHR interoperability could help improve the situation.

EHR-based RCTs
There is a separate type of clinical trial called randomised controlled trials that fully rely on the clinical data available in EHRs. Researchers carry out such trials to design new clinical guidelines or reconsider the existing ones.

In this case, EHRs are studied and conclusions are drawn based on the data stored in the EHR solutions used by participating healthcare organisations. Among other things, this data includes patient-generated health data uploaded to the EHR

for patients with complex diseases, as well as patients at risk. For such studies, interoperability is very important because it helps to track a study participant's dynamics over time.

Large clinical trials
These types of trials are broader-scale (over 5K patients) and require extensive funding and a large number of participating medical facilities. Such studies greatly affect medical research and practice, but conducting them takes a lot of effort. The lack of productive communication and siloed systems are the key factors that prolong and complicate large trials. At times, those factors also threaten the credibility and quality of the results.

HIEs can have a major impact on trials of such kind by enabling access to relevant clinical information in a couple of clicks at the state, regional, and national levels.

Conclusion
Clinical trials require access to patient data to ensure the quality and accuracy of research as well as patient benefits. EHR is the tool available at the majority of healthcare organisations. It hosts a wide scope of patient data and can serve as a data source for clinical trials. So far, only interoperability, or sufficient access to data for all interested parties and the ability to use it, stand in the way of mainstream EHR use for clinical trials. However, things are changing fast.

Both clinical and healthcare IT communities have put a lot of effort into ensuring full-scale health information sharing. In this regard, cross-state data sharing efforts via HIEs look promising. With the help of those tools, providers and their IT partners can ensure interoperability via technology harmonisation and/or data standardisation. At some point, those efforts will eventually lead to ensuring health information interoperability nationwide. This in turn can allow organising large clinical trials on the national scale to improve patients' health outcomes and quality of life.

Conflict of Interest
None. ■

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